Maria K. DiBenedetto *Editor*

Connecting Self-regulated Learning and Performance with Instruction Across High School Content Areas

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Editor
Maria K. DiBenedetto
Bishop McGuinness Catholic High School
Kernersville, NC
USA

ISBN 978-3-319-90926-4 ISBN 978-3-319-90928-8 (eBook)
https://doi.org/10.1007/978-3-319-90928-8

Library of Congress Control Number: 2018940404

Printed on acid-free paper

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Foreword

Considerable progress has been made in identifying key self-regulatory processes, such as goal setting, strategy use, and self-monitoring, and in establishing the effectiveness of these processes in enhancing diverse measures of learning and motivation. As a result of this success, teachers, coaches, and technology instructors have sought examples of implementation of self-regulatory principles in naturalistic instructional settings. This text offers a very creative way to introduce self-regulatory theory and practices into classrooms. The editor, Maria K. DiBenedetto, invited an impressive group of self-regulatory scholars to co-author a chapter with carefully chosen high school teachers. The scholars could select their preferred theoretical model of self-regulation to guide their teachers' training. These teachers formulated lesson plans that implemented self-regulatory processes and principles in their curricular area, such as social studies, English language, STEM subjects, foreign language, music, art, and physical exercise. Diversity was created in each content area by selecting varying curricular subtopics. For example, social studies involved world history, civics and economics, and U.S. history, whereas STEM subjects involved life sciences, physics and chemistry, technology and engineering, and mathematics. After the teachers carried out the lesson plans in their classes, the scholars analyzed how the teachers used self-regulated learning practices. *Connecting Self-Regulated Learning and Performance with Instruction Across High School Content Areas* offers a unique approach for introducing self-regulation research into classroom practice that is practical and highly valued by both teachers and researchers. I strongly recommend it.

New York, USA

Barry J. Zimmerman
The Graduate Center of the
City University of New York

Acknowledgements

I would like to give heartfelt thanks to each of the contributors to this book. I express sincere gratitude to the dedicated high school teachers who carefully wrote their lesson plans and narratives, a time-consuming task that added many extra hours to their busy day. I am indebted to their coauthors, the scholars who identified these teachers as outstanding in their disciplines, and who viewed their lessons through a self-regulated learning research lens. I would like to thank the wise Patrick Preudhomme for his recommendations in the book's initial proposal and Barry Zimmerman for his constant mentorship and thoughtful counsel. A warm thank you to Héfer Bembenutty, Heather Brookman, Irene Delgado, and my sisters who are always providing me with words of encouragement. I am grateful to Albert Bandura whose social cognitive theory laid the foundation for self-regulated learning theories and whose supporting commentary concludes the book. I am especially thankful to Dale Schunk for his never-ending expert advice, patient guidance, and shared wisdom throughout the entire process of this project, and to my daughters for their ongoing friendship and love.

Contents

Contributors

Amber Alford Walkertown High School, Walkertown, NC, USA

Janice L. Anderson The University of North Carolina at Chapel Hill, Chapel Hill, NC, USA

Roger Azevedo Department of Psychology, North Carolina State University, Raleigh, NC, USA

Albert Bandura Department of Psychology, Emeritus Faculty, Academic Council Stanford University, Stanford, CA, USA

Michael Belter Rockingham County High School, Reidsville, NC, USA

Héfer Bembenutty Queens College of the City University of New York, New York City, USA

Brock Burkett Urban Assembly Maker Academy, New York City, NY, USA

Carol Ann Cavanaugh Hopkinton School District, Hopkinton, MA, USA

Peggy P. Chen Hunter College, The City University of New York, New York City, USA

Timothy J. Cleary Rutgers, The State University of New Jersey, Piscataway, NJ, USA

Adam W. Davidson Riverside High School, Durham, NC, USA

Maria K. DiBenedetto Bishop McGuinness Catholic High School, Kernersville, NC, USA

Miranda Suzanne Fitzgerald School of Education, University of Michigan, Ann Arbor, MI, USA

Martha A. Garrett Bishop McGuinness Catholic High School, Kernersville, NC, USA

Caroline Gergel Annandale High School, Annandale, VA, USA

Georgios S. Gorozidis 2nd General Lyceum of Amaliada, Ilida, Greece

Jeffrey Alan Greene The University of North Carolina at Chapel Hill, Chapel Hill, NC, USA

Anne Katherine Griswold Anything's Possible Educational Services, Kernersville, NC, USA

Andre Hayes Alternate Learning Center, New York City, USA

Amanda Herceg McNabb Middle School, Montgomery County, KY, USA

Marie Angelica Jean-Pierre Valley Stream Christian Academy, Valley Stream, NY, USA

Wayne Journell The University of North Carolina at Greensboro, Greensboro, USA

Anastasia Kitsantas College of Education and Human Development, George Mason University, Fairfax, USA

Athanasios Kolovelonis Department of Physical Education and Sport Science, University of Thessaly, Karies, Trikala, Greece

Evdoxia Kosmidou 11th Primary School of Thessaloniki, Thessaloniki, Greece

Leslie Laud Bank Street College of Education, New York, NY, USA

Terri Lerman Marion, MA, USA

Nikki G. Lobczowksi The University of North Carolina at Chapel Hill, Chapel Hill, NC, USA

Gary E. McPherson Melbourne Conservatorium of Music, University of Melbourne, Melbourne, VIC, Australia

Kimberly Mieder Hillsborough High School, Doctoral Candidate in Music Education, University of South Florida, Tampa, FL, USA

Peter Miksza Indiana University Jacobs School of Music, Indiana University, Bloomington, IN, USA

Miriam R. Vélez Nyack College, Nyack, NY, USA

Daniel C. Moos Department of Education Mattson Hall, Gustavus Adolphus College, Saint Peter, MN, USA

Christina E. O'Malley Carroll High School, Dayton, OH, USA

Annemarie Sullivan Palincsar School of Education, University of Michigan, Ann Arbor, MI, USA

Pooja Patel United Nations International School, New York, NY, USA

Erin Peters-Burton George Mason University, Fairfax, VA, USA

Erika Ruckert South Mecklenburg High School, Charlotte, NC, USA

Teomara Rutherford Department of Teacher Education and Learning Sciences, North Carolina State University, Raleigh, NC, USA

Dale H. Schunk The University of North Carolina at Greensboro, Greensboro, USA

Dan Spencer Department of Teacher Education and Learning Sciences, North Carolina State University, Raleigh, NC, USA

Christopher A. Stewart North Lakes Academy Charter School, Forest Lake, MN, USA

Gail Swingler Transit Tech Career and Technical Education High School, New York City, NY, USA

Jennifer Watson East Forsyth High School, Kernersville, NC, USA

Marie C. White Nyack College, Nyack, NY, USA

Katherine Willet Williamsburg Middle School, Arlington, VA, USA

Kristen Winter Skyline High School, Ann Arbor, MI, USA

Part I
Introduction

Chapter 1
Self-regulation in Secondary Classrooms: Theoretical and Research Applications to Learning and Performance

Maria K. DiBenedetto

Abstract This introductory chapter introduces the purpose and distinctive features of the book. These are followed by descriptions of each chapter's structure which includes sections written by high school teachers across multiple content areas and self-regulated analyses of the lessons written by educational psychologists. Following the structural overview, self-regulated learning theoretical frameworks by Zimmerman and Schunk, Pintrich and Zusho, and Winne and Hadwin are discussed. Brief summaries of the chapters are presented followed by a conclusion with information on how this book may be used effectively.

1.1 Introduction

Academic self-regulation learning refers to self-generated feelings, thoughts, and behaviors directed toward reaching one's personal goals (Zimmerman, 1998). Research shows that students who are self-regulated exercise control over their learning, are self-efficacious, set strategies for goal attainment, monitor performance, and reflect on their outcomes. As a result, they tend to have higher achievement than students who are less self-regulated (DiBenedetto & Zimmerman, 2010).

Research on self-regulated learning has grown exponentially over the last several decades (Schunk & Greene, 2018; Zimmerman & Schunk, 2011) but there appears to be a lack of research showing its application to classrooms in meaningful ways (Anderman, 2011). Fortunately, many of us have had one or more excellent teachers who have enhanced our motivation, helped us stay on task, taught us how

M. K. DiBenedetto (✉)
Bishop McGuinness Catholic High School, 1725 NC Highway 66 S,
Kernersville 27284, NC, USA
e-mail: mkdibenedetto@gmail.com

M. K. DiBenedetto (ed.), *Connecting Self-regulated Learning and Performance with Instruction Across High School Content Areas*,
https://doi.org/10.1007/978-3-319-90928-8_1

to keep track of our progress, and modeled how to attribute outcomes to controllable factors such as strategy use and effort. These teachers have modeled self-regulated learning processes and taught students how to be self-directed and to transfer these abilities to other situations.

The processes of academic self-regulated learning provide learners with essential skills needed for life-long learning. Once students graduate from high school, they make a series of important decisions that impact their future. They are faced with career and college decisions, challenges that come from families and interpersonal relationships, health and family needs, and important philosophical questions about their own purposes in life. High school represents a period of time in which students are experiencing less structure in their academic environment, in addition to increases in coursework, homework, and responsibility (Zimmerman, 2002). It is critical at this time for educators to instill self-regulatory skills that will foster success in school and in life.

My vision for this book is to provide readers with real-life examples of self-regulation in action; thus, this edited book was developed with this vision in mind. The organization of the book is different from most edited books and therefore, I begin by providing an overview of the goals and structure of the book, followed by the theoretical principles guiding the chapters' frameworks, a brief summary highlighting each chapter, and concluding remarks on how the book may be useful to readers. The book ends with a closing commentary by Bandura who discusses the importance of applying theoretical ideas to practical situations.

1.2 Overview

A central purpose of this book is to demonstrate that self-regulation is present in the high school classroom using a case study format. Case study research attempts to obtain an "up-close or otherwise in-depth understanding of a single or small number of 'cases' set in their real-world contexts" (Yin, 2012, p. 4). Case studies involve collecting qualitative information in natural settings such as classrooms and provide opportunities to study the processes of self-regulated learning in action (Gay, Mills, & Airsian, 2009). Case studies are useful for examining the applications of theoretical principles in dynamic, live contexts. In this edited book, I am fortunate to have gathered together excellent high school teachers who teach different subjects, and who were willing to share their lessons and classroom activities. Their lessons were then examined by eminent scholars who have conducted research and written extensively about self-regulation.

A survey of the fifty states in the U.S. shows that most high schools require four years of English, three years of mathematics, three years of social studies, two or three years of science, and additional courses in foreign language, art, music,

physical and health education, and technology (Zinth, 2007); topics which are represented in the book.

There are four overarching objectives of the book:

1. to provide 29 outstanding lesson plans and narratives across various high school content areas. These lesson plans have been identified by scholars as exemplary and represent the subjects of English Language Arts, Social Studies, Natural and Physical Sciences, STEM, Mathematics, Foreign Language, Art, Music, Health and Physical Education. In addition, there are lessons on the use of technology and social media for instruction, teaching students with special needs, and on how effective teaching uses homework. These lessons may serve as models to other teachers and students in teacher education programs.
2. to explore and identify the processes of self-regulated learning. Scholars analyzed the lesson plans through a self-regulated learning theoretical framework lens and highlighted research supporting the use of the processes within the framework. Those interested in self-regulated learning will see the research to practice link in schools across varied academic subjects.
3. to inspire additional research on self-regulated learning in content areas. There is a need for further research in areas such as social studies, foreign language, art, and in technology instruction using flipped classrooms and social media sources (Schunk, 2016), and there is a gap in the literature on the explicit use of the practical applications of self-regulated learning in the high school classroom (Anderman, 2011; Paris & Paris, 2001).
4. to provide educators and students with a resource. In the field of self-regulation, this book is different because each content area is coauthored by teachers and scholars. It is my hope that the book will spark further collaborations with those conducting research on self-regulated learning and those implementing the research findings with their students.

Unique characteristics of this book. There are several characteristics of this book that distinguish it from other edited books:

- Chapters are coauthored by high school teachers who are currently using the lessons they are writing about, and scholars who describe and analyze the lessons in a method similar to those used in case study analyses. The blending of practitioners and researchers is one not found in most education books.
- Content areas include those taught in most high schools throughout the United States and each lesson plan includes the standards relevant to that content area.
- Different types of high schools are represented (public, private, religious, charter, alternative learning environments). Table 1.1 provides a summary of the lessons, types of schools, cities, and states of the schools by chapter.

Table 1.1 Summary of lessons, schools, and states represented in the subsequent chapters

Chapter	High school lessons	Type of school	Location of school	
2	ELA: Reading: Poetry—*The Meaning of Repetition in Poetry and Daily Life*	Public	Ann Arbor	Michigan
	ELA: Reading: Literature—*Between Shades of Gray Learning Analysis of Quotes*	Public	Ann Arbor	Michigan
3	ELA: Creative Writing—*Turning Fiction Books Into News Articles within Literature Circles*	Public	Charlotte	North Carolina
	ELA: Writing—*Creating a Thesis From the Analysis of Nonfiction Literature*	Public	Charlotte	North Carolina
4	Social Studies: World History—*Do the Benefits of a Sedentary Lifestyle Outweigh the Costs?*	Public	Walkertown	North Carolina
	Social Studies: Civics and Economics—*The Declaration of Independence: The Greatest Complaint Letter Ever*	Public	Kernersville	North Carolina
	Social Studies: American History—*DBQ (Document Based Question) on the Korean War*	Public	Reidsville	North Carolina
5	Life Sciences: Biology—*Natural Selection*	Public	Annandale	Virginia
	Life Sciences: Biology—*Respiration and Photosynthesis*	Public	Arlington	Virginia
6	Physical Sciences: Chemistry—*Density and Proportional Reasoning Lab*	Private: Catholic	Dayton	Ohio
	Physical Sciences: Physics—*Introduction to Constant Velocity Lab*	Private: Catholic	Dayton	Ohio
7	STEM: Technology Education/ Engineering—*Design Brief-Shopping Cart*	Public	Durham	North Carolina
	STEM: Technology Education/ Engineering—*Ruler Game*	Public	Durham	North Carolina
8	Mathematics: Algebra I—*Asynchronous Algebra Study in Functions*	Public	New York	New York
	Mathematics: Geometry—*Asynchronous Geometry Study in Polygons*	Public	New York	New York
	Mathematics: Algebra II—*How Can We Further Investigate Exponential Functions?*	Public	Brooklyn	New York
9	Foreign Language: Beginner Spanish—*Why Study and Learn to Communicate in a Language Other Than English?*	Private: Protestant	Valley Stream	New York
	Foreign Language: Spanish Language and Literature (Advanced)—*Classic to Conversational Vocabulary Building*	Private: Protestant	Valley Stream	New York

(continued)

Table 1.1 (continued)

Chapter	High school lessons	Type of school	Location of school	
10	Visual Arts: Photography—*Fictional Self-Portrait: Photography and Digital Imagery*	Private: Catholic	Kernersville	North Carolina
	Visual Arts: Art—*Free Writing and Collaborative Drawing*	Private: Catholic	Kernersville	North Carolina
11	Music: Band—*Articulation Accuracy*[a]	Public	Bloomington	Indiana
	Music: Band—*Practice Strategies for Band*	Public	Tampa	Florida
12	Health Education: *Picturing Health*	Public	Thessaloniki	Greece[b]
	Physical Education: *Learning Strength-Resistance Exercises*	Public	Amaliada	Greece[b]
13	Students with Special Needs: ELA Writing—*How Do You Make This Paragraph Into An Essay?*	Private	New York	New York
	Students with Special Needs: Social Studies—*Using the TRAP Strategy to Enhance Reading Comprehension*[a]	Public	Dighton	Massachusetts
	Students with Special Needs: Biology—*Prokaryotes and Eukaryotes: Practicing Close Reading and Writing*	Public	Uxbridge	Massachusetts
14	Technology Uses in Education: Social Studies World History—*Practical Historical Skills (Eliminating Anthropological Bias)*	Charter	Forest Lake	Minnesota
15	Homework: ELA Literacy—*The Meaning of Love*	Public	New York	New York

[a]Lesson was written for students in grades 7–10 although teacher is in middle school
[b]Instruction in this content is similar to U.S. high school content and instructional practices

1.3 Chapter Structure

To ensure uniformity among chapters, authors were asked to follow very specific guidelines. As previously indicated, each chapter is coauthored by a high school teacher or teachers, and scholar(s)—experts in self-regulated learning and/or the specific content area.

- *Teachers' section*. The chapters begin with a lesson plan, followed by supplemental material where applicable, and then by a descriptive narrative. This sequence may be repeated once or twice depending on the number of lessons in that content area. The lesson plans consist of the elements found in typical lesson plans including the relevant standards. Standards are important components of the lessons because they guide teachers' choices in planning and they communicate to the students the objectives to be learned in the lesson (White & DiBenedetto, 2018). Each narrative describes the school setting and students,

explains how the lesson is carried out from beginning to end, and addresses the standards and the challenges faced in teaching the lesson.

- *Scholars' section.* Scholars introduce their sections by briefly discussing the self-regulated learning theoretical framework they apply to analyze the lessons. They then describe how the lessons exemplify aspects of the self-regulated learning theory, introduce empirical research which has supported specific aspects of the self-regulated learning instruction, bridge the standards with the lesson and self-regulated learning, and provide recommendations for research.

1.4 Theoretical Frameworks Guiding Scholars' Analyses

The scholars' analyses incorporate principles from different theoretical frameworks. Most of the chapters employ a social cognitive perspective. In this section, I discuss social cognitive theory and the self-regulated learning perspectives most commonly applied in the chapters that follow. While I indicate research in support of the models presented below, research supporting the processes of the self-regulated learning principles discussed in the individual chapters is discussed within those subject area contexts.

1.4.1 Social Cognitive Theory

Social cognitive theory postulates a model of human causality involving three factors: personal (affect and cognition), behavioral, and environmental, which interact with one another (Bandura, 1986). This triadic model of reciprocity explains how students in a classroom are influenced by factors that may affect their behavior. Research shows the triadic model can explain students' behavior and academic outcomes (Schunk, 2016). For example, students who are instructed by the teacher (environment) to copy material from the whiteboard into their notebooks (behavior) in preparation for an upcoming exam are directing their attention towards a strategy that will likely have positive outcomes. The students who correctly copy the information from the board and set time aside to study (behavior) are likely to feel more self-efficacious (personal) to perform well on the exam than those who did not (behavior).

Self-efficacy (a personal factor) is defined as the belief in one's capability to organize and implement actions needed to learn or perform at designated levels (Bandura, 1986). Self-efficacy comes into play in classrooms when students believe they will be able to complete a math problem or write a term paper successfully or when they believe they are unable to pass a physics exam because they did not study enough. There is extensive research demonstrating the influence of self-efficacy beliefs on the goals students set, how long they persist, and the effort

exerted to reach goals (Bandura, 1986; Schunk, 2016; Schunk & DiBenedetto, 2016).

The critical element in the triadic model of reciprocity is the social aspect (Bandura, 1986). *Vicarious learning* occurs when students observe teachers or classmates perform a task. Teachers who think aloud when problem-solving how to conjugate verbs in another language, or who demonstrate how to play a beautiful piece of music on the violin, are modeling behaviors which provide information on how to perform similar tasks and to cope, strategize, and persist when confronted with challenges. *Enactive learning* occurs by the act of actually doing something and from the consequences of one's actions (Schunk, 2016). When students perform an activity, they receive feedback that is informative and motivational. Students who are working on algebraic problems at their desks often know when they are having trouble solving for *x*. They are also acutely aware of the point in the problem where they get stuck. This provides them with first-hand information about what they are doing incorrectly. Students who perform tasks successfully are likely to be motivated and understand they are succeeding. Success is likely to produce future behaviors that lead to desirable outcomes.

1.4.2 Self-regulated Learning

According to Bandura (1986) self-regulation involves three processes: self-observations, self-judgments, and self-reactions. Self-observations involve being attentive to specific aspects of one's behavior such as self-monitoring progress toward goal attainment; for example, keeping track of the number of mathematical problems solved correctly or the strategies used to assist in reading comprehension. Self-judgments involve comparing one's performance against a standard such as whether I have jogged my goal of three miles a day. Self-reactions, such as self-efficacy beliefs about one's capability to successfully perform a task, result from the inferences one makes from perceived progress towards goal attainment or performance outcomes (Zimmerman & Schunk, 2011). These three processes are cyclical and affect future performance. Social cognitive theorists emphasize the dynamic nature of self-regulated learning (Bandura, 1986; Zimmerman, 2000). As learners experience feedback from their environment or themselves they monitor performance and make adjustments to improve outcomes. The dynamic nature and importance of feedback are facets which are highlighted in the different perspectives of self-regulated learning discussed below.

Zimmerman and Schunk's models of self-regulated learning. Zimmerman and Schunk have worked together for three decades (1986–2017) and as an outgrowth of their collaboration have developed a framework of three models of self-regulated learning: the cyclical three phases of self-regulated learning, the development of self-regulatory competency, and the dimensions of self-regulated learning (Schunk & Zimmerman, 1994, 1998, 2008; Zimmerman & Schunk, 1989, 2001, 2011). The three phases of self-regulated learning are dynamic and expand upon Bandura's

classical view of self-regulation (Schunk, 2016). The *forethought phase*, takes place *before* the learning event and involves two main categories: motivational beliefs and task analysis (Zimmerman, 2002). Motivational beliefs include self-efficacy beliefs, outcome expectations, intrinsic interest, and learning goal orientation. Outcome expectations refer to the value placed on learning consequences. For example, high school biology students who feel self-efficacious about their capability to memorize the scientific names for human body parts and believe this knowledge will help them get accepted to a pre-med program in college are more motivated to be self-regulated in their learning. Intrinsic interest refers to valuing learning for the sake of learning rather than an external reward, and learning goal orientation refers to reasons for learning (Zimmerman, 2002). A student learning to play the violin may be intrinsically motivated to learn because she enjoys playing and feels good when she does so. Her goal orientation is to become the best violinist she can be and continue to improve.

Task analysis involves goal setting and strategic planning. There is considerable evidence that students who set proximal goals that are attainable are more likely to be successful in reaching these goals (Zimmerman, Schunk & DiBenedetto, 2015). Strategic planning refers to plans of action that learners take to reach their goals. For example, a biology student is having a 20-word vocabulary test at the end of the week and wants to earn 100%. He decides to study and test himself on five words each night before the exam. This strategic plan with short-term goals (studying five words each night and earning 100% on five words at a time) will likely lead to success on the 20-word exam. Research shows that students can improve their performance when their strategic plans are clearly linked with their goals (Zimmerman, Schunk, & DiBenedetto, 2017).

The *performance phase* occurs *during* the learning task and the processes fall under two main categories: self-control and self-observation. Self-control involves carrying out strategies set during the strategic planning part of the forethought phase such as attention focusing, self-instruction, mental imagery, and help-seeking. The biology student may have set strategies to focus his attention on the first five words to rehearse, and to form visual images such as linking the body parts with the vocabulary words. He might even solicit his mother's help in "testing" him. During self-observation, processes such as self-recording and metacognitive monitoring are used by the self-regulated student. Keeping track of which words he had difficulty with on his self-test and being aware of when his thoughts are wandering from studying are examples of self-recording and metacognitive monitoring.

The *self-reflection phase* takes place *after* a learning event. During this phase, learners engage in processes in self-judgment and self-reaction categories in response to feedback received while performing a task or upon completion. Self-judgment includes the processes of self-evaluation and attribution. Self-regulated students will evaluate their performance based on a self-set standard and attribute outcomes to controllable factors such as strategy use and effort (Schunk, 2016). For example, the biology student finds he is consistently getting 4/5 on each self-test and believes he should earn 100%. He attributes his

performance to rote memorization rather than understanding the word definitions and decides to change his strategy before his in-class test on Friday. These two processes are closely linked to students' reactions. Self-reactions include self-satisfaction and adaptive or defensive reactions. Self-satisfaction involves how satisfied or dissatisfied learners are with the outcomes as they reflect on their performance. Self-satisfaction depends on whether the standard, such as a goal set in the forethought phase, has been met. Adaptive or defensive reactions are the ways in which a learner responds to the outcome. Students who respond in an adaptive manner are likely to alter their self-regulatory approach in future learning cycles or in similar learning situations. Students who are defensive are less likely to be motivated in similar situations and are likely to engage in self-handicapping behavior (such as procrastination, apathy, task avoidance) in future iterations of the cycle (Schunk, 2016; Zimmerman, 2002). The three phases are cyclical in nature in that the self-reflection phase feeds back to the forethought phase and affects future learning events.

Zimmerman and Schunk's (Schunk, 1999; Schunk & Zimmerman, 1997; Zimmerman, 2000, 2002) second model describes how students develop into self-regulated learners using four levels: observation, emulation, self-control, and self-regulation. Unlike developmental stage theories, the social cognitive perspective suggests that these levels are influenced initially from external sources which become internalized as learners develop competency (Schunk & Zimmerman, 1997). In addition, the levels are fluid in that learners may move back to previous levels if more help is needed from teachers and peers (Bembenutty, White, & DiBenedetto, 2016).

At the *observational level*, learners focus attention on a model such as the teacher or peer; therefore, they learn by watching (Bandura, 1986; Schunk & Zimmerman, 1997). Students become motivated, receive vicarious reinforcement, and learn to discriminate qualitative differences such as strategy use, coping and motoric skills, persistence, and effort in the model's behavior.

At the *emulation level* learners practice what they observed. They receive feedback from their own performance and others, and direct and social reinforcement as they work to duplicate what they observed from their model. This guidance can sustain motivation and improve students' accuracy in making sure their work corresponds with the model's work. The primary difference between these first two levels is that during the observation level, students learn from instruction and observation whereas in the emulation level, students learn from enacting or practicing what they observed under the close supervision of the model (Schunk & Mullen, 2013). During both levels learning has not been internalized yet, but students are beginning to feel self-efficacious as they demonstrate to themselves and others that they can replicate the skills and strategies performed by the model.

During the *self-control level* learners pattern their work after the model's and what they practiced during the emulation level on tasks that are similar to the original task. Students receive self-reinforcement as they demonstrate competency and automatization and use self-instruction to retrieve and apply strategies (Meichenbaum & Beimiller, 1990). In addition, during this level students who

focus their energy on techniques rather than outcomes tend to be more successful in achieving automaticity, the capability to produce work without much conscious awareness (Zimmerman & Kitsantas, 1997). While task conditions are structured, students' self-efficacy beliefs tend to become strengthened as they demonstrate competency in having learned how to complete tasks without close supervision of the model as during the emulation level.

At the final level, *self-regulation*, students complete tasks independently and make adaptations as needed. Learners make changes without much thought as they shift their attention from techniques to outcomes (Schunk, 2016; Zimmerman, 2002). They are able to transfer the skills and strategies learned to other similar, but different tasks and are able to handle changing situations. The source of self-efficacy has become internalized (i.e. under the learner's self-regulatory control) as learners feel competent in their ability to self-regulate their performance at successful levels on other tasks (Schunk & Zimmerman, 1997). Empirical evidence conducted by Zimmerman and colleagues on the development of self-regulatory competency has supported this multilevel view (Bembenutty, Cleary, & Kitsantas, 2013; Zimmerman, 2002; Zimmerman, & Schunk, 2011).

The third model of self-regulated learning describes the conditions for learning and how self-regulated students will optimize these conditions for success and are referred to as the psychological dimensions of self-regulated learning (Schunk & Usher, 2013; Zimmerman, 1994). The dimensions are associated with key scientific questions to understand the behavior of the self-directed student. Table 1.2 presents an adapted version of the psychological dimensions and the application of the three phase processes used by adolescents in learning. The first question asks *Why*? and addresses the psychological dimension of the *motive* for learning. High school students are typically concerned with access to placement into honors and advanced courses, admission into colleges, employment, participation in extra-curricular activities, and in making decisions about potential future career opportunities. Academic performance and achievement play a pivotal role and motivate many students to achieve academic success. Adolescents engage in the forethought processes of motivational beliefs and in strategic planning in planning for the future.

The second question asks *How?* and addresses the psychological dimension of *method*. Students are planning how to reach their goals and as they learn, engage in the processes found in the self-control and self-observation categories of the performance phase. The third question asks *When?* and addresses the psychological dimension of *time.* Self-regulated students anticipate how long tasks take to complete and plan for them. While engaging in activities, they self-record and monitor themselves, making adjustments as they manage the time needed. The fourth question of *What?* addresses the *behavior* learners engage in during the learning task and includes task strategies, monitoring, and metacognition as students focus on acquisition of learning. The self-regulated student will also self-reflect during the learning process as this offers an opportunity to make adjustments as needed to ensure progress towards goal attainment.

Table 1.2 Dimensions and three phases of self-regulated learning for adolescents

Scientific question	Psychological dimension	Self-regulatory attributes	Application of the three phases	Examples of application of the self-regulated learning dimensions to adolescents
Why?	Motive	Self-motivated	Forethought processes of goal setting, self-efficacy, intrinsic interest, goal orientation, and outcome expectations as students think, plan, and anticipate the future.	I want to be admitted to honors and advanced placement courses for several reasons: I will learn more about the subjects; it will look good on my transcript; it will help me get into a top tier college.
How?	Method	Planned or automatized	Forethought processes such as strategic planning. Performance processes in both self-control and self-observation as students engage in learning.	I plan to take the math practice tests in preparation for the honor's class screening exam. As I practice, I notice there are certain types of math problems I keep struggling with.
When?	Time	Awareness of time conditions	Forethought process of strategic planning is critical as adolescents often miscalculate the amount of time tasks take for adequate completion. Performance processes of self-recording and metacognition of the time spent; as students record and monitor progress they make time adjustments as needed.	I need to work on my time management. I want to play sports after school, but taking these practice tests is very time consuming. I am going to create a time log and record how I spend my time after school; maybe I waste time on distractions such as texting or playing games on my phone. As I look over my log, I see that I am spending more time than I thought hanging out with my friends after a baseball game.
What?	Behavior	Awareness of performance and approximation towards goals	Performance processes of task strategies, monitoring, and metacognition as students focus acquisition of learning. Self-reflection processes as self-regulated students evaluate their performance against the standard, measure their	Since I adjusted my time, my practice test grades have improved. I am sure if I cut out some of the additional distractions, they will improve further because then I can work through the challenging math problems more slowly to earn a higher score.

(continued)

Table 1.2 (continued)

Scientific question	Psychological dimension	Self-regulatory attributes	Application of the three phases	Examples of application of the self-regulated learning dimensions to adolescents
			satisfaction as they work on the tasks, and make attributions that may alter current behavior to advance goal attainment.	
Where?	Physical environment	Awareness of the environment conducive to learning	Forethought processes of strategic planning as students decide where to engage in academic work. Performance processes as students monitor distractions, environmental structure, and availability of resources. Self-reflection phase processes as students reflect during learning on elements of the environment such as space, sounds, temperature, resources, etc. and make adaptations as needed.	I planned to take my practice tests in my room but my little brother keeps interrupting me and my friends keep texting me. I am going to go to the local library directly after baseball rather going straight home, and I will leave my phone in the car.
With whom?	Social	Awareness of others who can help or hinder learning	Forethought processes of strategic planning as students decide to study with others or alone, eliminate social distractions, or seek help as needed. Performance processes as students monitor interference by social distractions, and strategize how to use the availability of resources. Self-reflection phase processes as students reflect during learning whether help is needed, or if others are helping or hindering learning.	My mom helped me a lot while I was studying my science vocabulary words, but for math, I really need to concentrate and work out the problems alone. One advantage of going to the library is that there are books there I can refer to if I need more help. I can also ask my math teacher before school if I am really stuck.

The fifth question asks *Where?* and examines the psychological dimension of *physical environment*. The self-regulated learner uses processes from each of the three phases by planning where to do coursework, monitoring the conditions where the work is taking place, and making adaptations as needed. The final question asks *With whom?* and addresses the *social* psychological dimension. Self-regulated learners are aware of others and whether they can help or hinder learning. They also take advantage of available models, teachers, knowledgeable peers, and resources which can provide assistance.

While each of these three models are often described separately in the literature, they actually operate together in students who are self-regulated as they manage and regulate themselves to promote learning.

Pintrich and Zusho's model of self-regulated learning. Pintrich and Zusho's model involves four phases of self-regulated that are similar to Zimmerman and Schunk's three phase model (Pintrich, 2000; Pintrich & Zusho, 2007). *Forethought, planning and activation* comprise phase one, *monitoring* is phase two, *control* is phase three, and *reaction and reflection* is phase four. The phases are dynamic and fluid and students may skip phases or return to phases as they work toward their goals. As learners progress through the task, they receive feedback that they use to make adjustments to strategies, monitoring, and control (Pintrich, 2000). Pintrich and Zusho's model addresses both cognition and affect as learners regulate their thoughts and feelings while engaged in a task in the learning environment.

During the first phase, self-regulated students think about the goals they want to accomplish and activate prior and metacognitive knowledge to assist with planning. They use efficacy judgments, goal orientations, perceptions of task difficulty, task value, and interest as motivational variables. The second and third phases occur while working on the task and include metacognitive awareness and monitoring of cognition and affect, awareness and monitoring of time, effort, need for help, and context, in addition to selecting and adapting cognitive and affective learning strategies, deciding on the amount of effort to employ, and changing the task or context. In the fourth phase, learners react and reflect. They form cognitive judgments and attributions for their performance which feeds back to the first phase and influences whether they change their behavior, task, or context; persist, give up, or seek help if needed.

The environment plays a critical role in Pintrich and Zusho's model of self-regulated learning. They suggest that self-regulated students are constantly trying to *control, monitor,* and *regulate* the learning context by attempting to change it, using various strategies that may lead to success, or adapting to it (Pintrich, 2000). In the classroom, students' perceptions about classroom norms, culture, practices such as grading, and tasks are important information for controlling, monitoring, and regulating. For example, adolescent students typically notice when a teacher who is usually cheerful and enthusiastic appears annoyed and frustrated (monitoring—aware of the sudden change in classroom climate) and they typically respond by becoming unusually quiet and attentive (controlling—avoiding getting the teacher angrier, and regulating—adapting their behavior to meet her mood). Self-regulated teachers will also modify their behavior to help students learn

(Garcia & Pintrich, 1994). For example, if teachers are monitoring the students and see that they are not feeling confident (self-efficacious) about their capability to learn a challenging task, they gain control of the instruction by modifying it and using various motivational strategies such as coping models, collaborative learning groups, mastery learning (grading based on individual performance), and tasks that are within the students' range and capabilities (Garcia & Pintrich, 1994; Schunk, 1991).

Winne and Hadwin's model of self-regulated learning. Winne and Hadwin's information processing model involves four phases: task definition, goal setting and planning, enactment, and adaptation that operate in relation to facets of the task (Winne, 2001; Winne & Hadwin, 1998). *Task definition* involves a perception of the task and what is involved in completing the task. Once the student has an idea of what is involved to work on the task the student *sets goals* and *plans* how to accomplish these goals. In the third phase, the learner *engages* in the plans set in phase two. In the fourth phase, the learner reacts to what was done in the first three phases and makes *adaptations* before engaging in a similar future task.

These phases are carried out using five elements: conditions, operations, products, evaluations, and standards. The *conditions* include environmental factors and cognitive information that is available. The self-regulated student must also use different *operations* depending on the task demands. For example, in order to be able to play an online video mathematics game, the player must know how to use the computer, how to download and open the game, and how to follow the rules of the game. The learner then creates internal *products*, ways to bring to long term memory information that has been stored in working memory, or to generate new information schemas based on transferring information from similar contexts to the current one. The learner then forms *evaluations* or attributions based on the results and the *standards* previously set. Like the previous two models described above, the Winne and Hadwin model of self-regulated learning is dynamic and recursive in that during a learning event, a self-regulated student will monitor, be metacognitively aware of learning, and make adaptations as needed in response to ongoing feedback.

1.4.3 Self-regulated Learning Across Content Areas in High School Classrooms

The following descriptions briefly highlight each chapter's content area, high school, lesson plans, and self-regulatory perspective chosen by the scholars.

Chapters 2 and 3 target four lessons in English Language Arts. In Chap. 2, high school teacher Winter from public school Skyline High School in Ann Arbor, Michigan presents two *reading* lesson plans and narratives, one on *poetry* and the second on *literature*. Palincsar and Fitzgerald analyze the lessons using Pintrich and Zusho's model of self-regulated learning. In discussing Winter's lessons they

highlight students' characteristics such as language use, motivational processes (e.g., students' values, goals, affect) and behavior, features of the classroom environment such as the type of tasks and methods of instruction, and self-regulatory processes (e.g., modeling that helps students internalize the self-regulated learning processes). Palincsar and Fitzgerald describe how the lessons are well-aligned with the standards and link to self-regulated learning. They conclude by providing recommendations for further research.

Chapter 3 presents two *writing* lesson plans and narratives, one on *creative writing* and one on *writing a thesis statement*. High school teacher Ruckert is from South Mecklenburg High School, a public school in North Carolina. Griswold's analysis begins with a discussion of how writing has taken a more prominent role in education and in the standards. Her analysis of the lessons uses Zimmerman and Schunk's three phases of self-regulated learning model. She highlights important self-regulatory processes used in the lessons, weaves the link between self-regulated learning and the standards, and concludes with recommendations for future instruction and research.

Chapter 4 focuses on *social studies* and covers lessons and narratives from three different teachers in public high schools in North Carolina. Alford's *world history* lesson takes place in Walkerton High School in Walkertown. The *civics and economics* lesson is taught by Watson, from East Forsyth High School in Kernersville; and the *American history* lesson is by Belter from Rockingham County High School in Reidsville. Schunk and Journell analyze the lessons using Zimmerman and Schunk's three phase model of self-regulated learning and the model of development of self-regulatory competency. They highlight specific processes of modeling, goal setting, self-motivation, self-instruction, self-evaluation, and discuss the application of the standards in the lessons throughout their analysis. They conclude with recommendations for future research on social studies and self-regulated learning.

Chapters 5–8 are organized under the *STEM* (science, technology, engineering, mathematics) heading. Chapter 5's lesson plans and narratives are focused on lab activities in the *life sciences (biology)* and take place in two public high schools in Virginia. The first lesson is on *natural selection* and is taught by Gergel in Annandale High School in Annandale. Willet's lesson is on *photosynthesis and respiration* and takes place in Williamsburg High School in Arlington. Cleary and Peters-Burton's analysis uses Zimmerman and Schunk's three phase model of self-regulated learning as they highlight exemplary and unique features of each lesson, and conclude with specific recommendations for how similar lessons can be enhanced to optimize learning.

Chapter 6's lesson plans and narratives target the *physical sciences* and include two lab lessons on *chemistry* and *physics*. O'Malley teaches both, chemistry and physics, and is from the Catholic high school: Carroll High School in Dayton, Ohio. Greene, Anderson, and Lobczowksi's analysis begins with a discussion of standards, followed by a description of how the lessons deepen student learning by using scientific inquiry using Zimmerman and Schunk's three phase model of self-regulated learning. They emphasize how learning becomes internalized as

students work to regulate their motivation, cognition, affect, metacognition, and behavior. They highlight research in support of their analysis and conclude with recommendations for further research and by acknowledging the challenges and dedication of high school science teachers.

Chapter 7 focuses on STEM instruction in the classroom. Both lesson plans and narratives focus on *technology education and engineering* and are written by Davidson from Riverside High School, a public school in Durham, North Carolina. Rutherford, Spencer, & Azevedo analyze the chapter using Pintrich's model of self-regulated learning. They discuss the importance of the classroom environment to promote self-regulated skills (self-efficacy, task value, affect), the teacher's use of portfolios for assessment and evaluations as a catalyst for self-regulated learning, and the role of modeling and scaffolding to promote self-regulation among students. The scholars describe how the teacher integrates standards to promote self-regulated learning among students and conclude with recommendations for future research focused on emotional regulation and on self-regulated learning practices in the STEM classroom, especially in engineering.

Chapter 8 consists of three lesson plans and narratives on *mathematics* instruction. Burkett is from Urban Assembly Maker Academy, a public school in New York City. Burkett wrote two lessons and narrations, the first one on *algebra I* uses a flipped classroom design (for more information on flipped classrooms see Chap. 14 of this book), the second on *geometry*. The third lesson by Swingler, is on *honors algebra II*. Swingler teaches at the public high school Transit Tech Career and Technical Education High School in Brooklyn, New York. Chen's analysis begins with an important discussion around how national assessments show the need for math improvement among American students. Her analysis uses Zimmerman and Schunk's three phases of self-regulated learning to highlight key processes in each of the lessons. The chapter concludes with educational implications and a description of the need for additional research on self-regulated learning and the high school mathematics classroom.

Chapter 9 focuses on studying a foreign language, *Spanish*, and includes two lesson plans, one a beginner level on *why study and learn to communicate in a language other than English?*, and the second one an advanced level on *conversational vocabulary building*. Jean-Pierre teaches at Valley Stream Christian Academy K-12, in Valley Stream, New York. White and Vélez begin their analysis by using a social cognitive framework to describe the teacher as an agent of change, motivational, and intentional as she creates a climate in which there is reciprocity among the environmental, behavioral, and cognitive conditions of learning. They continue to analyze the lessons using Zimmerman and Schunk's three phases of self-regulated learning and describe the importance of standards and the role of mentoring and modeling in instruction. White and Vélez conclude with implications for educational practice and the importance of future research on ways to enhance learning a second language in high school.

Chapters 10 and 11 are under the heading of the *Arts*. Chapter 10 targets teaching the *visual arts* and includes two lesson plans and narratives: *photography* and *collaborative drawing*, by art teacher Garrett from Bishop McGuinness

Catholic High School in Kernersville, North Carolina. DiBenedetto's analysis involves discussion of the research on the nature of creativity and introduces Rhodes's theory of creativity that is then mapped against Bandura's social cognitive theory to explain the processes students engage in during the creative process. DiBenedetto uses Zimmerman and Schunk's models of the three phases of self-regulated learning and the dimensions to highlight how students effectively learn how to create artwork in the visual arts classroom. Discussion of the standards is infused through the analysis and the importance of future research on our understanding the role of creativity in problem-solving skills is emphasized.

Chapter 11 focuses on *music* instruction and includes two lesson plans and narratives on band instruction, the first on *articulation accuracy*, the second on *band strategies*. The first lesson is by Herceg who teaches in the public school: Tri-North Middle School in Bloomington, Indiana. While she is teaching in the middle school, her lesson was written for students in grades 7–10. The second lesson is by Mieder from Hillsborough High School in Tampa, Florida. Miksza and McPherson analyze the lessons using Zimmerman and Schunk's models of the three phases of self-regulated learning as well as the development of self-regulated competency. They describe the nature of high school band instruction in the United States and emphasize the ways in which both lessons presented are examples of "best practices" in music instruction. They conclude by providing recommendations for further research that include both individual, small, and large group learning environments.

Chapter 12 focused on *Health and Physical Education* and consists of two lesson plans and narratives, one on *health education*, the other on *physical education*. Kosmidou teachers in 10th High School of Thessaloniki in Thessaloniki, Greece; and Gorozidis teaches in 2nd Lyceum High School in Amaliada, Greece. While both teachers are employed in public high schools in Greece, the content and instructional practices are very similar to what is used in the United States. Kitsantas and Kolovelonis analyze the lessons using Zimmerman and Schunk's models of the three phases of self-regulated learning and the development of self-regulatory competency. They highlight key processes such as modeling, self-efficacy, goal setting, self-monitoring, and self-reflection and infuse in their analysis the important role of standards. The scholars conclude describing the value of self-reflection processes for educators and students, and make recommendations for future research on how self-regulated learning instruction may benefit students in the early and middle grades.

While each of the teachers in the content areas described above discusses how they address students with special needs, it is important to present lessons from teachers who work *primarily* with students with special needs to demonstrate how self-regulated across multiple high school content areas can optimize learning. Chapter 13 contains three impressive lesson plans and narratives, the first lesson is an *ELA lesson on writing* taught by Patel at the private school, the United Nations International School in New York City. The second lesson, is on *reading comprehension of social studies informational text* by teacher Lerman from Dighton Middle School in Dighton, Massachusetts. While she is teaching in the middle

school, her lesson was written for students in grades 9–12. The third lesson is on *biology: reading and writing* and the lesson plan and narrative were written by Cavanaugh (assistant superintendent) and took place at Uxbridge High School, in Uxbridge, Massachusetts. Scholars Laud and Patel examine the lessons using the Self-Regulated Strategy Development model whose roots are in self-regulated learning. In particular, they elaborate on the processes of modeling, self-instruction, self-monitoring, and goal setting. They discuss the role of the standards and conclude with recommendations for future research that include more descriptive examples of practical applications of self-regulated learning in the classroom.

Chapter 14 addresses technology uses in high school instruction and focuses in particular on the use of a *flipped classroom design and social media* to teach a *social studies: world history* lesson. Stewart, a teacher at North Lakes Academy Charter School in Forest Lake, Minnesota wrote the lesson plan and narrative. Moos's analysis begins with a discussion of the role of technology in instruction and links it to self-regulated learning and history content. Moos uses the Winne and Hadwin's four-phase information processing model of self-regulated learning to highlight the principles and constructs to teach world history in a nontraditional format and to describe the importance of pacing and collaborative learning to enhance instructional effectiveness. He concludes by discussing the need for research on teaching history using technology within the self-regulated learning framework.

Chapter 15 focuses on the role of *homework* on a *literacy* lesson by Hayes from the Alternative Learning Center in New York City. Bembenutty's analysis uses Zimmerman and Schunk's three phases of self-regulated learning model to describe how the teacher uses these processes to teach his students and to successfully promote self-regulation of homework. He emphasizes the importance of monitoring and self-recording logs, the roles of autonomy, self-efficacy, and academic delay of gratification to promote homework completion. Bembenutty discusses the standards in his analysis and concludes by emphasizing the power of self-regulatory processes to enhance teachers' pedagogical practices and students' understanding of homework as a means of optimizing educational outcomes.

1.5 Conclusion

Research on self-regulation provides key insights into what high achieving students do to succeed. This book makes it clear that self-regulation principles and processes are taught in secondary classrooms by teachers in conjunction with content learning. The chapters are easy to read and provide lively examples of classroom discourse. They are rich in description and give readers insight into the effective interactions that take place between teacher, while instructing, and students, while learning. A distinctive feature of this book is the coauthorship between secondary teachers and researchers in the field of self-regulated learning.

The scholarship findings of the educational psychologists in these case studies are substantiated by research and demonstrate that self-regulated learning processes are alive and thriving across several academic domains. This book can serve as a resource for educators and hopefully, spur efforts to encourage more attention on self-regulation for content areas in high school classrooms. I am encouraged by the extent of the self-regulated learning applications and feel confident that researchers and teachers will work together more often in the future to advance self-regulated learning research to help students become better self-regulated learners and masters of their own learning. In sum it is my hope that the book will have appeal to

- Secondary high school teachers seeking exemplary lessons they can implement (or elements of lessons they can transfer to other content area disciplines)
- Educational psychologists interested in research and applications of self-regulated learning to secondary classrooms
- Pre/in-service teachers, graduate students, and their educators seeking information on self-regulated learning processes in action
- Educators teaching courses on high school instructional design, educational psychology, student learning, and self-regulated learning across multiple academic disciplines

High school is a tumultuous period in most people's lives (Yeager, Lee, & Dahl, 2017). The teachers in this book show readers how self-regulated learning skills can arm learners with the skills needed to be flexible and adaptable so that learning is not only optimized, but with them for life.

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Part II
English Language Arts: Reading and Writing (Four Lessons)

Chapter 2
Applying Principles and Constructs of Self-regulated Learning to Teaching in the English Language Arts

Annemarie Sullivan Palincsar, Miranda Suzanne Fitzgerald and Kristen Winter

Abstract Using two rich English Language Arts lessons; one specific to poetry and the other specific to literature, we apply the lens of self-regulation (SR) to identify the application of principles and constructs derived from the SR literature to teacher planning. Specifically, we examine lessons for evidence of the ways in which the teacher invited students to set personal goals and then supported them toward the attainment of those goals. We apply a model of self-regulation derived from Pintrich and Zusho (2007) and consider how the lessons provide the opportunity for students to: acquire disciplinary-specific tools for self-regulation, engage in other-to-self regulation, experience learning as meaningful, make emotional connections, and attain English Language Arts standards.

Table 2.1 The meaning of repetition in poetry and daily life lesson plan

Teacher: Kristen Winter, BA Concordia University, Post-Baccalaureate Secondary Education Eastern Michigan University, Certified 6–12 State of Michigan English, Speech and Psychology	**Grade Level(s)**: 10
School: Skyline High School	**Subject**: English 10
City and State: Ann Arbor, MI	
Instructional Plan Title: The Meaning of Repetition in Poetry and Daily Life	

(continued)

A. S. Palincsar (✉) · M. S. Fitzgerald
School of Education, University of Michigan, Ann Arbor, MI, USA
e-mail: annemari@umich.edu

M. S. Fitzgerald
e-mail: mfitzge@umich.edu

K. Winter
Skyline High School, Ann Arbor, MI, USA
e-mail: winterk@aaps.k12.mi.us

M. K. DiBenedetto (ed.), *Connecting Self-regulated Learning and Performance with Instruction Across High School Content Areas*,
https://doi.org/10.1007/978-3-319-90928-8_2

Table 2.1 (continued)

Common Core State Standards: ELA1.ELA10.IFT.4 Determine the meaning of words and phrases as they are used in a text including figurative connotative and technical meanings; analyze the cumulative impact of specific word choices on meaning and tone ELA1.ELA10.IFT.6 Determine an author's point of view or purpose in a text and analyze how an author uses rhetoric to advance that point of view or purpose		
Learning Objectives: 1. Students will differentiate various types of repetition used in poetry and how the use impacts meaning within text 2. Students will categorize examples of lyrics that demonstrate use of repetition to convey meaning		
Instructional and Learning Materials Needed: • Internet availability and technology use • Dictionaries if technology is not available • Video (see example here https://www.youtube.com/watch?v=YshUDa10JYY) • Computer and screen to display video • Notecards for each student • Grading rubric for class activity and poetry slam (see Tables 2.2 and 2.3 at the end of the lesson plan)		
Lesson Duration: 72 min		
Teaching and Learning		
Min on this Activity	**Targeted Activity**	**Purpose of Activity**
7	**Orienting Students to Lesson**: • Instruct students to identify a song that reaches them emotionally • Each student writes title of song on dry erase board, creating a "graffiti wall" • Allow a few students to share the song they identified and explain why the message of the song is meaningful to them	• Help students make connections between themselves and the messages in songs to set the stage for the lesson and sparks student interest • Create a transition to the importance of message and repetition
10	**Motivation**: • Ask students to note one topic, thought, or idea that resonates with them • Students view example video clip on the lives of teens "Somewhere in America" (https://www.youtube.com/watch?v=YshUDa10JYY) • After viewing the clip, ask students about the subjects that meant something to them	• Students connect with the lesson when they see other students their age empowered to use their voices to passionately convey messages • Through viewing the video clip, students begin to understand that their voices in poetry have meaning. This initiates students' into using their own voices for further learning and to eventually participate in a poetry slam (see lesson narrative for description of poetry slam)

(continued)

Table 2.1 (continued)

30	**Whole Class Instruction**: • Place students in groups of 3–4 • Give each group 4 words to explore: anadiplosis, epimone, epiphora, diacope • Ask each student in the group to pick a word and convene with students exploring the same word • Students respond to think-pair-share group questions including: *How can I put this term in my own words? How can I connect it to real life with an example? How can I share the meaning with my peers and help them learn?* (In a think-pair-share, students briefly ***think*** about their responses to the questions individually, ***pair*** up to share their thinking with a partner, and then ***share*** out with the class • Within their expert groups, students decide how they will teach their peers about their selected word (approximately 15 min). • Students return to original groups to share their expertise about their selected word	• Working with their peers allows students to interpret information, come to agreement on the meaning of new terms, determine how to communicate new knowledge with their peers, and relate the terms to real-world examples
15	**Guided Practice/Providing Feedback**: • Students work with their original group of 3–4 to look back at the graffiti board and find a song that uses one of the forms of repetition • Students identify and explain the form of repetition in their own words, and sing or say the repetition from the song • Pose the following questions to guide students' analysis: *How did repetition impact the messages? Did you notice an escalation in emotion? How would you describe their conviction in their messages? What real life events and subjects did they touch that impact your lives? Does their message make an impact? Would it be the same without repetition?*	• Reinforce applicable knowledge of the terms learned and their daily use and interactions with messages in poetry and other forms of literature • Identify and share explicit examples, check for student understanding, and reteach as needed
5	**Independent Practice**: • Give each student a notecard to act as an entrance ticket for the next class. Students identify a song with repetition, identify and explain the type of repetition, and list sample lyrics using the following guiding questions: *How did repetition impact the messages? Did you notice an escalation in emotion? How would you describe their*	• Demonstrate individual understanding of repetition used for communication in their daily lives • Allows teacher to share illustrative examples and identify areas that need to be reinforced

(continued)

Table 2.1 (continued)

	conviction in their messages? What real life events and subjects did they touch that impact your lives? Does their message make an impact? Would it be the same without repetition?	
	Evaluation of Learning and Assessments: • Students' notecards and interactions in the lesson will be evaluated for the proficiency with which they can identify and explain the impact of word choices on meaning and tone, explain the purpose of a particular piece of writing, and convey the use of rhetoric to explain how the author creates purpose and point of view. This will serve as a formative assessment for the lesson. See rubric in Table 2.2 at the end of the lesson plan • The culminating poetry slam project will serve as a summative assessment. See rubric for poetry slam project in Table 2.3 at the end of the lesson plan. **Students who do not demonstrate understanding on formative and summative assessments will have the opportunity to participate in individual workshops tailored to their learning needs*	• Allow the teacher to identify areas for reinforcement and to reinforce these ideas in the following class sessions • Provide individual feedback in order to prepare students for the mastery/summative assessment (poetry slam)
5	**Closing Activities**: • Ask students each of the following questions, allowing about a minute of think-time, then allow a volunteer to share their answer and record for everyone to see: *What is one thing you learned today? What is one thing you found interesting? What is one question you still have?* • To close, describe how this lesson will culminate in a poetry slam that students will be creating over the next week, and the role of repetition in the project • Ask students to think of at least one thing they are passionate about, and would be interested in communicating to others	• Reinforce the learning objectives for the lesson, and describe the purpose of learning those objectives for a larger project in which students share their personal views using academic techniques

(continued)

Table 2.1 (continued)

Specific Strategies used to Address Exceptional Students and/or Students for whom English is a Second Language: • During the culminating project, a day is set aside for workshops in specific areas where a student may feel additional knowledge is necessary (e.g., a workshop for repetition) • Students may use a translator, the teacher notes from the class website, adapted equipment, and/or a word processor • Small groups with student/peer learning, the opportunity for one-on-one learning when needed, and both oral and written answers; individual and group checks for understanding, repetition of instructions and use of the classroom audio system helps ensure students understand the lesson process • Assign students to mixed ability groups, making sure that exceptional students and students learning English as a second language are assigned to groups that will maximize opportunities for participation and learning • Give exceptional students specific roles to help facilitate group projects; draw on the strengths of ESL students to give them lead roles in groups as well • Help exceptional and ESL students leverage prior knowledge and connections from their experiences. For example, introduce a song from a student's first language and share the meaning • Pre-teach key vocabulary prior to the activity, if needed • Providing differentiated instruction allows exceptional students and students for whom English is a second language to receive additional instructional support that meets each student's unique learning needs (e.g., one-on-one workshops to extend and reinforce learning, pre-teaching vocabulary, use of a translator, etc.), to be intentionally placed in groups that maximize participation and learning (e.g., mixed ability groups, assigning lead roles and/or roles that draw on students' strengths), to support students to make connections to prior knowledge and experiences that drive new learning (e.g., allowing students to identify song lyrics in their first language)

Table 2.2 Formative assessment rubric

Beginning!	On My Way!	Got it!
I am beginning to understand how to identify the impact of word choices	I can identify the impact of word choices on meaning and tone	I can identify and explain the impact of word choices on meaning and tone
I am beginning to identify the purpose of a particular piece of writing	I can identify the purpose of a particular piece of writing, and convey the use of rhetoric	I can explain the purpose of a particular piece of writing, and convey the use of rhetoric to explain how the author creates purpose and point of view in that writing
I would work on:		
*Best used as student evaluation with turned-in notecard, then formative assessment by instructor		

Table 2.3 Poetry slam rubric

Needs some work 0–6 points	Pretty good 7–8 points	Awesome 9–10 points
The societal, personal or message about honor is not clear with little rhetoric that creates purpose and point of view in the poetry	The societal, personal or message about honor is mostly clear with some rhetoric that creates purpose and point of view in the poetry	The societal, personal or message about honor is clear with rhetoric that creates purpose and point of view in the poetry
Word choices in the poetry does not impact meaning and tone	Word choices in the poetry mostly impacts meaning and tone	Word choices in the poetry impacts meaning and tone
Poetry is not rehearsed and is recited with reliance on notecards	Poetry is somewhat rehearsed and recited with little reliance on notecards	Poetry is rehearsed and recited without reliance on notecards
Pauses, pitch, volume, enthusiasm and diction needs improvement to raise the impact of the words and message in the poem	Pauses, pitch, volume, enthusiasm and diction mostly raises the impact of the words and message in the poem	Pauses, pitch, volume, enthusiasm and diction raises the impact of the words and message in the poem
The tone of the poem is not illustrated through the words and performance	The tone of the poem is mostly illustrated through the words and performance	The tone of the poem is clearly illustrated through the words and performance
The presentation of the poem is under 30 s	The presentation of the poem is under a minute	The presentation of the poem is 1–3 min
The posture and eye contact during the poem is not relevant to the message	The posture and eye contact during the poem is mostly relevant to the message	The posture and eye contact during the poem is relevant to the message

2.1 Narrative of the Meaning of Repetition in Poetry and Daily Life Lesson

Skyline High School is a public school located in Ann Arbor, Michigan. Ann Arbor is an urban community located in Washtenaw County. The region is supported by several technology and research-based businesses, and the University of Michigan. The school has approximately 1500 students enrolled with 40% minority students and 20% economically disadvantaged. Skyline offers a magnet program where students are able to centralize their interests and gain knowledge specific to their career interests. The school also offers a variety of advanced placement courses with 50% of the student population enrolled in the courses.

For this lesson, the classroom average is 32 students, with an average of 53% of the population being Caucasian, 29% African American, 14% Asian, 2% Hispanic, and 2% other. Of the 32 students, an average classroom has two students with Individualized Education Programs (IEP), one with a 504 plan, and two that are English Language Learning (ELL) students.

I arrange the classroom in a way that promotes student interactions by arranging the desks in groups of four. Arranging the desks in groups accommodates individual

and group strengths within the class. The group setting works well with this lesson, as well as with other activities within the class. I post class objectives, daily agendas, and homework in the same place in the classroom every day, as well as on the class website. Along with this information, I provide students with a daily directive of "what to do when you walk in." This directive prompts the class to start working right away and limits unused educational time. I create a classroom environment for students where classroom movement is encouraged and interaction is a norm.

In my class, the theme of voice in English is carried throughout several mastery assignments and corresponding scaffolding within the trimester. The concept of self and voice is related to real world application that can be used outside the classroom. For example, the prior unit uses self-voice by challenging students to think about a cause or implementation that they are passionate about. Students use that passion to construct letters to write for advocacy and change within their community and choose from a range of topics closely related to their world, and topics that are overarching in the larger community. Some examples of this range include writing the school board about implementing a policy of limited amounts of homework, to writing the state to pass laws against medically unnecessary animal testing. The point is students must be passionate about the topic, and use their voices to extend the messages through ethos, pathos and logos–the three keys to making change and creating an audience malleable to your message.

The lesson begins as students enter the classroom with directions posted near the door. I direct students to use the class whiteboard and dry erase markers to create a graffiti wall of songs. I instruct students to think of a song that really reaches them emotionally, and with a message that means something to them. Students should be able to explain why the song reaches them. After they have created the graffiti wall, I pick a couple of songs and ask students why the song they listed is meaningful. Then, I explain that many songs are forms of poetry, and that today they will start the journey of learning to use their passions, voices, and words to share their thoughts, connect with others, and perhaps initiate change.

Integrating music, a part of the daily lives of students, provides the motivation for students to explore knowledge they have obtained and applicability to their worlds. The universal human desire to connect with others through voice and experience provides an outlet for students beyond the academic realm and within their own worlds. Modeling of peers and music icons using repetition and their voices to convey passion works as a motivator for students that might otherwise not explore that side of their voice. Perhaps, even if the student is not a vocal learner, they can internalize and look for the repetition in daily messages—if not their own music choices.

To motivate students, I show them a video clip of poetry with voice, preferably from someone in their age group. Poetry with voice is poetry in which the speaker delivers a message, giving voice to their art while conveying meaning beyond the words—evoking emotion and setting tone. Before showing the clip, I ask students to note one topic, thought, or idea that resonates with them. After the clip, I ask students to share the topics/thoughts that meant something to them. I select one

sample clip that I show the class, *Changing the World, One Word at a Time!*, because of the age of the performers and the inclusion of relevant societal issues students are faced with on a daily basis. The clip exemplifies how students can use tone, repetition, and word choices to convey a message that reaches an audience emotionally as the three performers address societal issues that impact their own lives through performance poetry (see example clip: https://www.youtube.com/watch?v=YshUDa10JYY).

I organize the lesson as a jigsaw for self-exploratory learning reinforced by peer input. I arrange students into groups of four and give them four words to explore: anadiplosis, epimone, epiphora, and diacope. Each student in the group will pick a word and then convene with students of the same word in a different corner of the room. Using various resources such as laptops, dictionaries, or smart phones, I encourage students to explore a series of questions about their selected word. I propose the following questions to the expert groups: *How can I put this term in my own words? How can I connect it to real life with an example? How can I share the meaning with my peers and help them learn?* Within each expert group, students think-pair-share answers to the questions and determine learning/teaching techniques they will use to teach the word to their peers. During this time, I circulate between groups to help with strategies and observe processes. I also project a timer for pacing, which helps students progress proficiently. I allow 15 min for expert learning of their word and encourage students to take notes to use when teaching the word to their home groups. Adaptations can include the use of a translator, notes on the class website, and helpful links. Common challenges students face include learning the meaning of the word, synthesis, and making the word a part of their usable vocabulary. Encouraging students to practice pronunciation of the words and encouraging them to use the words in a sentence within their learning groups can support students to confront these challenges.

Students return to their home groups after 15 min of learning with their expert groups. Each expert will then share what they learned about their specific word with their home groups and discuss understanding. During this time, I encourage students to take notes and remind them of the guiding questions to teach their peers the word they mastered.

Once all students have shared their expertise with their home groups, I give them the next portion of their challenge. At this point in the lesson, students need to look back at the graffiti board they created at the beginning of the hour. I instruct each group to identify a song on the graffiti board that uses one of the forms of repetition they just learned with their groups. I instruct students to select a song, be able to explain the form of repetition used in their own words, and sing or say the repetition of the song (demonstrate it). They can also use another song they are familiar with that is school appropriate. After allowing a few minutes for each group to select a song and form of repetition, I ask students to share out what they found. During this time, I circulate throughout the room and help struggling groups with suggestions. While students share out, I encourage them to use examples to reinforce learning and make checks for understanding. I always share out too (for example, I use the song “Every Breath You Take” by The Police to illustrate Anaphora), and support

students to identify the types of repetition in the examples shared, as repeating this strengthens learning. I then pose the following questions to be answered: *How did repetition impact the message? Did you notice an escalation in emotion? How would you describe the song writer's conviction in their message? What real life events and subjects did they touch that impact their lives? Does their message make an impact? Would it be the same without repetition?*

To end the lesson, I stand at the front board and am ready to write student/group responses to the analysis questions. I ask each question, giving them a minute to think about their answer. I record student responses on the board. Sample questions are: *What is one thing you learned today? What is one thing you found interesting? What is one question you still have?* I then explain how this lesson is part of a poetry slam that students will be creating the next week, and repetition is part of the project. I ask students to make a goal for starting the process of their own poetry communication and to think of at least one thing they are passionate about, and would be interested in communicating their message to others.

Through engaging students in identifying and analyzing examples of repetition and its impact on meaning and tone in song lyrics and poetry, this lesson addresses two Common Core State Standards focused on craft and structure. Through analyzing specific lyrics in groups and independently, I support students to identify and explain the impact of word choices on meaning and tone (ELA10.IFT.4), to identify the author's message, and to and evaluate the author's use of rhetoric to explain how the author creates purpose and point-of-view (ELA10.IFT.6) in song lyrics and poetry (Table 2.1).

For specific task mastery, a formative assessment will be assigned for outside of class. Grading will be non-mastery level, credit for completion—while feedback will be given on notecards. Each student will be given a notecard to act as an entrance ticket for the next class. The notecard will need to be returned with one song that includes one type of repetition. Each student will write the name of the song selected, the type of repetition identified, and the lyrics with the repetition will need to be recorded on the notecard. Here, students individually respond to the same questions posed during the group activity. This formative assessment is evaluated per the rubric (see Table 2.2). The most meaningful way to do this is to have students do a self-evaluation, after which, I complete the evaluation and give feedback. Based on the results of the formative assessment, I may change future lessons to provide additional support in areas where a particular need is identified (Table 2.3).

Student mastery of the skills and content in this lesson will be demonstrated within a culminating project—a poetry slam—that includes at least one of the forms of repetition. After working through the unit to build an understanding of voice, rhetoric, and speech delivery techniques, students create and perform an authentic piece of poetry driven by a societal or personal drive to express change, emotion, or honor. Unlike traditional poetry slams, each student is encouraged through positive peer feedback and positive peer suggestions—as instructed prior to the event of sharing. No students are eliminated as in traditional slams. Students turn in a written copy of their poetry to accompany their presentation.

In this lesson and throughout the course, annotation is taught for each part of written analysis. To annotate, students write their thoughts about the repetition they identify in the margins of a document. Students are encouraged to annotate for examples of repetition and types of repetition, as well as for how the repetition impacts the tone and message. The next unit of study focuses on the analysis of message and how an author makes their voice clear through word choices. Tying structural elements together with the written and aural contexts makes the messages from writers apparent in the structure of the text, and repetition can be a key to theme in all written material. Identifying the repetition literally and figuratively becomes a focus in the next unit about voice and the message.

Table 2.4 Between shades of gray learning analysis of quotes lesson plan

Teacher: Kristen Winter, BA Concordia University, Post-Baccalaureate Secondary Education Eastern Michigan University, Certified 6–12 State of Michigan English, Speech and Psychology	**Grade Level(s)**: 10
School: Skyline High School	**Subject**: English 10a
City and State: Ann Arbor, Michigan	
Instructional Plan Title: Between Shades of Gray Learning Analysis of Quotes	
Common Core State Standards: ELA1.ELA10.SL.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one in groups and teacher-led) with diverse partners on grades 10 topics texts and issues building on others, ideas and expressing their own clearly and persuasively ELA1.ELA10.LIT.4 Determine the meaning of words and phrases as they are used in the text including figurative and connotative meanings; analyze the cumulative impact of specific word choices on meaning and tone	
Learning Objectives: 1. Students interpret pertinent literary quotes from selected material 2. Students select information from daily life, their community and universally to support their understanding of literary quotes and connect reading outside of fiction	
Instructional and Learning Materials Needed: • Quote sheet, which consists of a collection of quotes taken from the following website (Goodreads, Between Shades of Gray Quotes): https://goo.gl/2KdfoP • Student activity sheet (see Table 2.5 at the end of the lesson plan and link). • Student access to the Internet • Between Shades of Gray (Sepetys 2011) • White boards and dry erase markers for student groups • Grading rubric (see Table 2.6 at the end of the lesson plan)	
Lesson Duration: 72 min	
Teaching and Learning	

Min on this Activity	**Targeted Activity**	**Purpose of Activity**
5	**Orienting Students to Lesson**: • Students sit in groups of 3–4 at a table	• Students begin to connect the meaning of the reading and quote they selected to themselves

(continued)

Table 2.4 (continued)

	• Upon taken their seats, students are directed to look through the basket of quotes from Between Shades of Gray by Ruta Sepetys (2011) on their table and to select two quotes that are personally meaningful (see https://goo.gl/2KdfoP) • Students may share a quote with a peer at their table if both students find the quote meaningful	• This lays the foundation for the lesson and begins preparing students for essay analysis writing
10	**Motivation**: • Student volunteers share out the quote they chose and explain why it was meaningful to them • Teacher points out similarities and differences in their selections and how the quotes apply to the storyline and characters in the novel • Teacher explains that the learning objective is to analyze quotes from the novel and explain how the quotes can deliver a universal message or evoke personal meaning	• This ties the reading to students as individuals and applies the words in the quotes to current topics • Students recognize that the meaning of the novel and quotes can be interpreted by each student as an individual, tied to the characters and the plot, and applied to global topics
10	**Whole Class Instruction**: • Using a quote selected prior to the lesson, teacher projects and models how to complete the quote analysis table (see Table 2.5). To model, teacher writes quote, describes why it is personally meaningful, and then conducts online research to relate the quote to the community, then globally (research is conducted in order to make connections to issues in students' local community and global issues and may be conducted online through various news sites or using newspapers/magazines when Internet access is not available) • Leave this example projected as students begin the guided practice activity • Adaptations can be made by shortening to one quote, checking for understanding of directions, repeating verbal directions and providing written directions	• Teacher demonstrates how students can connect to the quote they selected personally, and how they can make other connections to the quote as well • This provides a model for students of how to approach analysis of their quote, and emphasizes that there are no wrong answers, just the connections students make to the quote and larger text
10	**Guided Practice/Providing Feedback**: • Take sample quotes and student connections. The teacher suggests ways to connect the quotes to the community and globally, and also suggests ways to research connections to the community and globally • Using a white board and dry erase markers, each group of 3–4 students section the whiteboard into columns labeled "connects to me," "connects to the community," and "connects to the world"	• This provides an opportunity for students to practice analyzing a quote as a group and work together to make connections • This also allows the teacher to clarify student understanding and give feedback

(continued)

Table 2.4 (continued)

	• Each group selects one quote to analyze as a group and share with the class. During this time, teacher circulates, asks questions, and provides feedback and suggestions	
30	**Independent Practice**: • Students complete the quote activity sheet (see Table 2.5) individually, typing directly into a digital copy or using paper and pencil) and submit their work for feedback, which is aligned to the rubric (see Table 2.6). Feedback focuses on preparing students for rhetorical writing. The goal is for students to move beyond providing only their thoughts and ideas about the identified quotes, and begin providing examples and explanations that clearly tie the quotes to their community and the world	• The independent practice allows for students to show areas of mastery and needs for relearning. Students are given individual feedback, which prepares them for deeper analysis of text and the application to their own lives
	Evaluation of Learning and Assessments: • Students will be formatively assessed on their responses on the activity sheet. Additional class sessions provide time for focusing on areas where students need re-teaching. Feedback is written on the rubric (Table 2.6), and when needed verbal, such as in a one-on-one workshop, where I work directly with the student to diagnose difficulties and support the student to understand and be successful with the task/content at hand (e.g., through providing additional graphic organizers, prompting and guiding their research, etc.). Workshops can be student or teacher-led, depending on the comfort level of the student • Students will demonstrate mastery in the culminating project for the novel (see lesson narrative)	• This is a building lesson to grow the skill of analyzing meaning within text and drawing the story to life applications. Thus, it is a learning opportunity whereas mastery will be demonstrated in a culminating novel evaluation
7	**Closing Activities**: • End the lesson by dividing the class into thirds. • Have 1/3 pair and share similarities they found to a character from their quote. Have another 1/3 pair and share similarities they found from the quote/book to their community. Have the last 1/3 pair and share similarities from the quote/book to the world. Have a few from each third section share out with the class • Remind students, as they continue exploring the book, to make connections to their own lives as well as the larger communities	• The closing reminds students of the purpose of reading beyond being told a story—deriving meaningful connections to themselves and to others

(continued)

Table 2.4 (continued)

Specific Strategies used to Address Exceptional Students and/or Students for whom English is a Second Language: • Students may use a translator, the teacher's notes that are available on the class website, adapted equipment, and/or a word processor • The lesson includes small groups with student/peer learning, the opportunity for one-on-one learning when needed, and both oral and written answers • Individual and group checks for understanding, repetition of instructions and use of the classroom audio system helps ensure students understand the lesson process • Accommodations (e.g., translator, access to notes, word processor, etc.) provide for mastery learning for exceptional students by providing multiple ways to participate in and access activities and information • Multiple participation structures (small groups, independent, one-on-one) give exceptional students and students for whom English is a second language the chance to bring their strengths to a small-group setting, as well as to benefit from strengths, skills, and knowledge that their peers bring to group work before applying new skills and learning independently

Table 2.5 Quotes activity table

Name: _____ Quotes Activity Directions: After looking through the 4 quotes you selected, narrow down your quotes to the 2 quotes that speak to you the most. You may do research and use the Internet to find connections if needed			
Write the quotes you chose.	Write why/how you connect to the quotes	How do the quotes relate to your community?	How do the quotes relate to the world today?
Quote #1			
Quote #2			

Table 2.6 Formative assessment rubric

Beginning!	On My Way!	Got it!
I can somewhat interpret quotes, but I am working on explaining their meaning and how they connect to me	I can interpret quotes and somewhat explain their meaning and how they connect to me	I can interpret quotes and explain their meaning and how they connect to me
I can select quotes that have meaning to me, but I am working on analyzing their meaning to make connections to my community and the world and am working on examples and explanations	I can select quotes that have meaning and can somewhat analyze their meaning to make connections to my community and the world with one example or explanation	I can select quotes that have meaning to me and can analyze their meaning to make connections to my community and the world with examples and explanations
I would work on:		
*Best used as student evaluation with turned-in notecard, then formative assessment by instructor		

2.2 Narrative of Between Shades of Gray Learning Analysis of Quotes Lesson[1]

Prior to this unit, students learned about voice in biographies they completed about each other. Within this project, students conducted interviews after compiling a focused list of questions and fine-tuning their interview skills to go beyond the scope of the question. They interviewed their subjects and at least two people who are close to the subjects. During this process they selected direct and indirect quotes that were used in their final projects. Students were able to choose many different formats to display what they learned about their subject, and the final projects had to include at least four quotes. The quotes were then displayed within the classroom. Reference to voice was given about how each quote relates to the person being spoken about and the quotes are easily referred to during this lesson to provide the message of meaning in voice and words—especially when talking about relating to the message with self and beyond.

As this lesson begins, I direct students to have a seat and look through a set of quotes from the novel the class is reading, *Between Shades of Gray* by Ruta Sepetys (2011), placed at each table grouping (groups of four are preferable). Prior to students entering the room, I cut the quotes (see https://goo.gl/2KdfoP) into strips to separate them. Once seated, I instruct students to select two quotes they find meaningful in some way. Students may share a quote if they both connect with it.

Next, I ask for volunteers to share out a quote they selected and to explain why the quote was meaningful to them. I facilitate this discussion by pointing out similarities and differences within students' selections, and how the quote applies to the storyline and characters. Before transitioning to the next activity, I explain that the learning objective is to analyze quotes within our reading and explain how those quotes can send a universal message and/or evoke personal meaning.

After introducing the learning objectives, I project or draw a table (Table 2.5) with the following categories: *Write the quotes you chose; Write why/how you connect to the quotes; How do the quotes relate to your community?; How do the quotes relate to the world today?* To model how to complete this table, I select a quote from the pile that is meaningful to me and use the projected table to talk through my thought process, then answer the prompts and questions within the table. For example, I write the quote I selected, fill in why it means something to me, and show the research process I would use to relate my quote to the community and then globally. After modeling this process, I leave my example displayed for students to refer back to as they complete the same activity. I adapt this activity as needed by shortening the process to one quote, making frequent checks for understanding of directions, as well as repeating verbal and providing written directions.

[1]See the previous narrative for a description of school and class characteristics.

For guided practice, I take some sample quotes and student connections and suggest ways to connect the quotes to the community and globally. During this process, I also suggest techniques students may use to research their quote and the meaningful ties it has outside of the novel and classroom, such as using the Internet to conduct searches on various news sites or using newspapers or magazines to identify current events within their communities and the world that connect to their selected quotes. Next, I give each group a whiteboard and dry erase markers and have them section the whiteboard in columns labeled "connects to me," "connects to the community," and "connects to the world." I then instruct students to choose a quote to work with as a group and then share out the group's results. I circulate around the classroom as students compose their tables and ask questions while giving suggestions to struggling groups. After completing the group practice, students engage in independent practice using a student handout (Table 2.5). The students individually complete and submit this handout for feedback according to the categories included in the rubric (Table 2.6).

The lesson ends by dividing the class into thirds. In my class students are prearranged by learning preferences and levels, so I divide the class by tables. I have each grouping pair and share in varying discussion areas. The first third shares connections they found to a character from their quote. The second third shares connections they found from a quote that relates to their community. The last grouping pairs and shares connections from a quote that relates to the world. Finally, I ask a few students from each section to share out their quote and the comparison they made, then remind students, as they continue exploring the book, to make connections to their own lives as well as to the larger community. Challenges a teacher may face in teaching this lesson include access to technology and other resources for students to research connections to current community and global events or issues, supporting students to interact productively within groups, and supporting students through the challenges of engaging in self-directed research in order to make community and global connections.

This lesson addresses two Common Core State Standards by engaging students in independent and small-group analysis of quotations from the novel. Throughout the lesson, students evaluate the quotes and the impact of the author's word choices on meaning and tone, making connections to the characters in the novel to which the quotes relate (ELA10.LIT.4). In addition to interpreting the literal meaning of the quotes, students are guided to interpret figurative and connotative meanings as they make connections to real life. Finally, students are grouped to collaborate, express ideas, and eventually make a claim that is substantiated by real-world evidence (ELA10.SL.1).

Assessment for the lesson will be formative based on the feedback from the handout students complete independently. I write feedback for the formative assessment in annotations, which include thoughts I have about students' writing, as well as questions to prompt students to include further examples and explanations. If needed, I provide additional verbal feedback in one-on-one workshops and additional class sessions to allow for focusing on areas in need of re-teaching. Finally, mastery assessment will occur in the culminating project for the novel. For

the culminating project, I give students the choice of writing a rhetorical essay based on the book or writing their own historical fiction piece, which draws on real-world connections of today. I invite authors to visit and speak to the class prior to beginning the project. Both options tie well to the standards, but allow students to choose between narrative and analytic writing based on their interests.

Students with exceptional learning needs or those learning English as a second language may use a translator, the teacher's notes posted on the class website, adapted equipment, and/or a word processor. The lesson includes small groups with student/peer learning, the opportunity for one-on-one learning when needed, and both oral and written answers. Individual and group checks for understanding, repetition of instructions and use of classroom audio systems helps students understand the content and engage in the learning processes.

As a whole, this lesson is designed to encourage students to make meaning of their reading and apply the meaning to themselves and others. The activity ties the reading to students as individuals, while comparing the words to current events. Modeling this activity demonstrates the freedom of thought exploration students can have while interacting in an educational environment, and their daily lives. The freedom is that there are no wrong answers, just students connecting themselves to words with meaning and connecting to others. When concluding the lesson, the purpose of reading beyond being told a story is expressed. Students are encouraged to connect the meaning of the words to themselves and to others.

Coinciding with the reading of this novel, students work on their own versions of historical fiction, which they submit to a local writing contest. They are encouraged to pick a historical era of their interest, and create a dynamic character within their chosen era. Students are able to research the era of their choosing and give voice to a character managing conflict within the era. Adding quotes to give meaning to the dialogue is imperative to the structural writing within the genre. Students are able to use the quotations to make parallels between the world of the character, and the world within a designated historical timeframe.

2.3 Exploring Self-regulated Learning in English Language Arts Instruction

2.3.1 Introduction

In their introduction to the *Handbook of Self-regulation*, co-editors Boekarts, Pintrich, and Zeidner (2000) conjectured that progress in the study of self-regulation would depend upon the field's ability and inclination to clearly define the construct theoretically and to empirically distinguish self-regulation from other constructs. We see the current project, represented in this volume, as an important effort toward this goal. In her invitation, DiBenedetto asked that the authors "connect the principles and constructs of self-regulated learning" to the

lesson plans of teachers. Teachers' plans are a valuable lens with which to explore teaching practice and instructional opportunities (see Peterson, Marx, & Clark, 1978; Yinger, 1980); they provide interesting grist with which the research community can consider the question of what is included and what is excluded when defining a construct; in addition, teachers' plans, designed to support the complex work of enacting instruction, put "flesh" on otherwise ambiguous—perhaps nebulous—constructs.

The teacher with whom we collaborated, Ms. Kristen Winter, is an experienced English teacher, who was selected from a competitive field of teachers to work in a public school serving a diverse student body. We examined Ms. Winter's lessons for evidence of the ways in which she *invited students to set personal goals and then supported them toward the attainment of those goals*. This broad stance toward self-regulation, reflected in the scholarship of, for example, Boekaerts (2011), Pintrich (2000), and Zimmerman (2002) seemed fitting with respect to the nature of teachers' work. What became clear in the process of this investigation is that we needed to draw upon multiple frameworks to characterize Ms. Winter's perspective on *planning for the purposes of teaching*. Even a quick skim of Ms. Winter's plans reminds the reader that classrooms are complex contexts and that teachers are constantly striving to meet multiple goals—some of which are in tension with one another—including: the management of large groups, supporting students to feel connected to school and the curriculum, planning instruction that can accommodate the diverse range of academic skills and interests that students bring to the classroom, meeting the standards to which she and her students will be held accountable, and doing justice to the discipline of English as she acculturates her students to acquire and adapt the tools and discourse of her field. So, while we foreground the lens of self-regulation, we hope to illustrate how self-regulation is necessarily at the nexus of multiple constructs when used to describe classroom instruction. This response is consistent with Boekaerts' (2002) call for researchers to broaden how "the dynamics of learning contexts" (p. 589) are conceptualized in explorations of self-regulated learning so they researchers take into account the "whole person in context" (p. 591).

2.4 A Critique of Generic Strategy Instruction as the Means to Self-regulation

The model of self-regulation that guided our analysis is derived from Pintrich and Zusho (2007). (See DiBenedetto, 2018/this volume, for additional information regarding Pintrich and Zusho's framework.) We selected this model because it is a comprehensive model of self-regulation that takes into account: (a) student characteristics (e.g., ethnicity, language use), (b) features of the classroom context (such as the nature of the academic tasks, methods of teaching), (c) motivational processes (e.g., values and goals, affect and emotions), (d) self-regulatory processes

(i.e., ways of regulating cognition and behavior) and (e) outcomes (described in terms of choice, effort, persistence, and achievement). This model argues that personal characteristics and classroom contexts influence motivational processes and self-regulatory processes, which influence one another; all leading to the outcomes. In this multidirectional model, the outcomes are assumed to influence the personal characteristics, classroom context, and motivational and self-regulatory processes (see Pintrich & Zusho, 2007, p. 753 for a helpful graphic depicting this model).

Since we are analyzing the poetry and literature teaching plans for one teacher who brings a common orientation to curriculum and instruction across topics, we will discuss her two plans in an integrated manner. We begin by attending to Ms. Winter's learning objectives. In the poetry lesson, the goal focuses on differentiating types of repetition used in poetry and how these repetitions convey meaning; in the literature lesson, the goals include making meaning with text and applying the meanings constructed to the students' own lives. Historically, when evaluating learning goals with a self-regulation lens, one would look for evidence that the teacher is focused on strategies that support students' actions toward the attainment of goals; this has been characterized as a learning-to-learn approach. Pintrich (1999) proposed that there were three categories of strategies that students should have access to: (1) *cognitive learning strategies* that help students to attend to, select, elaborate, and organize information to promote deep learning; (2) *metacognitive and regulation strategies* which reflect the intention to plan, monitor, and regulate cognitive strategies, and (3) *resource management* strategies to reach goals.

Explicit strategy teaching, typically associated with teaching for self-regulation, does not play a role in these lessons and we think this is no accident. While strategy instruction was initially embraced in the field of literacy (Wilkinson & Son, 2011), there have been a number of concerns raised about strategy instruction. When strategies were first introduced to the reading community, they were characterized in terms of the ways in which they would facilitate success with reading. For example, Brown (1985) generated a set of strategies that she hypothesized would facilitate success with reading; these included: (a) clarifying the purposes of reading, (b) understanding both the explicit and implicit task demands, (c) identifying the important aspects of a message, (d) focusing attention on the major content rather than trivia, (e) monitoring ongoing activities to determine whether comprehension is occurring, and (f) engaging in self-questioning to determine if goals are being achieved, and taking corrective action when failures in comprehension are detected. Over time, educators lost sight of the fact that strategy instruction was to be embedded in purposeful use and that those purposes should relate explicitly to what we know about how comprehension occurs. As a consequence, strategy instruction became decontextualized from both constructing meaning from text and knowledge building (Palincsar & Schutz, 2011). Studies have discerned that teachers too often resort to mechanistic use of strategies

(Garcia, Taylor, Pearson, Stahl, & Bauer, 2007), or fail to teach flexible use of the strategies (King, 1999).

Concomitantly, English Language Arts scholars (see, for example, Rainey & Moje, 2012) noticed that students became facile at "becoming strategic" with reading (for example, using context clues to identify and define words) but without being able to critically read texts, respond to text, or, in fact, experience pleasure in reading. Most importantly, reading strategy instruction often has not translated to enhanced academic literacy skills that supported knowledge building, for example, with history or science texts. In Ms. Winter's instruction, we see evidence of the ways in which Ms. Winter promotes the tenets of self-regulation, not through the explicit teaching of strategies, but rather by providing her students tools that they can deploy resourcefully toward the goal of becoming self-directed and independent in their learning; these tools are reflective of the demands of the discipline, which is the topic to which we turn next.

2.5 Teaching Disciplinary-Specific Tools for Self-regulation

In contrast to teaching strategies for self-regulation, Ms. Winter's lessons foreground the teaching of *disciplinary-specific tools* for interpreting and responding to text. In the poetry lesson, she foregrounds an element of author's craft when she engages students in analyzing how authors use various forms of repetition (i.e., anadiplosis, epimone, epiphora, and diacope) to convey meaning; furthermore, she engages students in analyzing this element across genres of text (i.e., poetry and song). In the literature lesson, she engages students in the close reading of text by having them analyze quotes and consider how these quotations communicate universal themes. These skills are valued in the English language arts and are considered "insider knowledge" (Rainey & Moje, 2012). In this respect, we find it noteworthy that Ms. Winter talks about "initiating" the students for eventual participation in a poetry slam. *Initiating* is an interesting choice of words that resonates with the acculturation to which we alluded earlier. In the case of the poetry lesson, these students are being supported to appropriate the particular practices associated with a poetry slam. The mission of Poetry Slam Incorporated (PSI) is to "promote the performance and creation of poetry while cultivating literary activities and spoken word events in order to build audience participation, stimulate creativity, awaken minds, foster education, inspire mentoring, encourage artistic statement and engage communities worldwide in the revelry of language" (http://poetryslam.com/). In the case of the literature lesson, Ms. Winter is preparing the students to engage in essay analysis writing.

Having long-term goals that can engage students in purpose-driven activity is consistent with teaching for self-regulation (Shaw & Kruglanski, 2000). Ms. Winter

is attentive to this dimension of instruction; her students are not striving to commit definitions to memory, although getting clarity regarding each of the tools is integral to the lesson; instead, they are being supported to experience the role of these tools in attaining long-term goals, all of which are associated with meaning making. This feature of Ms. Winter's lessons resonates with the role of outcomes (in the Pintrich and Zusho model) in influencing motivational and self-regulatory processes; engaging students in activity that is designed to support meaning making and taking a horizon view of instruction (that is, being thoughtful about how the immediate instructional goals will support valued activity over time) is hypothesized to influence the goal setting and activity of students.

2.6 Teaching with an Other-to-Self Orientation

Ms. Winter's approach to instruction is quite consistent with an orientation derived from the literature on teaching for self-regulation; namely, she approaches instruction with an *other-to-self orientation*. Through an artful combination of teacher modeling and peer collaboration (both of which we describe below), she sets the stage for the learners to experience, in a socially supported context, the means by which they will be able to independently engage in self-regulation; the role of social interaction in promoting the internalization of self-regulating processes has long been recognized in the literature (see Palincsar & Brown, 1989; Schunk, 1999).

This orientation is particularly characteristic of the literature lesson in which Ms. Winter: (1) provides a model of the process of selecting a quote, and (2) identifies how: she connected to the quote, related the quote to the classroom community, and related the quote to the world today. The model is accompanied by a think-aloud in which Ms. Winter shares her decision making about how she selected a quote that was meaningful to her and how she made connections to that quote. Ms. Winter then keeps this model visible for the students as they undertake the same task. This instructional move is an instance of using a "worked example," one of the best known and most well-studied methods of reducing cognitive load to facilitate learning of challenging content (see Sweller, 2015).

With respect to guided practice, in the literature lesson, the students are collaborating to complete an application task, which Ms. Winters describes as "metacognitive," in the sense that the students are now investigating their song choices for evidence of the literary devices that they have been learning about. She further scaffolds this activity by proposing a set of questions to guide the students' thinking; these questions directly reinforce her instructional goals in the sense that they engage the students in an analysis of the role of the literary devices in engendering particular feelings or responses to the songs/poetry. It is also noteworthy that, in each lesson, group practice is followed by some form of individual

accountability; in one case, through the completion of a handout, and, in the other case, by submitting an entry card as the students come to class the day following the lesson.

Further evidence of other-to-self regulation is Ms. Winter's prominent use of group activity; students who are more likely to share zones of proximal development (Vygotsky, 1978), are positioned to support one another in both lessons. In both lessons, she proposes that the students spend the preponderance of their time working in groups of three to four students. Jarvenoja, Jarvela, and Malmberg (2015) note that while, historically, research on self-regulated learning focused on the individual learner in attempts to explain strengths and weaknesses of that learner that could explain differences in academic attainment, the increased presence and use of interactive and collaborative learning, supported in some cases by highly interactive technologies, call for a new perspective on the study of self-regulation; that is, a *situated* perspective (see also Greeno, 2006). Consistent with a situated perspective, we see ways in which Ms. Winter's plans make salient the role that social, contextual, and cultural aspects of the classroom play in influencing learning in powerful ways. According to her literature lesson plans, the class, divided into thirds, reports, by pairs, how they have connected the quotations they have selected to characters in the novel, to their community, and to the world. As Ms. Winter describes in her narrative, her goal here is "thought exploration," and the opportunity to make personal connections and connections to the community, and, indeed, the world. In the instructional portion of the poetry lesson, Ms. Winter uses Aronson's (1978) Jigsaw approach in which the students become "expert" with respect to one of the literary terms and then share their expertise with other members of the class. The teacher describes this as "self-exploratory learning."

2.7 Making Learning Meaningful in Teaching for Self-regulation

In the closing activity, the teacher engages the students in goal setting, an important dimension of self-regulation. Boekaerts (2011) points to the importance of goal setting and attending to students' personal goals in for the purpose of attaching value to academic tasks. In addition, goal setting is featured prominently in the Pintrich and Zusho model; it is assumed to play a prominent role in the motivational processes that, in turn, influence self-regulatory processes.

Across her lessons, personal meaningfulness is salient. In the case of the literature lesson, the students are asked to select from a set of quotes that are meaningful to them; in the case of the poetry lesson, the students are asked to select a song that reaches them "emotionally" and—again—"means something to them." In this lesson, Ms. Winter uses songs, which are more likely to be in the students' cultural repertoires, to bridge to poetry. Furthermore, she uses poetry slams, which are—

again—likely to be in the cultural repertoires of the students, as the genre she is supporting the students to participate in. Finally, in the poetry lesson, the teacher extends the classroom community to include youth who have a presence on the Internet through YouTube clips.

While this feature of her lessons is consistent with Pintrich and Zusho's (2007) model to the extent that Ms. Winter's choice of instructional goals and activity reveals how she attends to the personal characteristics of the students (i.e., young teens from diverse ethnic and cultural groups), this aspect of her plans also suggests interesting connections between the literature on self-regulation and related literatures that are important in contemporary educational conversations. For example, her plans call to mind the exhortation that educators strive to create *third spaces* (see Gutiérrez, 2008); in which students can bring the cultural capital they have derived from their home and community lives to academic—school—learning goals. We also see these as instances of engaging in culturally sustaining pedagogy (Paris, 2012), which serves to encourage "linguistic, literate, and cultural pluralism as part of the democratic project of schooling" (Paris, 2012, p. 93). Finally, her choices are also consistent with calls suggested for teachers to engage youth through popular culture, drawing upon their own social contexts (Wang, 2009).

2.8 Promoting Emotional Connection as a Means of Promoting Self-regulation

As we read Ms. Winter's lessons, with her frequent focus on feelings and her expectation that students will connect "emotionally" with the content she is teaching, we were reminded of the emergence of neuroscience in highlighting the role of feelings, emotion, and affect in education. Immordino-Yang and Damasio (2007) argue that recent advances in neuroscience provide neurobiological evidence that "the aspects of cognition that we recruit most heavily in school, namely learning, attention, memory, decision making, and social functioning, are both profoundly affected by and subsumed within the processes of emotion; we call these aspects *emotional thought*" (p. 3). Historically, emotional thought has not been represented in models of self-regulation, which have, instead, been more likely to focus on behaviors (e.g., help-seeking), metacognitive strategies and problem-solving skills that can be recruited to manage academic and social demands. But, we see ways in which these literatures could productively inform one another. Furthermore, we see interesting connections between calls to attend to the regulation of motivation in engagement and achievement (Wolters, 2003) and emotional thought. Research in neuroscience suggests that emotion plays a critical role in supporting individuals to bring prior knowledge to bear in informing real-world decision making and, in fact, may play an essential role in helping learners discern when and how to apply what is learned in school contexts to our

everyday lives (Immordino-Yang & Damasio, 2007). Ms. Winter's emphasis on emotional connection in her lessons may, in fact, influence the likelihood that her students will persist in efforts to construct meaning with literature and poetry throughout their lives in both school and out-of-school contexts.

2.9 Addressing the Standards and Self-regulation

It is clear that Ms. Winter drew upon the CCSS for ELA to develop student learning goals and to guide her instruction. Ms. Winter frames the poetry lesson around two standards related to craft and structure—one focused on determining how an author's word choices impact meaning (ELA10.RI.4) and the other focused on analyzing an author's purpose and use of rhetoric to achieve that purpose (ELA10.RI.6). The literature lesson is designed around standards related to collaboration and comprehension (ELA10.SL.1) as well as craft and structure (ELA10.LIT.4). Evidence of how the teacher integrates the standards into her instruction can be found throughout the lesson plans and teacher narratives: (1) in the learning goals set and communicated to students, (2) in the participation structures Ms. Winter organizes, (3) in the design of learning activities and assessments, and (4) in the rubrics which prompt students to reflect and self-assess as well provide a space for Ms. Winter to give focused feedback on how students are progressing toward the learning goals and standards. As described previously, in Ms. Winter's instruction, we see evidence of the ways in which Ms. Winter promotes the tenets of self-regulation by providing her students supports (e.g., use of modeling and peer collaboration prior to engaging in independent practice) and tools that they can use resourcefully toward becoming self-directed and independent in their learning. In carefully crafted lessons, such as those described, these supports and discipline-specific tools for interpreting and responding to text also assist students in achieving the goals outlined in the CCSS for ELA.

2.10 Conclusion

Our analysis of Ms. Winter's lesson plans supports—and elaborates upon—the dynamics proposed in Pintrich and Zusho's (2007) model. Ms. Winter's instructional decision making illustrates how she considers the personal characteristics of her students; that said, in contrast to the typical personal characteristics that are often identified in this "box" (i.e., age, gender), we expand those characteristics to include students' interests and cultural capital. The intentionality with which Ms. Winter designs the participation structures that she employs in her teaching reminds us that it is possible to design instruction such that knowledge emerges from the

structures of the activity, rather than from the heads of individuals (Greeno & Engestrom, 2014). In this sense, Ms. Winter forces us to "open up" the features of classroom context. What is being self-regulated in this context is the application of powerful tools for interpreting and generating poems and literary text; that is, the self-regulatory processes are domain specific. Ms. Winter encourages both the internal (self-reflection) that is associated with monitoring performance, but she also encourages external reflection, through collaborative thinking. To understand the "outcomes" of these lessons is to understand the role that state and district standards are playing, as well as Ms. Winter commitment to supporting connections among students, between the students and herself, and between the content and the students' personal interests and aspirations. Finally, we felt that to tell the full story of her instructional planning, it was necessary to draw on theory regarding the creation of third-spaces and the application of culturally sustaining pedagogy.

We suggest that there are a number of productive intersections to be pursued in future research. One such intersection is the relationship between teaching strategies that promote self-regulation and teaching disciplinary-specific tools for thinking and reasoning within and across subject areas. Rather than introduce yet another pendulum swing in education, how can we best capture what we have learned about the value of teaching learners to be strategic in their learning activity and apply those lessons to burgeoning calls for teaching in domain-specific ways? A second recommendation is specific to method; how can our methods for studying self-regulated teaching and learning reflect the complex theoretical models that abound in this area of inquiry, including models that take into account students' instructional histories vis a vis self-regulation, interests, knowledge, motivation, self-efficacy, and emotions? Finally, as teacher educators, we are compelled to ask: How can we support pre-service teachers and novice teachers to acquire the knowledge, skill, and dispositions that Ms. Winter brings to her teaching? A volume, such as this one, is useful toward codifying the knowledge base, but there is still the work of supporting practitioners to apply this knowledge base in productive ways.

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Chapter 3
Applying Self-regulated Learning to Writing Instruction in High School Classrooms

Anne Katherine Griswold and Erika Ruckert

Abstract While research on self-regulated learning and teaching is on the rise, writing is a task with which many high school students continue to struggle. It is encouraging that some teachers are cognizant of the importance of considering self-regulation and motivation levels of students as they design innovative and effective writing lesson plans. In this chapter, two exemplary writing lesson plans are presented, followed by teacher reflections, and an analysis of how each lesson plan addresses the construct of self-regulation.

Table 3.1 Turning fiction books into news articles within literature circles lesson plan

Teacher: Erika Ruckert, M.F.A in Creative Writing, B.A in English & Secondary Education, Licensed in English Education	**Grade Levels**: 9–12
School: South Mecklenburg High School	**Subject**: Creative Writing
City and State: Charlotte, NC	
Instructional Plan Title: Turning Fiction Books into News Articles Within Literature Circles	
Common Core State Standards: CCSS.ELA-LITERACY.RL.9–10.1: Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text CCSS.ELA-LITERACY.W.9–10.2.B Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic CCSS.ELA-LITERACY.W.9–10.3	

(continued)

A. K. Griswold (✉)
Anything's Possible Educational Services, Kernersville, NC, USA
e-mail: a.kathygriswold@gmail.com

E. Ruckert
South Mecklenburg High School, Charlotte, NC, USA
e-mail: erika.forland@gmail.com

M. K. DiBenedetto (ed.), *Connecting Self-regulated Learning and Performance with Instruction Across High School Content Areas*,
https://doi.org/10.1007/978-3-319-90928-8_3

Table 3.1 (continued)

Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences		
Learning Objectives: 1. Students will identify events within a fiction novel that develop characterization and conflict 2. Students will recreate one event in an individually written newspaper article using elements of effective news writing, an inverted pyramid structure, active voice, unbiased tone, proper formatting and direct quotations		
Instructional and Learning Materials Needed: High-interest fiction books, pink, yellow and orange highlighters, student notebooks and writing utensils, copies of Inverted Pyramid Diagram, copies of Notes on Newspaper Writing, high-interest news articles, and butcher paper; Inverted Pyramid (see Fig. 3.1 at the end of the lesson plan); Newspaper Writing Handout and Turning Passive Voice into Active Voice Exercise, (see Table 3.2 at the end of the lesson plan); Ruckert Newspaper Writing Handout (see Table 3.3 at the end of the lesson plan); News Article Rubric (see Table 3.4 at the end of the lesson plan); Article Template and Sample Article (see Table 3.5 at the end of the lesson plan)		
Lesson Duration: One class period of 85 min		
Teaching and Learning		
Min on this Activity	**Targeted Activity**	**Purpose of Activity**
10	**Orienting Students to Lesson**: • As students enter, they sit in pre-assigned groups of 4–6 and receive the Inverted Pyramid Diagram and a high-interest article • Students are instructed to read their article and to highlight the lead in pink, the body in orange, and the tail in yellow	• Students are familiar with using The Inverted Pyramid Diagram and using it at the beginning of the lesson activates prior knowledge • The diagram provides a visual representation of the structure of news articles and engages students in active learning
10	**Motivation**: • Students share their work with group members and discuss the previously taught 5 Ws (who, what, where, when, why/how) • Students discuss their responses to the question: Do you notice any patterns?	• Active discussion regarding the articles promotes interest and ignites a collaborative atmosphere in the classroom • Focusing of the 5 Ws helps students discover patterns and guides them to uncover the formulaic nature of news writing • Pre-writing exercises prepare students to use the formula to write their own news articles based on the experiences of characters in their literature circle books
25	**Whole-Class Instruction/ Whole-Class Discussion**: • The teacher leads a discussion on newspaper articles and how they differ from fiction • Using the Newspaper Writing and Turning Passive Voice into Active	• Whole-class instruction provides necessary guidance to illustrate the purpose of news writing • Teacher guides students to identify and distinguish between active and passive voices, biased and unbiased tones

(continued)

Table 3.1 (continued)

	Voice Exercise Handout, the teacher addresses active versus passive voice and unbiased tone • The teacher leads students in completing the handout followed by students practicing independently with assistance provided as necessary • In pairs, students read the list of biased words and discuss what makes them biased • Next students are asked to identify the definitive formatting of news articles • Led by one student, groups will complete the Ruckert Newspaper Writing handout and discuss findings	• Teacher thinks aloud on how to complete the exercise and handout • Guided practice provides the opportunity for the gradual release of control • Partner teaching permits students to brainstorm on topics and encourages enhanced comprehension • Student-led practice allows stronger students to take a leadership role in leading group activities, thereby increasing interest and motivation in the task
10	**Guided Practice/Providing Feedback**: • Students come up with Hashtag moments in their groups and write them on butcher paper • As students work on Hashtag Moments, the teacher circulates to assess understanding • Feedback is provided as necessary to help students comprehend learning objectives • Students share what they believe is their best Hashtag Moment	• Group work encourages collaboration and motivation and enhances comprehension • Feedback sets students up for success in the culminating exercise of writing a news article • The opportunity to share results with peers encourages students to take the assignment seriously and take pride in it
30	**Independent Practice**: • Led by the group leader, students outline the writing assignment and direct students on completing the necessary background research • Individual students choose an event their group brainstormed on to investigate further • Students identify the five Ws of the event and write down 2–3 direct and relevant quotes and other facts about the event • Students use the Article Template and the Article Sample handout for scaffolding purposes	• Independent practice allows students to demonstrate what they have learned and teachers to monitor the success of the lesson • Engaging in brainstorming activities maximizes chances of identifying what is "newsworthy" in the context of the assignment • The template provides students with a graphic organizer and the sample helps them further comprehend and visualize what is expected
Ongoing	**Evaluation of Learning and Assessments:** • Evaluation is ongoing throughout the lesson	• Ongoing evaluation encourages accountability and effort • Teachers and peers provide different sources of motivation to students

(continued)

Table 3.1 (continued)

	• The teacher monitors student understanding and checks on individual progress • Students are held accountable by his/her peers • Writing assignments are graded based on the news article writing rubric	• The rubric promotes understanding of what is expected

Specific Strategies used to Address Exceptional Students and/or Students for whom English is a Second Language:

- If needed, students with IEPs or those who are identified as ELLs will have the notes in advance and will use translation resources to read and comprehend the notes ahead of time to prepare for the activities
- Teachers may also consider choosing simpler articles or even dual-translation articles for differentiation
- Grouping is necessary for the activity, but choosing effective partners and coaching those partners on "helping strategies" can make this a successful experience for all students
- Providing ready-made article templates for students who struggle with understanding formatting is an option

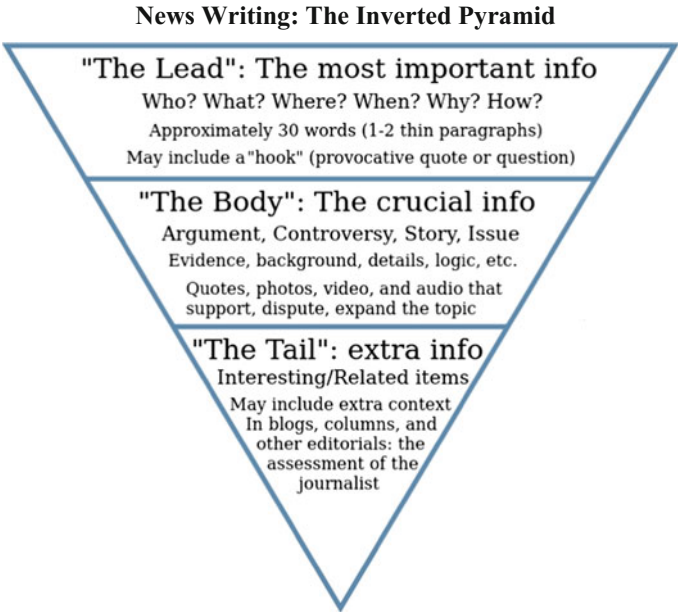

Fig. 3.1 The inverted pyramid

Table 3.2 Newspaper writing and turning passive voice to active voice exercise handout

Active voice: Active means "doing something!" Active voice shows initiation, power, confidence and excitement. In the active voice, the subject of sentence performs the act. Good news writing uses the active voice. Ex: Harry ate six shrimp at dinner.

Passive Voice: It's the more "laid back" voice in writing. In the passive voice the subject receives the action.
Ex: At dinner, six shrimp were eaten by Harry.

Turning Passive Voice to Active Voice Exercise

Directions: Circle the subject and underline the verb, then rewrite the sentence in active voice.

Passive Voice	Active Voice
At the beach, a girl was stung by the poisonous jellyfish.	The poisonous jellyfish stung a girl at the beach.
Five students were kidnapped by the teacher.	
A six-year-old boy was bitten by the dog.	
The car was stolen by the teenagers last night.	

Unbiased Tone: Tone is the attitude the writer has as he/she writes. An unbiased tone means that the writer is not overtly showing his/her opinion or making an argument over the incident. To keep your article unbiased in tone DO NOT USE these words in your article:

It seems to me that …	That is why I think …
In my opinion, …	I am sure/certain/convinced that …
I am of the opinion that …/ I take the view that ..	I am not sure/certain, but …
My personal view is that …	I am not sure, because I don't know the situation exactly
In my experience …	I am not convinced that …
As far as I understand / can see, …	I have read that …
As I see it, … / From my point of view …	I am of mixed opinions (about / on) …
As far as I know … / From what I know …	I am of mixed opinions about / on this.
I might be wrong but …	I have no opinion in this matter.
If I am not mistaken …	The fact is that
I believe one can (safely) say …	The (main) point is that …
It is claimed that …	This proves that …
I must admit that …	What it comes down to is that …
I cannot deny that …	It is obvious that …

(continud)

Table 3.2 (continued)

I can imagine that …	It is certain that …
I think/believe/suppose …	One can say that …
Personally, I think …/ There is no doubt that …	It is clear that …

Table 3.3 Ruckert newspaper writing handout

Headline: It catches your eyes and sums up the story. It is usually in larger font and often bolded. "Man wins $50 Million!"
Byline: This tells you who wrote the article and sometimes gives you the journalist's specialty, for example, "Science Reporter"
Placeline: It tells you where the story originated
Lead: This gives the most important information very briefly (usually who, what, when and where)
Facts: Every news article includes simple, true statements about what happened, such as "The fire set the building's security system off at 9:15 a.m."
Quotations: These retell, word for word, what someone actually said. Usually these quotations come from witnesses at the scene, or experts on a subject

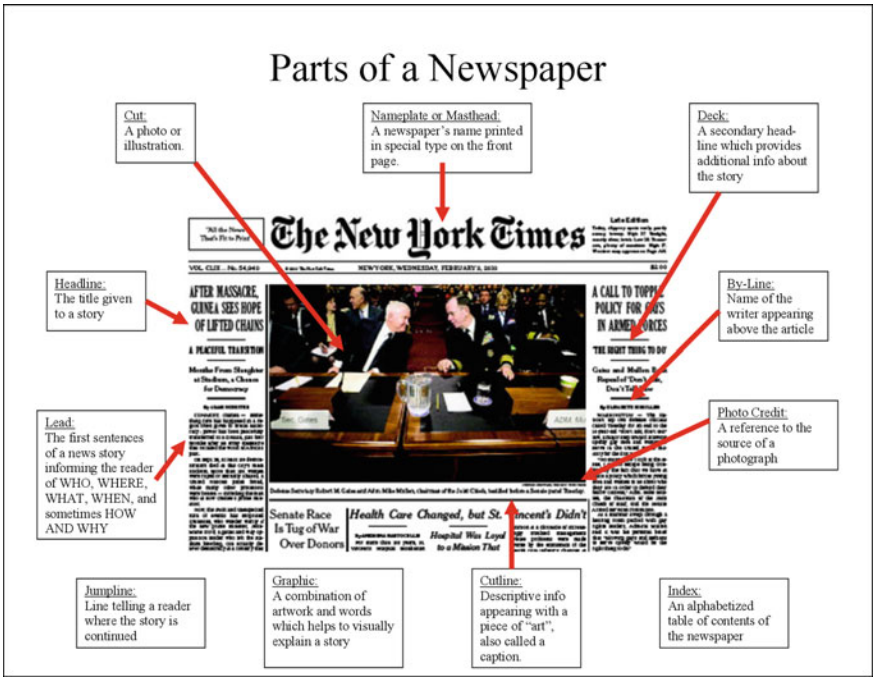

Table 3.4 News article rubric

Name:

Use this rubric to help you as you write your news article. Your editors will use this rubric when they read and evaluate your articles, and your teachers will use this rubric to grade your final article.

Newspaper Basics: 15 points

____ Headline communicates main idea of story (5 points)

____ Has a byline (name of author) (5)

____ Dateline includes date and place (5)

Organization, Style, and Content: 55 points

____ Lead catches the reader's attention and makes the reader want to keep on reading (5)

____ First paragraph following the lead gives the most important information: who, what, where, when, why, how (9)

____ Rest of article gives sufficient and appropriate information, including lots of specific details (10)

____ Includes at least 2 pertinent quotations (6)

____ Relates to the essential question (10)

____ Is written in the third person (5)

____ Is easy to read and understand, and uses appropriate and engaging vocabulary (10)

Format: 30 points

____ Is at least 250 words long (10)

____ Demonstrates correct punctuation: especially no run-on sentences! (7)

____ Capitalization is correct: beginning of sentences, proper nouns (7)

____ Spelling is correct (6)

TOTAL: 100 points

Table 3.5 Article template and sample article

Article Template:

Name Head

Header

byline, date

DECK (Optional)

Cutline or Caption

Placeline--Lead paragraph

Body

Body

Tail

Article Sample:

(continued)

Table 3.5 (continued)

South Meck Times

Students Dedicate Themselves to Writing Stories

by Ms. Teacher, Educator, April 25, 2016

In a world saturated by feeds depicting other people's stories, students learn to write their own.

A South Mecklenburg student writing an article about community issues.

Charlotte, NC—This week South Mecklenburg creative writing students are transforming the way they interact with news. Instead of re-posting news articles, they are writing their own. Through their nonfiction unit, they are being taught to write to express facts, ideas and events in their literature circle books

Students will be writing news articles based on the events in the lives of their literature circle book characters. To preface this work, students started off Monday by learning the parts of a news article as well as the difference between "active" and "passive" voice. "I had no idea what that was," claims Cesar Ramos, "but I am a genius at it now!"

Today students brainstormed with their literature circle groups to come up with "hashtag moments," a literacy strategy from the School of Laura Rhodes, in which students make hashtags for memorable moments in the lives of their characters. "O-M-G! There are so many moments I want to report on!" says Jamie Johnson, a senior

The stories will be written individually and will represent the many exciting moments in the lives of some very interesting characters including: Celia and Marco, Sierra Santiago, Fin and Roza, Steve Harmon, Travis Coates, Willowdean, Craig Gilner and Jin Wang

Teacher Erika Ruckert says, "The purpose of this assignment is to give students a chance to experiment with news writing. It's taking a fictional event and creating a piece that reads like nonfiction, which demands advanced writing skills." As a culminating project, the students will end up creating a newspaper dedicated to their group's book

South Mecklenburg High School is a 9–12 school in Charlotte, North Carolina. The Creative Writing program was reinstated in the Spring of 2015

3.1 Narrative of the Turning Fiction Books into News Articles Within Literature Circles Lesson

South Mecklenburg High School is a public school in Charlotte, North Carolina with over 2,900 students. The student population for the 2015–2016 school year was: 47% White; 26% African–American; 28% Hispanic; 3% Asian; 12% multi-racial other. Forty-nine percent of students are considered economically disadvantaged and 6% are classified as Limited English Proficient (LEP) (http://www.usnews.com/education/best-high-schools/north-carolina/districts/charlotte-mecklenburg-schools/south-mecklenburg-high-14573/student-body) (South Mecklenburg High: Student body 2017).

The creative writing class consists of twenty-seven 9–12 grade students including one Limited English Proficiency (LEP) student, one foreign exchange student and two students with IEPs. The class is diverse—consisting of students enrolled in Advanced Placement classes, students struggling in standard classes, students who requested the class, students placed in the class, students defining themselves as "writers," and students simply looking to pass. With such diversity, my approach must be flexible in terms of teaching strategies and desired outcomes. My focus has been on empowering the creative and expressive side of individuals, nurturing a collaborative and supportive environment, and providing opportunities for growth. Each class is eighty-five minutes long and often we work on larger, long-term assignments across multiple class periods.

The objective of this lesson is to teach the non-fiction genre of newspaper writing and expose students to such writing within the creative writing context. As a practicing writer and MFA graduate in Creative Writing, I find we become better writers by reading, better readers by writing. From my experience, students are better equipped to learn "author's purpose" and "author's craft" choices more effectively after they have been "authors" themselves.

I designed the lesson to work in conjunction with literature circles since the circle format naturally lends itself to collaboration, support, and motivation. Literature circles comprise small groups of students who read the same text and engage with the text through close-reading practices, consistent student-led discussions, and layered projects. Additionally, since all literature circles read fiction novels for this lesson, there is the added challenge and need for collaboration as students must convert fiction stories into "nonfictional" newspaper articles. This helps students begin thinking analytically about what they read and ties in well the Common Core State Standard (2012). Later in the lesson, they are afforded the opportunity to expand further on this standard.

While sitting at tables, literature circle members receive the inverted pyramid diagram depicted in Fig. 3.1, a short high-interest article, and are instructed to get a highlighter or borrow one from my student-center closet. Articles are strategically selected based on reading level and interest: most are controversial, pop culture-related or involve recent events. The goal of such selection is to encourage student engagement and dialogue. As a warm-up activity, each circle member reads

a different article and highlights the sentences/paragraphs that represent the "lead" in pink, the "body" in orange and the "tail" in yellow. This affords me the opportunity to quickly identify who understood the previous mini-lesson on "the inverted pyramid," and later on, helps students visualize the formula for newspaper writing.

To promote accountability for warm-up completion and to begin collaboration, students are then instructed to share the 5 'Ws' (who, what, when, where, when, why/how) within their groups. The purpose of this activity is to allow students to demonstrate reading comprehension, develop a foundation, and encourage the continuation of student-monitored discussion. When I observe reduced discussion, I pose the following question: "As a group, do you see any patterns in your highlighting?" Most students discover that the pattern is pink, orange, yellow (Lead, Body, Tail), providing an opportunity to articulate that newspaper writing is formulaic and the goal of the lesson is to utilize this formula to create newspaper articles from the literature circle books.

Whole-class instruction begins with a discussion on what we know about newspapers. On the board, we list things that we associate with newspapers such as: events, weather, editorials, sports, advertisements, political cartoons, bias etc. This generates a discussion on the difference between newspaper writing and fiction writing. It becomes apparent that while students know the difference between news and fiction in theory, in practice they cannot use jargon or identify differences in format and technique. I then suggest that news writing requires specialized knowledge. The consistent goal of encouraging students to write as "professionals" motivates them to take themselves seriously, write seriously, and attempt to mimic great writers. I transition by saying: "News articles keep us connected to events and people in our community. They provide a way to tell a story that focuses on the facts, allowing the reader to make his/her own opinion. Today we are going to be writing a newspaper article based on events the characters in our literature circle books experience. But first, we must understand the specific way that professional news writers write."

Next, I introduce students to my unique handout on "newspaper writing" as shown in Table 3.2. The first objective is to learn to turn passive voice into active voice, the second, to identify words that suggest bias. This part of the lesson consists of direct instruction paired with individual and partner work. (While direct instruction and relevant activities suffice to convey information and practice skills, one of the challenges is teaching this lesson with students who vary greatly in motivation, interest, and capability (I believe in diverse classrooms, students might benefit from a separate mini-lesson addressing the passive voice). During this activity, I observe if any of the students' attention spans are wavering, which can hinder the positive momentum of the lesson.

Once this background work is complete, we transition by having students vote on group "leaders" to lead the next activity. This brief thirty second process encourages fluidity, organization, and student accountability. To transition to the next activity, group leaders raise their hands and address the class using this transition statement: "Not only do we need to use active voice and an unbiased tone, but if we are going to write news articles, it is important we write in the definitive format professionals use.

In your groups, you will explore the specific formatting elements of news writing." I then specifically communicate to group leaders the steps they should use to guide their groups through teaching each "part" of the newspaper article from the Ruckert Newspaper Writing Handout (see Table 3.3) and ask them to monitor students as they label applicable parts of articles.

Most groups do well with this exercise, however one of the challenges is keeping students on task. Due to the diverse nature of the class, all notes and activities are presented in handouts, providing resources students can refer to prior to requesting assistance. Additionally, this limits excuses when redirected back to the task at hand.

Once foundational knowledge and skills are acquired, we begin brainstorming activities. I transition the students to this creative activity by presenting the rhetorical question: "Now that we know what news articles look and read like, what should we write about?" I follow up by introducing "Hashtag Moments" and say: "As we know, our attention is constantly pulled in different directions. To keep our attention, the news must be fresh, challenging, and interesting. We may post news or retweet information and add hashtags such as: #amen; #true; #mindblown; #wakeup; #mylife to show how we relate to them. Because hashtags often get information across in a concise and powerful way, we are going to generate ideas for "Hashtag Moments" for our news articles using moments that greatly impact the characters from our literature circle books."

Hashtags are a word or phrase preceded by a 'hash' or pound sign (#). I define them as micro-informational tags that can either help categorize social media posts or offer short expressions or messages on a specific topic. In their groups, students are challenged to think of "hashtag moments," or memorable events that they related to or found engaging in their fiction books. "Hashtag Moments" allow students to brainstorm collectively to create writing topics and to share memorable reading experiences with their peers. One example of a hashtag moment from *Noggin* by John Corey Whaley (2015) is: "Travis Coates' head is cryogenically frozen: #BrainFreeze #BlockHead." This hashtag moment is two-fold: it provides a solid textual-based event and contains a humorous and memorable micro-informational text-bit. As I circulate the room, I remind students to focus on characters and how important events impact their lives. Encouraging students to think of significant events that develop a character or conflict within the story is important. Doing so provides plentiful information to pull from when they write articles reflecting critical events.

Butcher paper is provided on which students write "hashtag" moments. As students begin writing "hashtag moments," some groups work together to decide on each hashtag, while others have individuals list as many as they can. I quickly notice groups creating only hashtags, while others write a moment followed by a hashtag. As I circulate, I cannot understand every hashtag created by the "hashtag only" groups, but I witness how, because of their shared reading, group members have a common understanding, and they assure me that they know (and most can recite) the events these hashtags describe. While, it is encouraging to see how books can create shared memories among diverse students, I recommend modelling

"Hashtag Moments" and providing more specific information on formatting to ensure uniformity across the classroom.

As an educator, I find "Hashtag Moments" a rewarding activity to observe as students actively discuss books with excitement, focus, and specificity. Examples from a group that read Jason Reynold's *When I Was the Greatest* include: "Knitting helps Needles #Grandma," "Noodles tries to get a girl Tasha #NoGame," and "They decide to go to MoMo's party #TurnUp." Hashtag Moments presents me with the opportunity to meet another Common Core State Standard (2012) as students must develop topics using relevant facts and concrete details for their news articles from fiction books. While our discussion earlier on the differences between fiction and nonfiction develops the groundwork, this exercise prompts students to analyze and eventually create a text that achieves the instructional goal of the lesson.

After about seven minutes, the butcher paper is filled with hashtags and we transition into the Independent Practice section of the lesson. I allow group representatives to do a "spit-fire" or quick share of two hashtag moments. I then say: "Students, you will now write a news article based on one "Hashtag Moment" using best writing practices, the Inverted Pyramid structure, unbiased tone, active voice, the definitive formatting of a news article, along with direct quotes from your text. A rubric is provided (see Table 3.4) to guide you on expectations and grading policy. As we know, one of the most important jobs of a news reporter is research, therefore, our final assignment today is the pre-work needed to prepare us to begin writing." For scaffolding purposes, each student is provided with a copy of the Article Template and Sample Article (see Table 3.5). This provides students with a graphic organizer and a sample to help them further comprehend and visualize what is expected.

The research for the article is completed individually and each student chooses one (different) "Hashtag Moment" to investigate further. In their creative writing journals, students come up with the "5 Ws," 2–3 pertinent and direct quotes from the characters, and write down additional details concerning their moment. Before they start writing, I tell students that this pre-work will be checked. The pre-work is a very important step in the creative process for my students because it gives them a place to start. Further, it gives me a sense of whether they read deeply, can gather main ideas and supporting details, and can identify relevant quotes to bring events to life. Students become investigators before they write: a skill strongly related to the work of a reporter. This activity clearly ties to Common Core standards and prepares them to achieve others. Writing the article allows students to produce articles based on the experiences of characters using appropriate technique in a well-structured sequence (Common Core State Standard: CCSS.ELA-LITERACY.W.9-10.3, 2012). I check students' work to ensure they will be ready to write the following day. Students who are behind are instructed to finish their research for homework.

The lesson is usually very successful. I recommend adding mini-lessons to allow students to recognize the specific language and skills of news writing; this would alleviate potential lulls in the lesson, which presents an additional challenge. Follow-up lessons include self-editing, peer-editing, and conferencing.

I recommend continuous reference to the rubric, which provides a "checklist" to help keep students on track. Overall, the outcomes are often better than anticipated, and I believe students truly benefit from and enjoy this writing experience.

Table 3.6 Creating a thesis from the analysis of nonfiction literature lesson plan

Teacher: Erika Ruckert, M.F.A in Creative Writing, B.A in English & Secondary Education, Licensed in English Education	**Grade Level**: 12
School: South Mecklenburg High School	**Subject**: English IV
City and State: Charlotte, North Carolina	
Instructional Plan Title: Creating a Thesis from the Analysis of Nonfiction Literature	
Common Core State Standards: CCSS.ELA-LITERACY.RI.11-12.5: Analyze and evaluate the effectiveness of the structure an author uses in his or her exposition or argument, including whether the structure makes points clear, convincing, and engaging CCSS.ELA-LITERACY.RI.11-12.6: Determine an author's point of view or purpose in a text in which the rhetoric is particularly effective, analyzing how style and content contribute to the power, persuasiveness or beauty of the text CCSS.ELA-LITERACY.W.11-12.1: Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence	
Learning Objectives: 1. Students will analyze nonfiction text for nonfiction techniques 2. In groups, students will generate a thesis statement that addresses the author's purpose of using three consistently used nonfiction techniques 3. Students will ensure thesis statements are concise, clear, and formulaic	
Instructional and Learning Materials Needed: Nonfiction Literature Circle books: several copies of Gladwell's *Blink,* (2005), *Outliers*, (2008), and *The Tipping Point*, (2000), copies of the article "Creative Nonfiction Techniques" by Hood (2012), Author's Purpose Phrases Handout (see Table 3.7 at the end of the lesson plan), Thesis Statement Template handout (see Table 3.8 at the end of the lesson plan), Thesis Writing Rubric (see Table 3.9 at the end of the lesson plan), highlighters, butcher paper, and markers	
Lesson Duration: 85 min	
Teaching and Learning	

Min on this Activity	**Targeted Activity**	**Purpose of Activity**
20	**Orienting Students to Lesson:** • Students get into their literature circles and begin silently reading Malcolm Gladwell's *Blink, Outliers* or *The Tipping Point*	• The books selected are high interest non-fiction • Students are given the opportunity to become immersed in their books
5	**Motivation:** • High interest, non-fiction books preselected by teacher	• Students who are given choices are more interested and motivated

(continued)

Table 3.6 (continued)

	• Students grouped according to reading level and with the goal of promoting positive group dynamics to encourage optimal growth and engagement • Groups select the book they find most interesting and reread for a couple of minutes and then share an interesting fact they read with a partner • The teacher starts the lesson with questions	• Students who know they must share findings with a peer may be more engaged in a task • Questions promote response and engagement
15	**Whole Class Instruction**: • The teacher begins reading "Creative Nonfiction Techniques" by Dave Hood (2012) • Students complete the reading silently and highlight literary techniques they read about that are seen within their literature circle book and make annotations • Students make annotations and highlight important points. Highlighting and annotating is something we do regularly and they are reminded of these techniques. Additionally they are informed this annotation will be a resource for them in group discussion • The teacher monitors by walking around the room to identify students who may need encouragement, redirection or intervention based on their interaction with the text	• Students tend to feel more accountable for learning the nonfiction techniques in this approach rather than the teacher lecturing on it • Students have a well-written explanation they can continuously return to throughout the lesson and beyond • Highlighting and annotating are skills used in classrooms beyond high school
5	**Guided Practice/Providing Feedback**: • Students complete a "rapid fire" within their literature groups on techniques they identified within the text. A "rapid fire" is when each person says one thing he or she identified without further explanation. Ex: "The author used Braided Structure" • When the "rapid fire" ceases, the group leader (previously chosen) asks one person to explain how he or she saw the technique employed. Students are to use their texts and flip to the given pages. They then have three	• "Rapid fire" exercises increase participation and puts all students on a level playing field • It also permits students to participate without the pressure of starting a conversation • It prevents one student from monopolizing the conversation before everyone has the chance to share • Having the leader choose the first person to share promotes accountability from a person other than the teacher and

(continued)

Table 3.6 (continued)

	minutes to keep the conversation going about the different techniques used • The teacher should circulate the classroom to listen to which groups have a lot to talk about, and which do not. This will help the teacher scaffold as needed during independent work	without the pressure from the entire group. It is a question asked directly by a peer • Short discussions about the text leaves students feeling there is more to discuss, promoting excitement and motivation
20	**Independent Practice**: • Students are introduced to writing a complete thesis statement. The teacher explains the thesis creation assignment, which can be used to prepare the students to write a research paper on the book • Students are provided with a group assignment and guidance on how to begin to create a thesis statement using the nonfiction techniques Malcolm Gladwell uses • Students are instructed to include each of the three techniques employed, define them, and provide a direct example from the text including the page number • Before students begin, the teacher discusses the formulaic set-up of the thesis statement and how it promotes clarity and specificity • The class discusses how to identify the author's purpose and the teacher puts examples on the board using the Author's Purpose Phrases Handout. The teacher also models an example of a solid thesis statement using the Thesis Statement Template handout • Students begin working and are required to discuss their ideas, reread in a more critical way, and be able to explain their choices	• Many skills are used during the independent work section including utilizing academic conversation, narrowing and choosing topics within a collaborative group, and properly defining and explaining literary technique • Discussing craft choices and narrative techniques with textual evidence helps sustain motivation. • Activating prior-knowledge to analyze and create a thesis ensures a level playing field for all students • The group component is effective because it requires students to collaborate using the text • The assignment is rigorous, prompting students to rely on one another to produce the best possible product
Completed after class by teacher	**Evaluation of Learning and Assessments**: • Students are assessed based on a Thesis Writing Rubric scale that includes the clarity and content of the	• The rubric provides clear guidelines to students on how they will be evaluated

(continued)

Table 3.6 (continued)

	thesis statement, the identification, definition and example of the three techniques, and collaboration between all group members • Students can be evaluated on mastery in a few ways, including using this assignment as an outline for an essay or a research paper based on the literature book. Students can also be tested on this by giving them another piece of nonfiction text and completing the same task	• This lesson lends itself to several opportunities to evaluate students' writing
20	**Closing Activities**: • Students present a brief summary of their book, read their thesis to the class, and address their examples by reading snippets from the book • The teacher discusses how this is an opening lesson for writing an analysis essay on their respective books	• Presenting their work provides accountability and reinforces what was learned by hearing what their peers learned • This lesson provides a good segue to a more comprehensive writing activity
Specific Strategies used to Address Exceptional Students and/or Students for whom English is a Second Language: • Students have built in support from peers. If necessary, a teacher could assign one student to partner up with an ELL student • Adaptations for students for whom English is their second language can include chunking or puzzle-piece reading with a peer • Additionally, for struggling readers, one could chunk the text to smaller sections and require annotations for each section		

Table 3.7 Author's Purpose Phrases Handout

Author's Purpose Phrases
Below is a list of some "author's purpose phrases." You may use one of these, or come up with your own based on what you have read and learned. Please make sure to run it by me before you decide to incorporate into your thesis statement
To contrast the ideas of…
To inform the reader of…
To set the framework for…
To display the theme of…
To persuade the reader that…
To challenge the idea that…
To argue the point that…

Table 3.8 Thesis statement template

On your page: Create a "thesis" statement which includes the nonfiction techniques Malcolm Gladwell uses within your particular book. Then include each of the three techniques, define them, and provide an example.

Thesis:
Ex: In Malcolm Gladwell's _____, he uses _____, _____, and _____ to _____.

Technique #1:	Technique #2:	Technique #3:
Definition:	Definition:	Definition:
Example:	Example:	Example:

Book Title: Group Members

Table 3.9 Thesis writing rubric

Criterion	Requirement	Points
Thesis	Evidence formula followed	5
Thesis	Content and accuracy	5
Technique #1	Identify	5
Technique #1	Definition and example	5
Technique #2	Identify	5
Technique #2	Definition and example	5
Technique #3	Identify	5
Technique #3	Definition and example	5
Total		/40

3.2 Narrative of the Creating a Thesis from the Analysis of Nonfiction Literature Narrative Lesson[1]

The English class, in which this lesson is taught consists of thirty-six 12th grade students, including two students with IEPs and two with 504 Plans. The class is diverse racially and socio-economically. Additionally, the class is comprised of students with vastly different academic skills and levels of motivation to succeed.

[1]See the previous narrative for a description of school characteristics.

This student population challenges me as an educator to try to meet all students where they are, resulting in constant efforts to provide scaffolding as necessary while ensuring all students are challenged adequately. The curriculum focuses on British Literature and a semester-long graduation project. The senior project is a student-led inquiry on an issue of choice and the completion of a product or service learning experience. Each class is 85 min long and often we work on longer texts across multiple class periods.

Prior to this lesson, using the literature circle format, students read one of three nonfiction books by Malcolm Gladwell: *Outliers* (2008), *The Tipping Point* (2000), or *Blink* (2005) and these provide the underlying framework for the lesson. I pre-selected these three books for students to choose from as I believe they are both interesting and age-appropriate. Further, since Malcolm Gladwell wrote all three, the probability of similar non-fiction writing techniques being apparent is high. Finally, the books satisfy the non-fiction element of the lesson plan. Literature circles are grouped based on reading level, but also with a goal of creating positive dynamics to encourage student growth and engagement. In order to promote conditions for optimal motivation, literature circle groups are permitted to choose the Gladwell book they find the most appealing. All books are nonfiction. While the "big picture" goals of this lesson include aspects of the Common Core, the specific objective of the lesson is to teach students a formulaic means by which to write effective thesis statements. During my years as a high school English Language Arts teacher, I have observed that generating effective thesis statements is a skill that even the strongest students struggle with, and for this reason many scaffolding strategies are used. Given the importance of a strong thesis in all academic writing, I feel this lesson is valuable, and skills acquired are generalizable across multiple genres and disciplines.

To facilitate academic discussion, class begins with a teacher-led discussion designed to help students more fully comprehend the differences between fiction and nonfiction writing. In general, students understand that nonfiction writing is factual. To provide more advanced information about nonfiction writing, I inform students that while this is true, nonfiction authors use many creative techniques designed to lead readers to insights that go beyond the facts stated and to help them draw certain conclusions: conclusions strategically intended by the writer. For example, if the author's purpose is to persuade readers, certain techniques are employed, techniques that are different than those a writer would use to describe.

As a follow-up to the teacher-led discussion, students read the article "Creative Nonfiction Techniques" by Dave Hood (2012). This article provides many useful facts about creative nonfiction writing and a "toolbox" of techniques. Hood's article is written in language that is accessible to most high school students and helps familiarize them with several creative nonfiction techniques. It emphasizes both genre-specific and rhetorical techniques used by writers, and explains how effective implementation of such techniques results in more powerful written products. Reading the Hood article also helps prepare students to address the Common Core State Standards (2012) which emphasize determining the author's point of view or purpose and how the author's style contributes to the power of the text.

Next, students are instructed to individually identify and highlight techniques described in Hood's article (2012) and observed by them in Gladwell's writing. The purpose of this activity is to encourage students to reread parts of the books in a more critical way and locate information relevant to the task, while also preparing them to discuss the topic with their group. Students are then given three minutes to share thoughts and discoveries with their literature circle members; this provides the opportunity for students to verbalize and think more deeply about their findings. Since students are analyzing texts and attempting to assess the effectiveness of literary techniques, this activity allows me to address two of the literacy Common Core State Standards (CCSS.ELA-LITERACY.RI.11-12.5 and CCSS.ELA-LITERACY.RI.11-12.6).

These discussions serve as an additional level of inquiry during which I observe students opening the text to prove their findings to group members. Discussions further encourage students to explore aspects of the book and to interpret collectively the effectiveness of the techniques employed by the author. My hope is that students can identify some craft choices and narrative techniques Gladwell uses to support claims. Examples include, but are not limited to, using relevant facts and providing evidence. The goal of these discussions is to enhance student understanding of and interest in the text, and to provide evidence that students are able identify and analyze to what extent an author uses literary techniques to achieve his or her literary goals (Common Core State Standards, 2012, CCSS.ELA-LITERACY.RI.11-12.5).

Through the discussion of craft choices and writing techniques, it is predicted that students will be better equipped and more confident in their abilities to formulate their own arguments and ultimately thesis statements.

Following the sharing of observations, as a whole-group, the concept of "author's purpose" is discussed. To start the discussion, I say, "It's great that you identified some of the many writing techniques Gladwell uses, but to think at a higher level, a college level, we must identify *why* he chooses to use such techniques and *what* the impact is." I then inform students that they will be generating a thesis statement based on the author's purpose and three nonfiction writing techniques used by Gladwell. Students are provided with a list of "author's purpose" phrases on the Author's Pupose Phrases Handout to use as stems or starting points for thinking (see Table 3.7) and a Thesis Statement Template (see Table 3.8) to serve as a scaffold for students as they compose their own thesis statements. Giving students these handouts provides them with a graphic organizers on which to formulate and visualize their thoughts, while supporting them as they narrow and select an aspect of the author's purpose and writing techniques to write about. Examples of stems include: to contrast the ideas of, to set the framework for, to persuade the reader that, and to argue the point that. Such stems familiarize students with language related to writing, assists them in properly defining Gladwell's purpose, and supports them as they frame their arguments.

Following teacher-modeling, whole-group practice, and small-group practice, using the Thesis Statement Template, (see Table 3.8.) students were asked to generate their own thesis statements and write them down on butcher paper, along with the three creative nonfiction techniques, a definition of each technique, and an example of each technique used by Gladwell. The goal of this expanded approach is to provide students with a formulaic approach to writing powerful thesis statements. It is believed that this purposeful strategy helps students analyze the extent to which their thesis statements are effective. Once thesis statements were completed, students were given the Thesis Writing Rubric (see Table 3.9) and asked to evaluate their work. The combination of a template and a rubric provides students with an external means by which to assess intended arguments and to consider to what extent they set the stage for producing convincing and engaging arguments for a research paper on author's purpose and craft analysis. Analysis of thesis statements generated by students helps me determine to what extent they are prepared to write arguments and support claims using valid, relevant, and sufficient evidence (CCSS.ELA-LITERACY.W.11-12.1).

This lesson is extremely engaging and effective, and works well, even in diverse classrooms. I believe clear expectations set at the beginning of the lesson facilitate success. Students feel comfortable in their groups, have ample time to read and prepare, and are usually collaborative and thorough in completing the assignment. In terms of quality, outcomes tend to vary; this should be expected in classes comprised of students with such a vast range of abilities and motivation levels. Weaker outcomes usually emerge from groups who read less and read less analytically, and/or from those who produced thesis statements lacking coherence and relevant evidence. Most of the challenges I faced were anticipated. I teach a highly diverse student population and always expect to have a class composed of students of varying abilities and motivation levels. A main challenge I have faced is keeping the groups on task, however, I have learned that strategic grouping ameliorates this issue. I have found effective ways to optimize the success of this lesson, and these include, being organized, explicitly stating expectations, and providing resources such as graphic organizers and samples to help guide students.

Potential follow-up lessons include having literature circle group members write individual papers using the same thesis or having all students write another thesis and compose individual papers. If students share the same thesis, it creates an opportunity for students to read each other's papers and see how their evidence, rhetorical strategies and voices differ: this generates conversation on what is effective and what is not. All follow up lessons will allow teachers to more fully address standard CCSS.ELA-LITERACY.W.11-12.1. Overall, this lesson is well-received by students as an interactive, low-pressure way to practice analysis, thesis formation, and evidence compilation.

3.3 Applying Self-regulated Learning to Writing Instruction in High School Classrooms

3.3.1 Introduction

Writing is complex skill requiring the utilization of multiple cognitive processes. Having the requisite academic skills is often insufficient to promote successful writing outcomes. Producing written products of any genre requires the ability to tap cognitive processes at all stages of the writing process: from planning to publishing (Bazerman, 2008). Potential for quality written products is increased when other cognitive variables such as planning, goal setting, reflection, and analysis are employed (i.e. self-regulation). Further, specific genres and contexts influence how such processes are employed while writing and in teaching.

As the twenty-first century ushered in a post-No Child Left Behind era, it has become widely accepted that more advanced writing skills are required at the high school level and beyond if the United States wishes to produce learners who can compete in today's global economy (Applebee, Langer, Wilcox, Mastroianni, Dawson, & Nachowitz, 2013). In 2007, Graham and Perin published *Writing Next*, a compilation of research designed to encourage schools to use evidence-based practices in writing instruction. With the adoption or partial adoption by most states of the Common Core State Standards, in recent years, writing has gained increased attention (Applebee et al., 2013).

While increased attention to writing-instruction is encouraging, it is evident that instruction in classrooms varies substantially by state, school district, school, and even classroom. In fact, writing does not have a universally accepted framework that maps out what students should be able to do (Applebee et al., 2013). Three types of writing are specified by The Common Core (2012): narrative, informative/explanatory, and argumentative; these should encourage various disciplines to incorporate writing into their curricula. However, Applebee et al. (2013) found that state mandated testing exerts pressure on educators that makes it difficult for them to engage students in writing of substance. The situation is further compounded since students differ substantially in writing ability (Juzwik et al., 2006), self-regulation, motivation, and other psychological constructs that affect writing performance (Bandura, 1997). As scholars advocate for increased emphasis on disciplinary writing (Bazerman, 2008; Shanahan & Shanahan, 2014), the reality is, although writing occurs in various disciplines, it is not in the quantity deemed necessary to inspire and produce quality writers (Applebee et al., 2013). National Assessment of Educational Progress (NAEP) data (2011) indicated that 14% of high school seniors and 10% of 8th graders had no writing homework in a typical school week and 26% of seniors and 31% of 8th graders compose less than a page

of writing during their English classes in a typical week. It is hardly surprising that by the time students get to the college level, they are ill-prepared to meet the writing demands (Hunter & Tse, 2013; Watts & Burnett, 2012; Wingate, 2006).

3.3.2 *Writing and Self-regulation*

While such data are discouraging, it is important to note that quality research with encouraging findings has been and continues to be conducted by researchers in the field of writing (Griswold, 2015; Harris, Graham, Mason, & Friedlander, 2008). Additionally, exemplary and passionate teachers are finding novel approaches to writing that both challenge students to become good writers and meet the demands of the Common Core. With an awareness of the vast diversity in our nation's classrooms, researchers are increasingly looking at creative approaches to writing instruction that include components beyond convention and process—ones that include teaching and encouraging self-regulatory skills and processes. While some teachers may be unsure of the definition of self-regulation, they are, through experience, highly aware of what it looks like in practice. Such awareness is evident from the two lesson plans presented in this chapter. In fact, in a close analysis of each lesson plan, components of Zimmerman's (2002) model of self-regulation are evident.

According to Zimmerman, self-regulatory strategies are: "specific processes and associated actions designed to acquire or display a skill" (Zimmerman, 2002, p. 13). Self-regulated learners are accountable for their learning outcomes, understand they have choices, and recognize they are active participants in the acquisition of knowledge (Schunk, Pintrich, & Meece, 2008; Zimmerman, 1990). Assumed in this model of self-regulation is the belief that positive motivational beliefs, as well as metacognitive strategies play a part in student-learning (see DiBenedetto, 2018/this volume). Self-regulation is not an inherent trait or skill: it is a set of self-directed processes that enable students to convert mental abilities into positive academic outcomes (Zimmerman, 2002).

It is common knowledge that many students lack the characteristics of self-regulated learners, and teachers are encouraged to incorporate self-regulatory processes into lesson plans. Through the analysis below, it is hoped teachers of writing will gain a better understanding of how this may be accomplished. Further, these lessons illustrate how doing so leads to better writing outcomes for students while encouraging them to "become masters of their own learning processes" (Zimmerman, 2008 p. 166). It is imperative to understand that all lesson plans are context-specific, and while suggestions are given to promote expansion to other contexts, individual instructors are most capable of adapting lessons to best serve specific populations.

3.4 Two Exemplary Writing Lesson Plans for High School Students

3.4.1 Background

Erika Ruckert is an English teacher at South Mecklenburg High School in Charlotte, North Carolina. She teaches a very diverse student population, which was clearly considered when designing and implementing the lessons during the 2016–2017 school year. The first lesson, "Turning Fiction Books into News Articles Within Literature Circles," challenges students to write newspaper articles based on books they have read, and the second, "Generating Thesis Statements," teaches students how to compose powerful, nonfiction thesis statements related to literary techniques. Both lesson plans are purposefully designed to meet the demands of diverse learners and build upon tasks and skills previously taught. The lessons are highly structured and promote self-regulatory throughout. It is clear Ms. Ruckert was deliberate in structuring the lessons to benefit students with vastly different levels of writing skill, motivation, and self-regulation. The outcomes of both lessons were impressive and show the benefits of advancing theory into practice.

3.4.2 Turning Fiction Books into News Articles Within Literature Circles

Ms. Ruckert was strategic in her planning and designed the lesson and corresponding activities to be completed during class time. Such forethought by Ms. Ruckert optimized the chances for success and completion of tasks by all students: she was highly aware of the self-regulatory challenges many of her students face. Each phase of the project comprised a goal which fed directly into the next phase of the assignment. For example, at the beginning of the lesson, students were given high-interest news articles, an inverted pyramid, and highlighters to help them analyze news articles. Since each student at each table was given a different article, they could not rely on others to garner information from, thus self-regulation was encouraged. Students knew that at the end of the lesson they would be expected to share individual findings with peers: they had explicit accountability and this translated into personal responsibility. The learning goal of understanding the formulaic nature of news writing was accomplished through collaborative work led by the teacher which fostered students' self-efficacy. Students also knew that ultimately, they were going to learn how to differentiate nonfiction from fiction and the skills necessary to write in both genres, targeting the process of outcome expectations in the forethought phase. Such structure encouraged students to prepare for action, and a connection with phase one of Zimmerman's model is apparent (Zimmerman, 2002). As a catalyst to set a goal and plan strategically, students were challenged to think about what they had to accomplish, were provided with the

materials to carry out the task, and put in a situation where peer pressure had the potential to encourage them to complete the task. Typically, students are most motivated by models who are similar to them, and seeing competent peers complete the assigned task fostered their self-efficacy beliefs (Bandura, 1997). Knowing they would have to present findings with peers, students may have been more motivated to complete the task.

Following the opening activity, Ms. Ruckert encouraged students to enter phase two of Zimmerman's model by leading whole-class discussions. In doing so, she helped students make connections, articulate findings, and comprehend differences between news articles and fiction, exposing them to the knowledge and cognitive processes required for other parts of the lesson. Due to teacher participation and the presence of higher-level students, the whole class had the opportunity to observe and participate in a scholarly discussion.

Once students were familiar with the assignment, Ms. Ruckert conducted a mini-lesson on converting the passive voice into the active voice using handouts she created. An initial example was completed as a group with the goal that students would complete two further examples independently. Ms. Ruckert noted this was challenging for several students and suggests a more in-depth lesson may be required. Much of the student population she teaches simply lacks the skill and/or self-regulatory capacity to learn this skill with such limited direct instruction and guided practice. Additional modelling and/or scaffolding or gradual release of control is suggested when teaching students how to recognize and ultimately avoid using the passive voice. Despite the small setback in the lesson, Ms. Ruckert moved forward with student-led practice. Given many of the students lacked all but basic self-regulatory skills, Ms. Ruckert designed the lesson to give students time to work on academic skills with assistance for an extensive period, thus self-regulatory processes such as attention focusing, imagery, metacognition, and task strategies (Table 3.10) described in the second phase of Zimmerman's model (2002) had the potential for activation. For this reason, it was imperative that she was purposeful in her efforts to have all students complete the assignment.

As students moved into the group work phase of the lesson, they were asked to write down issues related to characters in the fictional works read earlier in the school year. Students wrote down the issues on butcher paper, thus were closely surrounded by peers of differing abilities from whom they could learn from. The communal aspect of using butcher paper inspired collaboration and motivation in addition to focusing the students' attention on the fictional characters' issues. Furthermore, to increase motivation to complete the task, Ms. Ruckert requested students use hashtags as a means by which to identify the issues, for example, #mindblown. Most students frequently interact with social media and would find this a familiar way to communicate thoughts: many adolescents are highly interested in and involved with social media. Hashtags also provide a visual representation of the character about whom they would be writing. Students began the task of writing a news article based on an issue faced by a fictional character using task strategies learned, and they were provided with a detailed rubric. It was believed students would use the rubric to monitor their own mastery of the targeted skills

(Schunk et al., 2008). Ms. Ruckert provided continuous informal feedback as students worked on their articles. The combination of the rubric and feedback set up a scenario in which students had an opportunity to engage in self-control and self-observation, the two major subcategories of phase two of Zimmerman's model. Due to the diverse nature of the students, the extent to which students utilized metacognitive processes to monitor progress, ascertain to what extent strategies were working, and think of ways to adapt varied. Given this situation, only a minority of students likely had the potential to, or in fact cycled into phase three of Zimmerman's model, the self-reflection phase (Zimmerman, 2002).

To encourage students to enter the self-reflection phase, Ms. Ruckert included an evaluation component into the final stages of the lesson—peer evaluations. While the writing component of the lesson occurred during a different class period, it is the culminating task of the lesson and the activity that provides the optimal opportunity for students to engage with the self-reflection phase of the model. The extent to which students had the skills to evaluate or the interest in revising articles varied, and such issues impacted students' abilities to exhibit self-regulatory strategies at higher levels. Such outcomes should be expected when working with diverse students, however, it should be emphasized that failure of all students to reach phase three of Zimmerman's model is in no way indicative of any shortcomings of the lesson. As with academic skills, the ability to use self-regulatory skills varies by student. It is believed that by participating in and completing Ms. Ruckert's exemplary lesson that most students advanced from both an academic and a self-regulatory perspective. Students who are willing to edit their writing based on feedback and a rubric engage in the self-refection phase of the model. Ms. Ruckert's lesson provides the potential for students to reach this advanced stage of the model, and for those willing and able to put in the time and effort, optimal self-regulatory behaviors are evident.

Table 3.10 Turning fiction books into news articles within literature circles lesson plan

Forethought Phase		Performance Phase		Self-Reflection Phase	
Process	Example from Lesson	Process	Example from Lesson	Process	Example from Lesson
Self-efficacy	Vicariously through teacher and peers as they model how to identify the components of a news article	Attention Focusing	Handouts highlight what to focus on when writing a news article Butcher paper also shows the hashtags created by their peers and focuses attention on the fictional characters	Self-satisfaction	Students share hashtags with peers

(continued)

Table 3.10 (continued)

Forethought Phase		Performance Phase		Self-Reflection Phase	
Process	Example from Lesson	Process	Example from Lesson	Process	Example from Lesson
Goal Setting	Students will identify the components of news articles and write their own news articles by changing a fictional story to a nonfictional one	Task Strategy	Students taught a strategy for identifying meaningful events in the lives of their characters	Causal Attributions	Students familiarize themselves further with the strategies taught and the expectations
Intrinsic Interest	Teacher pre-selects high-interest articles Hashtags are commonly used by adolescents	Imagery	Hashtags visually represent a relationship between a character and his or her life event	Adaptiveness	Students make changes to produce a quality news article
Outcome Expectations	Students understand the difference in writing nonfiction versus fiction and can demonstrate this in writing.	Metacog-nition	Hashtags indicate accurate understanding of characters' experiences	Self-evaluative Standards	Students use rubric to self-regulate progress and quality

3.4.3 Creating a Thesis from the Analysis of Nonfiction Literature

As with her first lesson, Ms. Ruckert was strategic in planning and designing this lesson to be completed during class time. Again, such forethought was intentional and enhanced the chances for success by all students, and as mentioned above, she was highly aware of the self-regulatory challenges facing this student population. Ms. Ruckert states that as an educator, she feels responsible to attempt to meet all students where they are. Each phase of the lesson comprised a goal, which fed directly into the next phase of the lesson. For example, at the beginning of the Creating a Thesis from the Analysis of Nonfiction Literature lesson, students were referred back to high interest books they had read. The goal of selecting high interest books was to promote motivation and interest in nonfiction literature (Wigfield, Guthrie, Tonks, & Perencevich, 2004). The philosophy behind Ms.

Ruckert's grouping was to promote students' self-efficacy for reading and analyzing nonfiction literature. This was further promoted by allowing groups to select which Gladwell book to read, or handing over control to students, an important aspect of the lesson. Ms. Ruckert was cognizant that students would struggle with writing thesis statements, and attempted to set the stage for learning this skill and others addressed in the lesson.

In order to jumpstart the lesson, Ms. Ruckert leads a whole-class discussion, the goal of which is to help students understand and articulate differences between fiction and nonfiction writing, along with an introduction to creative techniques used by authors of nonfiction writing. The learning goal of understanding the rhetorical nature of specific writing techniques is further addressed by a close reading of the Hood (2012) article. Since the article is written at a level accessible to many high students, students' self-efficacy for identifying creative nonfiction techniques was enhanced. Prior to reading the Hood article, students were informed that they would be responsible for, on an individual basis, identifying and highlighting nonfiction writing techniques they noted in their Gladwell books. This simultaneously targeted the process of outcome expectations in Zimmerman's (2002) forethought phase: students were encouraged to prepare for the tasks of locating and using nonfiction-writing techniques. Reading the Hood article and other activities was instrumental in promoting students' self-efficacy for completing the assigned tasks (Zimmerman & Bandura, 1994). Through the preparation process for discussions with peers, phase one of Zimmerman's model is evident. Students knew they would be required to share creative nonfiction writing techniques they uncovered, and thus had to think about this goal and how to reach it. As with Ms. Ruckert's first lesson, peer models were expected to motivate students to complete the task. It was also expected that such collaboration would promote student self-efficacy for identifying creative nonfiction writing techniques.

As students identified techniques, shared findings with peers, and analyzed their books at a deeper level, Ms. Ruckert observed enhanced interest in the texts, as well as increased ability to discuss the nonfiction-writing techniques Gladwell uses. Such observations suggest students entered phase two of Zimmerman's model: they made relevant and meaningful connections and shared them with peers. During this process, one may assume the students became metacognitively aware of what they knew and did not know: an important aspect of self-regulation and self-regulated action (Kaplan, 2008). The process clearly prepared students for the next part of the lesson, and brought them a step closer to possessing strategies and skills required to frame arguments and develop thesis statements.

To encourage students to further enter phase two of Zimmerman's model, Ms. Ruckert started a whole-group discussion, during which she informed students they would be generating thesis statements based on author's purpose and writing techniques used by Gladwell. A discussion of craft choices was intended to enhance students' self-efficacy for writing coherent arguments and thesis statements. Explicitly communicating expectations provided students with the opportunity to set tangible goals. Giving students the Thesis Statement Template and Rubric provided a visual aid to help them successfully complete the task. Students had the

opportunity to use skills learned to produce quality and logical thesis statements. As students wrote initial thesis statements, identified three creative nonfiction techniques, and definitions of techniques on butcher paper, a collaborative learning environment was promoted, and students may have become more motivated. Ms. Ruckert, knowing the challenges many of her students face, used strategies conducive to all students' success and promoted attention, metacognition, and task strategies (Kaplan, 2008).

Since students created thesis statements and wrote down literacy techniques and definitions, they had the opportunity to move into phase three of Zimmerman's cycle, the self-reflection phase. Using handouts created by Ms. Ruckert, students could ascertain to what extent they met the performance standards of the assignment. While the extent to which students engaged in the self-reflection phase may be difficult to gage within the context of this lesson in isolation, it is believed that suggested follow up activities would be better indicators. Table 3.11 below provides highlights of the processes in the three phases of self-regulated learning used in the current lesson. While the processes in her lesson for the self-reflection phase are not clearly delineated, one can presume that students engage in the self-reflection phase during the writing and revising processes. It is at this time that students have the opportunity to truly become masters of their own learning and action, and as a result more self-efficacious about their abilities to complete the task successfully (Schunk et al., 2008).

As with lesson one, diverse outcomes were expected from both the performance and self-regulatory perspectives. That being said, it should be noted that students had the opportunity within the context of this lesson to evaluate their work. Ms. Ruckert's lesson on creating thesis statements provides a solid framework through which all three phases of Zimmerman's model may be attained.

Table 3.11 Creating a thesis from the analysis of nonfiction literature

Forethought Phase		Performance Phase		Self-Reflection Phase	
Process	Example from Lesson	Process	Example from Lesson	Process	Example from Lesson
Self-efficacy	Grouping of students at similar reading levels helped promote self-efficacy for reading the Hood article	Attention Focusing	Students identify and highlight creative nonfiction writing techniques used by Malcolm Gladwell	Self-satisfaction	Students share techniques they identify in their books with peers
Goal Setting	Students will identify and define nonfiction	Task Strategy	Students taught a strategy for generating a	Causal Attributions	Students understand nonfiction

(continued)

Table 3.11 (continued)

Forethought Phase		Performance Phase		Self-Reflection Phase	
Process	Example from Lesson	Process	Example from Lesson	Process	Example from Lesson
	writing techniques for their thesis statements		thesis statement using teacher created template		writing techniques
Intrinsic Interest	Teacher pre-selects 3 popular, high-interest nonfiction books, but allows groups to make the final decision on book they will read	Imagery	Thesis Statement Template provides a visual aid for students to organize their thoughts	Adaptiveness	Students make changes to techniques to make thesis statements logical
Outcome Expectations	Students understand specific writing techniques are used in nonfiction writing	Metacog-nition	As students brainstormed on three techniques to support a thesis, they become aware of their thoughts and understanding from peer discussion	Self-evaluative Standards	Students use thesis statement template and rubric to self-regulate progress and quality

3.5 Recommendations for Future Lessons

Given that self-regulatory strategies can be taught, lessons addressing any of the three Common Core (2012) writing standards would benefit from deliberate inclusion of a self-regulatory component. This is particularly important for students who struggle with both writing and self-regulation. Further, as students are taught to plan, organize, and execute a plan, self-regulatory strategies taught within the context of writing have the potential to transfer to other academic tasks. Such behaviors are associated with self-regulated learners. The fact that such deliberation is possible and has the potential for success was found by Griswold (2015) in a study designed to measure the effects of a self-regulated strategy development (SRSD) based writing intervention on the self-efficacy, writing apprehension, and writing performance of high school students. According to Harris, Graham, Mason, and Friedlander (2008), SRSD is an explicit, quality model of writing instruction that teaches students the strategies employed by skilled writers. Similar techniques

could be used to encourage the acquisition of self-regulatory strategy use in lessons designed to teach writing of multiple genres and across disciplines.

While some scholars argue against a process approach to writing instruction, given the challenges mentioned above, it could be argued that a process approach is simply a tool: one which can be modified to meet students where they are. It is, in a very general sense, a starting place to address the writing deficits inherent in American high school students. Ultimately, it is up to individual teachers of writing to decide what is appropriate for specific student populations. Since writing is a process, lessons designed to teach writing at the high school level are naturally conducive to the inclusion of self-regulatory strategies. Lessons which include specific processes designed to acquire and/or display skills such as planning, goal setting, reflection, and analysis (Zimmerman, 2002) are examples of how self-regulation may be addressed in the high school writing classroom.

Teachers of writing are encouraged to deliberately include self-regulatory strategy instruction in their lessons, should expect to model them, allow for independent student practice, and provide feedback. When designing lessons, writing teachers should consider where students are from both a writing and a self-regulatory perspective. Lessons which take these into account will be more effective. For example, putting students in groups according to where they are—from a self-regulatory perspective with regards to writing—might make it easier for teachers to implement quality writing lesson plans that incorporate self-regulatory strategies. Further, educators should assist students in comprehending how and why such strategies may be converted into positive academic outcomes. As with all lesson plans, educators must be cognizant of student strengths and weaknesses, and plan to scaffold accordingly.

In addition to promoting self-regulation within the teaching of writing, it is recommended that educators simultaneously attempt to enhance student self-efficacy for writing. Griswold (2015) found that the use of a process approach, modeling, guided practice, independent practice, and feedback boosted student self-efficacy for writing research papers. The advantage of a process approach that addresses writing tasks from start to finish is that it allows students to use strategies taught to complete a product and receive feedback. Such engagement in writing tasks is likely to increase student self-efficacy for writing (Bandura, 1997).

3.6 Recommendations for Future Research

It is apparent that gaps exist in the research on self-regulation and writing. It is important that creators of writing interventions and lesson plans understand that students will not necessarily make the transition from the observational level of self-regulation to the self-regulated level in a single lesson or by completing a single assignment. Future research on writing and self-regulation should reflect an understanding that students differ in writing skills and self-regulatory ability (Schunk & Zimmerman, 2007). While there have been calls for disciplinary literacy

(Shanahan & Shanahan, 2014), there remains a need for quality writing instruction that includes a self-regulatory component. Interventions including sound strategies for planning, organizing, and revising research papers should lay the foundation for writing instruction at the high school level. Such interventions must embed the teaching of self-regulatory strategies to help students understand exactly how and when to apply such strategies, for example through modeling. Since teachers spend the most time with students, researchers should partner with teachers to create and implement quality lesson plans that promote writing skills and self-regulatory processes. Through collaborative planning and assessment, researchers and educators have the potential to positively impact student writing outcomes, while aligning with Common Core standards.

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Part III
Social Studies: World History, Civics, and Economics, U.S. History (Three Lessons)

Chapter 4
Self-regulated Learning in the Social Studies Classroom

Dale H. Schunk, Wayne Journell, Amber Alford, Jennifer Watson and Michael Belter

Abstract Research on self-regulated learning in the social studies curriculum is under-represented relative to other secondary disciplines such as reading and science. Yet examination of three social studies lessons reveals multiple instances of teachers implementing the phases, levels, and processes of self-regulated learning. Social studies lessons and narratives on world history, civics, and U.S. history are presented. The ensuing commentary discusses how these social studies teachers incorporate the phases, levels, and processes of self-regulated learning into their instruction. Recommendations are made for further research on self-regulated learning in social studies and on ways to enhance self-regulation in the social studies classroom.

D. H. Schunk (✉) · W. Journell
The University of North Carolina at Greensboro, Greensboro, USA
e-mail: dhschunk@uncg.edu

W. Journell
e-mail: awjourne@uncg.edu

A. Alford
Walkertown High School, Walkertown, NC, USA
e-mail: acalford@wsfcs.k12.nc.us

J. Watson
East Forsyth High School, Kernersville, NC, USA
e-mail: jcwatson@wsfcs.k12.nc.us

M. Belter
Rockingham County High School, Reidsville, NC, USA
e-mail: mbelter@rock.k12.nc.us

M. K. DiBenedetto (ed.), *Connecting Self-regulated Learning and Performance with Instruction Across High School Content Areas*,
https://doi.org/10.1007/978-3-319-90928-8_4

Table 4.1 Do the benefits of a sedentary lifestyle outweigh the costs? Lesson plan

Teacher: Amber Alford, B.A. in History, M.A. in Education, NC Professional Teaching License, 9–12 social studies	**Grade Level(s)**: 9–12 This lesson was written with 9th graders in mind
School: Walkertown High School	**Subject**: World History
City and State: Walkertown, NC	
Instructional Plan Title: Do the benefits of a sedentary lifestyle outweigh the costs?	
North Carolina Essential Standards: WH.H.2.9 Evaluate the achievements of ancient civilizations in terms of their enduring cultural impact **Common Core State Standards**: CCSS.ELA-LITERACY.SL.9-10.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively CCSS.ELA-LITERACY.SL.9-10.1.A Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas CCSS.ELA-LITERACY.SL.9-10.1.C Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions **C3 Framework for Social Studies State Standards**: Dimension 1: Developing Questions and Planning Inquiries Dimension 3: Evaluating Sources and Using Evidence Dimension 4: Communicating Conclusions and Taking Informed Action	
Learning Objectives: 1. Students will evaluate the costs and benefits of the Neolithic Revolution 2. Students will deliberate with their classmates about their opinions on the inquiry question of "do the benefits of a sedentary lifestyle outweigh the costs?"	
Instructional and Learning Materials Needed: Prior knowledge about the Neolithic Revolution, Jared Diamond's (1987) Article "The Worst Mistake in the History of the Human Race," available at http://discovermagazine.com/1987/may/02-the-worst-mistake-in-the-history-of-the-human-race, large room with chairs, seating chart, paper, pen, rubric, blog access, and seminar rubric (see Table 4.2 at the end of the lesson plan)	
Lesson Duration: One 90-min class period and homework the day before	
Teaching and Learning	

Min on this Activity	Targeted Activity	Purpose of Activity
5	**Orienting Students to Lesson**: • Students respond to warm up question: "How do you or your parents get food for dinner?" while the teacher takes attendance	• This warm up question serves as an introduction to the day's lesson • It sets the framework for discussing the differences between growing food and hunting/gathering for food

(continued)

Table 4.1 (continued)

15	**Motivation**: • Students watch John Green's Crash Course World History #1. https://www.youtube.com/watch?v=Yocja_N5s1I • Following the video, the class discusses ideas about John Green's opinion of the Neolithic Revolution • Students are told they will be asked to formulate their own opinions of the Neolithic Revolution at the end of class	• John Green's Young Adult books and Crash Course World History videos are very popular among students and will help motivate students to learn the lesson • Video serves as review of prior day's lesson • John Green also mentions several of Diamond's opinions in "The Worst Mistake"
40	**Whole Class Instruction**: • Students will be divided into two groups (A and B) to participate in a whole class seminar • The large overarching question for the seminar is "Do the benefits of a sedentary lifestyle outweigh the costs?" • The night before, as they read the Diamond article, students developed two questions they want to ask during the seminar. They should tweet these questions to the teacher with the hash tag #WHSseminar1 • During the first half of period, students in group A will be in the inside circle, actively participating in the seminar while group B is on the outside circle taking notes on the seminar • After 20 min groups can be switched making group B the discussion group and group A the note taking group • There is always a "hot seat" in the discussion ring, which allows students on the outside to jump into the discussion if they have something really important and pressing they want to share • As students participate in the seminar, the teacher plays the role of facilitator, asking questions and providing guidance when necessary	• The seminar discussion allows students to practice engaging their peers in an intellectual discussion. Due to the nature of discussions, the students may find that they do not always agree with one another. This format allows them to learn how to respectfully disagree with each other • Students also learn how to support their opinions with facts and evidence • Students creating seminar questions promotes student buy-in into the discussion and gives students confidence during the seminar itself (because they should be able to answer at least two of the questions asked, their own • Having students tweet questions also allows shy students or those lacking confidence in the seminar process to review the questions prior to class and can be prepared to answer at least a few questions • Students take notes in the outside circle so they have some written material to refer to when completing their blog post
20	**Guided Practice/Providing Feedback**: • Students then log onto the class blog and respond to the blog post that corresponds with the overarching seminar question. • For homework students reply to two other posts by their classmates	• Asking students to write their answers to the seminar question allows students to take the information they have heard and learned and formulate this information into a well-reasoned and supported answer

(continued)

Table 4.1 (continued)

	• The teacher also replies to each post to provide feedback in addition to the seminar rubric given to each student	• Asking students to reply to each other illustrates the importance of seeing other opinions and gives students the ability to practice agreeing and disagreeing respectfully and with evidence and support
	Evaluation of Learning and Assessments: • The teacher reads and replies to each blog post • Students also are given a grade for their seminar based on their outside circle notes and the comments they made during the seminar	• This feedback allows students to see where they need more evidence and when they have answered the question fully with interesting thoughts
10	**Closing Activities**: • Students answer an open ended Polleverywhere.com poll, which allows students to respond to questions anonymously while allowing for a look at how the class responded as a whole • Students will be asked to respond to the overarching seminar question with at least one example they hadn't thought about prior to today's class	• Answering in this format makes students summarize their opinions quickly and succinctly • This format also allows the teacher and other students to view and discuss the class' responses.

Specific Strategies used to Address Exceptional Students and/or Students for whom English is a Second Language:

- To address advanced students, assign the enrichment activity of having students research the gender differences that occurred as a result of the Neolithic Revolution to see if this adds or changes their original argument
- To differentiate for students with learning difficulties or students who are English Language Learners, edit the Diamond article to make it shorter in length
- Another adaptation would be to meet with students prior to class to discuss one or two of the questions that will be asked during the seminar. English Language Learners could also practice saying their responses out loud prior to class so that they are confident during the seminar

Table 4.2 Seminar rubric for world history

SEMINAR RUBRIC

Seminar Title: _____Seminar Date:_____

Student Name:_____

ARGUMENTS		
Arguments: ▪ are relevant ▪ are clearly stated ▪ relate to the general path of the discussion ▪ add new ideas to the seminar (necessary for a "10")	10 5 9 4 8 3 7 2 6 1	COMMENTS:
EVIDENCE		
Evidence: ▪ is accurate ▪ is specific ▪ relates closely to arguments being made ▪ is cited where necessary and appropriate	10 5 9 4 8 3 7 2 6 1	COMMENTS:
MECHANICS		
Student: ▪ invites others into the discussion where necessary ▪ is respectful of others even in disagreement ▪ does not dominate conversation or hide ▪ draws interesting things out of others (necessary for a "5")	5 4 3 2 1	COMMENTS:
TOTAL		
	___/25	GENERAL COMMENTS:

4.1 Narrative of the Do the Benefits of a Sedentary Lifestyle Outweigh the Costs? Lesson

I teach at a rural, public high school that opened 5 years ago in North Carolina. We graduated our first class of seniors 2 years ago. The student body is approximately 60% White, 30% African-American, and 10% Latino/a. My classes tend to mirror the overall student demographics of the school (Table 4.1).

Teaching at a new school is nice because we have numerous technological devices available for daily use in our classrooms such as a classroom performance system, big screen TV, desktop computers and iPads. I have used this lesson with a variety of ninth grade World History classes, including a standard level class of 28, in which 6 students had Individualized Education Plans (IEPs) and with seminar classes (a step above Honors in my district) as small as 16 students, where none had IEPs. This lesson is easily modified to fit a class of any size with all kinds of learners. I have also conducted the actual lesson in both the media center and in my classroom. For larger classes, I suggest the media center. The media center also gives the seminar a more formal feeling which sometimes leads to more intellectual discussions. However, having the seminar in the classroom can also allow students to feel more comfortable and thus students are more willing to talk and participate. The classroom teacher has several options.

In order to carry out this lesson smoothly, there is a bit of work that must be assigned prior to the day I am planning to conduct the seminar. One to two days before the seminar students are required to read, "The Worst Mistake in the History of the Human Race" (Diamond, 1987). As they read, students annotate the reading with their comments and questions, paying careful attention to the things they agree and disagree with. This article can be modified in length and in word choice for struggling readers. In addition to this reading, students are taught about the Neolithic Revolution. They discuss how this is the shift from hunting and gathering to farming and domestication, paying close attention to how this revolution changed society from a nomadic lifestyle to a sedentary, civilization based society. The content of this lesson aligns with the North Carolina Essential Standards for world history (North Carolina Department of Education, 2016), and the use of seminar as a means to answer an inquiry aligns with the goals of the Common Core (Common Core State Standards, 2016a, 2016b) and the C3 Framework (National Council for the Social Studies, 2013).

After the reading and lesson on the Neolithic Revolution, students are told that they will be participating in a whole class seminar discussion focused on the question, "Do the benefits of a sedentary lifestyle outweigh the costs?" As a ticket into the seminar, they provide two questions via Twitter that they want addressed at the seminar, such as, "How is domesticating animals better than farming?," "What do people do with all their new-found free time?," and, "Do people really have more free time?." I have my students post their questions to Twitter using a unified hash-tag (such as WHseminar1). The benefit of this is that I can see the questions quickly at any point of the day and can give students feedback. Examples of feedback include, "Great question!" or, "You seem to be asking two or three different things in this question, can you rewrite and simplify?" If students have not tweeted their two questions in advance of the seminar, they are not allowed to participate.

Another benefit of this method is that students access Twitter before the seminar to see what questions will be asked, so they can prepare ahead of time. I find this

helps English as a Second Language Learners (ESL), exceptional students, and students who are shy or lacking self-confidence. By allowing them to prepare ahead of time, they are more confident in the seminar and are more willing to participate. Students who do not use Twitter accounts or are not allowed to create them can bring the questions to me the day before, and I will tweet their questions for them. I also print off the questions posted so far, so that these students have the chance to prepare.

The day of the lesson I arrange my room in the seminar style, or I reserve the media center and arrange the chairs there in the seminar format. To set up the seminar, I put half of the chairs in a small inner circle including two extra chairs for the seminar facilitator and the "hot seat"). The other half of the chairs is arranged in a larger outside circle at tables or with desks that students can use to take notes. As students come into class they sit in their previously assigned inside or outside circle chair and complete the warm-up activity by writing a response to the question, "How do your parents get the food you eat for dinner?" As they are completing their warm-up, I take attendance. After students have had a chance to answer the question, we discuss their answers. Hopefully, they have answered something like "the store" or "the restaurant," which will allow us to begin our discussion of the differences between growing food and hunting/gathering for food. If students do not answer questions in this way, I ask guiding questions to get them to this point.

After the warm-up, students watch John Green's Crash Course World History #1 video. This video serves as a review of the prior day's lesson and as an introduction into today's discussion. John Green does a good job presenting all sides of the Neolithic Revolution, as we are hoping students will do in the seminar as well. After the video, students begin the seminar discussion. They have their copies of the Diamond article, as well as any notes they think will be useful during the discussion. They also have some blank notebook paper to take notes on when sitting on the outside circle.

To conduct the seminar, the facilitator (normally me, the teacher) poses questions to the inside circle. These students have been instructed on how to participate in seminar discussions. They should not raise their hands or dominate the conversation; rather, they should yield to one another naturally. The class also is told of the hot seat. This is the one open chair in the inner circle reserved for anyone on the outside circle. If someone in the outside circle has a point to make, they move to the hot seat. The inner circle immediately yields to the hot seat; the person in the hot seat makes their point, and then returns to the outside circle. This can happen as often as the students wish. The facilitator keeps the questions moving at an appropriate pace, not too fast, but also not too slowly. These questions are taken from the ones students posted to Twitter. I also ask one student on the outside circle to be my recorder. He or she makes a seating chart and tallies which students speak.

When the seminar is almost over for this group of students, I ask the recorder to pass me his or her sheet, so I can pointedly pose questions to some students who have said very little. This is my way of ensuring that everyone has a chance to speak in the seminar.

I also fill out a rubric (Table 4.2) on seminar performance as my students are participating in the discussion. I use the same rubric for every seminar we do throughout the course, and students are given a copy at the beginning of the semester. The rubric covers the strength and clarity of their points as well as their behavior; for example, did they "hide" or "dominate" or disrespectfully disagree with a peer? Halfway through the allotted seminar time I switch the circles so that everyone has the opportunity to be on both the inside and outside.

When the seminar is over, students log onto the class blog to respond to a post that corresponds with the overarching seminar question. The blog post is open ended and asks students to reflect on the seminar and summarize an answer to the overarching seminar question; for example, "How did the seminar go?," "Were your thoughts well received?," "Did other people agree with you?," "Did they disagree with you?," or "Did someone say something that caused you to change your opinion?" For homework, students respond to two posts made by their classmates. I also respond to each blog post to offer feedback on students' thoughts on the seminar.

As they finish their blog posts they are given the code to the polleverywhere.com question for the day. The question is the same overarching question from the seminar and is an open-ended poll question; although there is no character limit on what students post, most responses that are akin to phone text messages in length. These responses then show up on the polleverywhere.com screen, which is projected in the front of the room. The texting simulation offered by polleverywhere.com makes students summarize their thoughts in a succinct fashion. This serves as their "ticket-out-the-door."

Seminar discussions work well for ninth-graders for a variety of reasons. First, students love to talk, and this gives them an opportunity to do so in class. Second, it forces them to think about their ideas and opinions and communicate them clearly and articulately. Third, this lesson engages students because it is so different from the lecture and note-taking or worksheet type of class. The seminar can be difficult when students do not do the reading or they are not prepared. One way to combat this issue is to make the reading a separate grade. Having students post their questions the day before can also help ensure that students are doing the reading, thinking about the topic, and preparing for the seminar. Another challenge I have found is that the discussion can be divided by gender. Freshmen girls tend to be a bit shy when it comes to these discussions; they may not say much or be disagreeable. Freshmen boys, however, tend to dominate and take over the conversation. I find that a balance between males and females in each circle helps manage this challenge. I conduct a seminar like this for almost every unit in World History. It is a good summative assessment that differs from the standard multiple choice test. The more controversial the topic, the more engaged the students become.

Table 4.3 The declaration of independence: the greatest complaint letter ever lesson plan

Teacher: Jennifer Watson, B.A. History and Psychology UNC Chapel Hill, M.A.E.D. Wake Forest University, NC Professional License—Secondary Education, 9-12 social studies	**Grade Level(s)**: 10th grade
School: East Forsyth High School	**Subject**: Civics and Economics
City and State: Kernersville, NC	
Instructional Plan Title: The Declaration of Independence: The Greatest Complaint Letter Ever	
North Carolina Essential Standards: C&G 1.1 Explain how the tensions over power and authority led America's founding fathers to develop a constitutional democracy C&G 1.2 Explain how the Enlightenment and other contributing theories impacted the writing of the Declaration of Independence, the US Constitution, and the Bill of Rights to help promote liberty, justice and equality **Common Core State Standards**: CCSS.ELA-Literacy.RH.9-10.5 Analyze how a text uses structure to emphasize key points or advance an explanation or analysis **C3 Framework for Social Studies State Standards**: Dimension 1: Developing Questions and Planning Inquiries Dimension 2: Applying Disciplinary Concepts and Tools	
Learning Objectives: 1. Students will understand the reasons for colonial unrest and rebellion, such as British control and taxation, and ways in which the American colonists responded 2. Students will produce a song or rap rewrite of the Declaration of Independence, emphasizing natural rights and colonial grievances	
Instructional and Learning Materials Needed: Textbook, PowerPoint, Internet Access, Seminar Rubric (see Table 4.4), Exit Slips (see Table 4.5 at the end of the lesson plan)	
Lesson Duration: 120 min (1.5 class periods)	
Teaching and Learning	

Min on this Activity	Targeted Activity	Purpose of Activity
5	**Orienting Students to Lesson**: • Students write down the answer to their two-minute drill question: What would you include in a protest letter to our school superintendent? • Possible answers include lunch period too short, too much homework, etc	• The two-minute drill engages students in the lesson by equating the colonial protests to a concern they have regarding their education/school experience
5	**Motivation**: • Teacher projects information about a pretend locker tax that students will be required to pay. The students will react with anger and frustration • Teacher then tells the students that the tax is not real, and then asks students if	• The locker tax activity captures interest by using an example that is relevant to students' lives, as well as activates prior knowledge about taxation without representation • This activity serves as the introduction to the lesson

(continued)

Table 4.3 (continued)

	there have been other times that they have felt like they didn't have a voice • Teacher connects the hypothetical example to the experiences of the colonists. The class discusses how the colonists felt regarding taxation without representation	
40	**Whole Class Instruction**: • The instruction begins with students reading the text of the Declaration of Independence and answering a series of questions for each section of the document • The teacher monitors student success and helps guide students who are struggling • After students have analyzed the document, the teacher goes over the answers to the questions • Then, students view a PowerPoint presentation outlining facts about the writing and signing of the Declaration	• The purpose of this instruction is to familiarize students with the Declaration of Independence text, so that they may understand the fundamental goal of the Second Continental Congress in drafting the document • Students also examine how the document was organized (preamble, natural rights, grievances, and conclusion) and analyze each section, focusing on Jefferson's intent and tone
35	**Guided Practice/Providing Feedback** • Students work in groups of three or four to rewrite the Declaration in the form of a song or rap. The product must include 4 sections (preamble, rights, grievances, and conclusion) • Students view two online videos (Declaration: Too Late to Apologize: A Declaration http://www.schooltube.com/video/e1895c4c1683c3124733/Too-Late-to-Apologize-A-Declaration and Jib Jab rap video We Declare Independence https://www.youtube.com/watch?v=5n98oj2OvEw) that demonstrate great examples of Declaration rewrites • The teacher monitors student progress during the planning stage and offer appropriate feedback • Students present songs/raps during the next class period	• This activity allows students an opportunity to practice the concepts that they have learned (inalienable rights, consent of the governed, national rights) by creating an original product
30	**Independent Practice**: • Students write a protest letter to our superintendent using the same	• Students are able to demonstrate mastery of the concepts presented in the lesson through this protest letter

(continued)

Table 4.3 (continued)

	four-section structure as the Declaration of Independence • This letter is assigned as homework, but can be worked on in class as well. Students receive a homework grade for this assignment	
	Evaluation of Learning and Assessments: • Students are assessed using summative methods (Rap or song and homework letter) using detailed rubrics (Table 4.4) • Formative assessments include text-directed teacher questioning, and peer assessments (after the presentations) in which students give a "grade" to their classmates; there is no rubric for this assessment	• Combining summative and formative assessments will allow students various methods of feedback
5	**Closing Activities**: • Students complete an exit slip (Table 4.5), answering the following question: Explain why it might have been risky for the signers of the Declaration of Independence to approve this document	• The closing provides the teacher a quick way to assess if students understand the impact of the document as well as provide an opportunity for students to expand on what they have learned in this lesson
Specific Strategies used to Address Exceptional Students and/or Students for whom English is a Second Language: • ESL students or students with learning disabilities are provided an annotated version of the text to assist them in the text directed questions • Advanced students can be assigned an enrichment activity (for example, comparing the Declaration of Independence to the French Declaration of the Rights of Man). They can make this comparison using a Venn Diagram		

Table 4.4 Seminar rubric for civics

	Excellent	Good	Satisfactory	Needs Improvement	Points Earned
Creativity	The rap contains many creative details and/or descriptions that contribute to the reader's enjoyment. The student has really used his imagination	The rap contains a few creative details and/or descriptions that contribute to the reader's enjoyment. The student has used his imagination	The rap contains a few creative details and/or descriptions, but they distract from the story. The student has tried to use his imagination	There is little evidence of creativity in the rap. The student does not seem to have used much imagination	/15
Focus on Topic	There is one clear, well focused topic. Main idea stands out and is supported by detailed information	Main idea is clear but the supporting information is general	Main idea is somewhat clear but there is a need for more supporting information	The main idea is not clear. There is a seemingly random collection of information	/15
Vocabulary Inclusion	Writer uses five or more specified words and phrases that demonstrate the reader's own knowledge, and the choice and placement of the words seems accurate, natural and not forced	Writer uses at least five specified words and phrases that demonstrate the reader's own knowledge, and the choice and placement of the words seems accurate, natural and not forced	Writer uses four specified words and phrases that demonstrate the reader's own knowledge, and the choice and placement of the words seems accurate, natural and not forced	Writer uses three or less specified words and phrases that demonstrate the reader's own knowledge, and the choice and placement of the words seems accurate, natural and not forced	/15
Introduction (organization)	The introduction is inviting, states the main topic and previews the structure of the rap (10 points)	The introduction clearly states the main topic and previews the structure of the rap but is not particularly inviting (9–8 points)	The introduction states the main topic, but does not adequately preview the structure of the rap nor is it particularly inviting (7–6 points)	There is no clear introduction of the main topic or structure of the rap (5–0 points)	/15

(continued)

Table 4.4 (continued)

	Excellent	Good	Satisfactory	Needs Improvement	Points Earned
Content—Accuracy	All facts in the song/rap are historically accurate	99–90% of the facts in the comic are historically accurate	89–80% of the facts in the comic are historically accurate	Fewer than 80% of the facts in the comic are historically accurate	/25
Performance			The student performed the rap in front of the class	The student performed the rap in front of the class with music	/25
Total					/110

Table 4.5 Exit slip

Exit Slip	
3	Things I Learned Today …
2	Things I Found Interesting …
1	Question I Still Have …

4.2 Narrative of the Declaration of Independence: The Greatest Complaint Letter Ever Lesson

My high school is a public school with an enrollment is 1,841 students, the second largest in the county. The school opened in 1963 and is in need of building improvements. The majority of classrooms are not equipped with any advanced technology. My classroom is one of a few equipped with a solutions cart with a

desktop and a document camera, as well as a large flat screen TV for projecting notes and videos. For years, the only access to technology for the students was an outdated computer lab and a media center lab. As of this year, a Maker Space grant in collaboration with a local university has given students access to a class set of laptops and iPads.

My classes are academically diverse. I teach varying levels of Civics and Economics: one standard, one honors, and one seminar. Class sizes range from 18 in the seminar to 34 and 32 in the standard and honors classes, respectively. The standard class has seven students with Individualized Education Plans or 504 plans, and the class also contains four ESL students. In all of the classes, the majority of my students are White with anywhere from three to five students in each class who identify as African-American or Latino/a. My lesson (Table 4.3) works well with these diverse classes because it can be easily modified for differing academic levels (Table 4.4).

I use this lesson, entitled "The Declaration of Independence: The Greatest Complaint Letter Ever," in all of my classes, regardless of the academic level, although I adapt certain aspects of the lesson depending on the group. It addresses the North Carolina Essential Standards for Civics and Economics (North Carolina Department of Education, 2016), as well as the Common Core State Standard (Common Core State Standards, 2016a, 2016b) of creating and presenting a coherent argument. Finally, it also addresses Dimensions 1 and 2 of the C3 Framework (National Council for the Social Studies, 2013). The lesson begins as soon as the students enter the classroom. Every day the students have a "two minute drill" during which students respond in their notebooks to a posed question related to the day's lesson. The "two minute drill" serves as an effective way to engage students and focus them on that day's lesson. For this highlighted lesson, students respond to the following question: What would you include in a protest letter to our superintendent? Possible answers include lunch periods that are too short, too much homework, and not enough fun in school. Once we discuss student answers, we compare their concerns with our previous day's discussions about colonial protests regarding taxation without representation. We center our talks on how it feels when your complaints are not addressed or validated.

After the warm-up, I increase engagement by projecting a pretend locker tax that students must pay. In the pretend scenario, students will be charged a four dollar monthly tax for their lockers, and this tax will be used to make improvements to the state's department of education buildings. My students usually respond with anger and frustration, saying that they will not pay this ridiculous tax. Once I inform the students that the tax is not real, we discuss how they felt at being taxed without being given an opportunity to voice one's opinions. We again relate these emotions back to the previous day's lesson regarding the colonists' anger and frustration. This brief activity serves as a great introduction to the lesson and makes our discussions relevant to my students' lives.

The whole class instruction begins with students reading the Declaration of Independence and answering a set of text-directed questions. For many students, this reading is the first time they have analyzed the document. The questions are drafted so that students may reach a greater understanding of the four sections of the document: the preamble, or the purpose in drafting the Declaration; the natural rights section where Jefferson discusses life, liberty, and the pursuit of happiness and the concept of consent of the governed; the grievances section where Jefferson outlines in great detail the abuses the colonists have suffered at the hands of King George; and the conclusion, which explains what the United States will be able to do as a new and sovereign nation. Seminar students are given the Declaration as it was written; my exceptional and ESL students are given annotated versions to help their understanding. I monitor this activity to make sure students are finding answers and not becoming frustrated. After the allotted time, I review answers with the students. For the exceptional and ESL students, I provide a typed answer sheet to assist them in filling in their own note sheet. When we have finished reviewing answers, I present a "fun facts" PowerPoint to give students interesting pieces of information regarding the famous document.

The guided practice activity for this lesson is one of my favorites and is an example of reciprocal teaching (Palincsar & Brown, 1984), in that students take turns leading the group while others provide feedback. In this format, students are better able to comprehend the text of the Declaration using a different, student-generated format. Students work in groups of 3 or 4 to rewrite the Declaration in the form of a rap or song. Students' products must include the Declaration's four sections (preamble, natural rights, grievances, and conclusion) and must contain a minimum of four lines per section. I give students the freedom to choose their groups, so that they feel comfortable performing their rap or song in front of the class. I also allow time during the next class period to finalize group work and begin performances. As inspiration for the activity, I show the students two videos: "Too Late to Apologize: A Declaration," and "JibJab.com-We Declare Independence," which provide excellent and entertaining examples of Declaration rewrites. I monitor student progress during the planning stage and provide feedback to groups as necessary.

To conclude the day's lesson, students complete an exit slip (Table 4.5) during the last few minutes of class in which they explain why it might have been risky for the signers of the Declaration of Independence to approve such a document. The exit slip is completed on a sheet of paper and turned in as students leave the classroom. The closing activity provides a quick assessment of students' understanding of the impact of the document and an opportunity for students to expand on what they have learned in this lesson. Students also receive additional practice

with the concepts during the next class period. After the song/rap performances, students are assigned the following independent practice: Write a protest letter to the superintendent of the school system using the same four section format as the Declaration. This independent practice is formally assigned as homework, but I allow some time to work on it during the class period. The assignment also serves as an extension of the previous lesson's "two-minute drill" question.

This lesson allows students to tap into their creativity and incorporate music and technology in a fun and motivating way. However, there are some challenges to the lesson. My regular level and honors students are sometimes reluctant to perform their song and raps in front of the class. I have created a scoring rubric to encourage students to perform. The highest grade they can receive if they read their product to the class is an 85. They receive an additional 15 points for performing the rap or song and an additional 25 points for performing with music (the highest grade they can receive is a 110). I also show students videos of previous student performances to help encourage them. The students are supportive of one another and often pleasantly surprised to observe how many of their classmates are musically talented.

Another difficulty can be the challenging vocabulary and complex language that Jefferson used in the Declaration. Students often struggle with reading it and view the document as "boring." I attempt to promote the document by making relevant connections. The You Tube videos and "fun facts" PowerPoint presentation are also attempts to make the Declaration a more exciting and stimulating work to them. My hope is that they develop a respect for the Declaration while also gaining more confidence working with primary sources.

Table 4.6 DBQ (document based question) on the Korean War lesson plan

Teacher: Michael Belter, National Board Certified	**Grade Level(s)**: 10–12
School: Rockingham County High School	**Subject**: American History
City and State: Reidsville, NC	
Instructional Plan Title: DBQ (Document Based Question) on the Korean War	
North Carolina Essential Standards: AH.2.H.6.2 Explain the reasons for United States involvement in global wars and the influence each involvement had on international affairs (e.g., Spanish-American War, WWI, WWII, Cold War, Korea, Vietnam, Gulf War, Iraqi War, etc.)	
Common Core State Standards: CCSS.ELA-LITERACY.RH.11-12.6 Evaluate authors' differing points of view on the same historical event or issue by assessing the authors' claims, reasoning, and evidence	

(continued)

Table 4.6 (continued)

CCSS.ELA-LITERACY.RH.11-12.8 Evaluate an author's premises, claims, and evidence by corroborating or challenging them with other information
C3 Framework for Social Studies State Standards: Dimension 1: Developing Questions and Planning Inquiry Dimension 2: Applying Disciplinary Concepts and Tools
Learning Objectives: 1. Students will become familiar with reading and critiquing a historical passage by defining key concepts 2. Students will demonstrate understanding of a historical passage by accurately responding to questions
Instructional and Learning Materials Needed: video on The Korean War (https://www.youtube.com/watch?v=4VdXTw4q6y8), background passage from History.com (see the supplemental materials end of the lesson plan), worksheet with key terms and questions (see the supplemental materials, Tables 4.7–4.10 at the end of the lesson plan)
Lesson Duration: This is the introductory lesson to teaching students how to write a DBQ (Document Based Question). The unit lasts approximately five class meetings which are in blocks of 90 min

Teaching and Learning

Min on this Activity	Targeted Activity	Purpose of Activity
5	**Orienting Students to Lesson**: • Capture students' attention by asking them to imagine having to make a decision about whether or not to use a nuclear weapon against a nation	• Students' interest is sparked when considering the ethical and political issues involved in making serious life-and-death decisions
15	**Motivation**: • The teacher reviews the decision to use the atomic bomb on Hiroshima and Nagasaki and the benefits/consequences of doing so • Students are shown 15 min of a short video from the History Channel's *The Century: America's Time* from the episode entitled, "The Best Years 1946–1952"	• The teacher builds on the previous knowledge about the beginning of the Cold War and the next crisis facing the United States: Korea • The video grabs the students' attention and helps lay the foundation for the lesson
15	**Whole Class Instruction** • The lesson segues into a brief discussion of what happened when Communist China expanded and the Soviet Union obtained the atomic bomb • After distributing the historical passage on Korea and worksheet the teacher models how to read a historical passage	• The discussion prompts students to think about hypothetical consequences to world events • Modeling helps students learn how to look for important elements in the passage • Going back-and-forth to the video helps students make connections

(continued)

Table 4.6 (continued)

	• The teacher stops reading at certain times and replays excerpts from the video to highlight key points	between the passage and real-life situations
20	**Guided Practice/Providing Feedback**: • The teacher scaffolds students on how to use the context of the passage to define important concepts • The class reads the question: "Should the U.S. use nuclear weapons against North Korea and China in the Korean War?" which prompts students to begin thinking about the final assignment: the DBQ essay	• Teacher helps build vocabulary acquisition and strategies for understanding meaning within contexts • The question helps students stay focused on the current lesson when they know what their final task will be
25	**Independent Practice**: • Students individually answer the background questions to demonstrate comprehension of the text	• Questions are targeted at helping students articulate in writing their understanding of the terms and passage
N/A	**Evaluation of Learning and Assessments**: • The teacher informally monitors independent work through observations and formally by collecting and grading their responses and providing feedback	• These are in a series of assessments which culminate in the DBQ essay
10	**Closing Activities**: • Once questions are collected, the teacher highlights what will be covered in the next class: i.e. how to read primary source documents	• Providing students with information about the forthcoming class helps student prepare mentally
Specific Strategies used to Address Exceptional Students and/or Students for whom English is a Second Language: • Students with special needs are provided with questions modified to their level		

Table 4.7 DBQ background reading

Since the beginning of the 20th century, Korea had been part of the Japanese empire, but after Japan was defeated in World War II the Americans and the Soviets decided what should be done with their enemy's imperial possessions. Korea was divided in half along the 38th parallel. The Russians occupied the area north of the line and the United States occupied the area to its south.

By the end of the decade, two new states had formed on the peninsula. In the south, the anti-communist dictator Syngman Rhee was supported by the American government; in the north, the communist dictator Kim II Sung was supported by the Soviet Union. Neither dictator was content to remain on his side of the 38th parallel, however, and border skirmishes were common. On June 25, 1950 North Korea invaded South Korea.

The North Korean invasion came as an alarming surprise to American officials. As far as they were concerned, this was not a simply border dispute between two unstable dictatorships on the other side of the globe. Instead, many feared it was the first step in a communist campaign to take over the world. For this reason, nonintervention was not considered an option by many top decision makers.

"If we let Korea down," President Harry Truman said, "the Soviet[s] will keep right on going and swallow up one [place] after another." The fight on the Korean peninsula was a symbol of the global struggle between east and west, good and evil. As the North Korean army pushed into Seoul, the South Korean capital, the United States readied its troops for a war against communism itself.

At first, the war was a defensive one—a war to get communists out of South Korea—and it went badly for the Allies. The North Korean army was well-disciplined, well-trained and well-equipped; South Korean forces, by contrast, were frightened, confused, and seemed inclined to flee the battlefield at any provocation.

By the end of the summer, President Truman and General Douglas MacArthur, the commander in charge of the Asian theater, had decided on a new set of war aims. Now, for the Allies, the Korean War was an offensive one: It was a war to "liberate" the North from the communists.

Initially, this new strategy was a success. A daring beach invasion at Inchon pushed the North Koreans out of Seoul and back to their side of the 38th parallel. But as American troops crossed the boundary and headed north toward the Yalu River, the border between North Korea and Communist China, the Chinese started to worry about protecting themselves from what they called "armed aggression against Chinese territory." Chinese leader Mao Zedong sent troops to North Korea and warned the United States to keep away from the Yalu boundary unless it wanted full-scale war.

This was something that President Truman and his advisers decidedly did not want: They were sure that such a war would lead to Soviet aggression in Europe, the deployment of atomic weapons and millions of senseless deaths. To General MacArthur, however, anything short of this wider war represented "appeasement," an unacceptable knuckling under to the communists.
As President Truman looked for a way to prevent war with the Chinese, MacArthur did all he could to provoke it. Finally, on March 1951, he sent a letter to Joseph Martin, a House Republican leader shared MacArthur's support for declaring all-out war with China—and who could be counted upon to leak the letter to the press. "There is," MacArthur wrote, "no substitute for victory" against international communism.

Your task: Write an essay that answers the question

Should the U.S. use nuclear weapons against North Korea and China in the Korean War?

Background reading vocabulary and questions:

Define the terms:

38th parallel:

Dictatorship:

Communism:

Aggression:

Deployment:

Answer the background reading questions

1. What happened to Korea right after World War II?

2. How did the Korean War start?

3. Why did President Truman think that we needed to take military action in South Korea?

4. What was General MacArthur's goal in the Korean War?

5. Why did President Truman want to avoid an all-out war with China and North Korea

Table 4.8 Primary sources for Korean War lesson

Document A

"We do not want to see the conflict in Korea extended. We are trying to prevent a world war—not to start one. The best way to do that is make it plain that we and the other free countries will continue to resist the attack.

But you may ask why we can't take other steps to punish the aggressor. Why don't we bomb Manchuria and China itself? Why don't we assist Chinese Nationalists troops to land on the mainland of China?

If we were to do these things, we would be running a very grave risk of starting a general war. If that were to happen, we would have brought about the exact situation we are trying to prevent.

If we were to do these things, we would become entangled in a vast conflict on the continent of Asia and our task would become immeasurably more difficult all over the world."

President Harry Truman, 1951

1. Does Truman support bombing China? Why or why not?

Document B

"If a potential enemy can divide his strength on two fronts, it is for us to counter his effort. The Communist threat is a global one.

Its successful advance in one sector threatens the destruction of every other sector. You can not appease or otherwise surrender to communism in Asia without simultaneously undermining our effort to halt its advance in Europe."

General Douglas MacArthur, 1951

1. Do you think MacArthur wants to bomb China & North Korea? Why or why not?

Document C

"What are we in Korea for, to win or to lose?

If we are in Korea to win, then we should do everything possible to bring that victory about. If we are not in Korea to win, then our administration should be indicted for the murder of thousands of American boys."

Representative Joseph W. Martin, 1951

1. What do you suppose Rep. Martin would want to do to win in Korea against the communists?

Document D

It is possible that the Soviet Union, although this would increase the chance of general war, may endeavor to persuade the Chinese Communists to enter the Korean campaign with the purpose of avoiding the defeat of the North Korean forces and also of fomenting war between the United States and the Chinese Communists should we react strongly…It is difficult to appraise the risk at this time, and our action in moving major forces north of the 38th parallel would create a situation to which the Soviet Union would be almost certain to react in some manner. If only the Republic of Korea forces operate in or occupy Korea north of the 38th parallel, the risk of general hostilities would be reduced.

National Security Council Report, 1950

1. What risk does this report mention?

2. What does the report say about how the risk can be reduced?

Document E

There is a Korean War—and we are fighting it—for the simplest of reasons: because free leadership failed to check and to turn back Communist ambition before it savagely attacked us. The Korean War—more perhaps than any other war in history—simply and swiftly followed the collapse of our political defenses. There is no other reason than this—we failed to read and outwit the totalitarian mind [that is, the minds of the Communist leaders]. World War II should have taught us all one lesson. The lesson is this: to vacillate, to hesitate—to appease even by merely betraying unsteady purpose—is to feed a dictator's appetite for conquest and to invite war itself.

Dwight D. Eisenhower, 1952

1. What do you think that Eisenhower would do if he were in charge of the Korean War? Why?

Table 4.9 Primary source activity

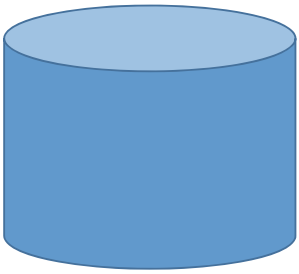
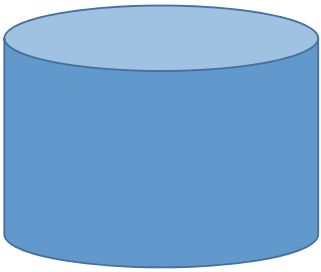
Categorize your primary sources by writing the appropriate letter of the primary source on the container that it belongs in	
	
The U.S. **should** use atomic bombs on North Korea and China	The U.S. **should not** use atomic bombs on North Korea
Write a sentence that states your answer to the essay question, "Should the U.S. use nuclear weapons against North Korea and China in the Korean War?" on the line below and provide your reasons for your statement below the line	

Table 4.10 Rubric for primary source lesson

	20	15	10	5
Thesis	The thesis answers the question and gives a reason for the statement	The thesis answers the question and gives a reason for the statement, but has no supporting sentences in the introduction	The thesis answers the question but lacks a reason for the statement	The thesis does not answer the question
Body	Body paragraphs contain accurate information and cite evidence that supports the writer	Body paragraphs cite evidence, but writer supports the evidence instead of evidence supporting the writer	Body paragraphs are historically accurate but do not cite specific evidence	Body paragraphs do not cite evidence and/or contain gross historical inaccuracies
	10	6	2	0
Grammar/ Organization	Paragraphs are organized into separate topics, fewer than three grammatical errors and essay has a conclusion	Paragraphs are organized but there are 3 or more grammatical errors and essay lacks a conclusion	Unorganized paragraphs and multiple grammatical errors	Thesis is in the body instead of the introduction, multiple grammatical errors, and/or unorganized paragraphs

4.3 Narrative of the DBQ (Document Based Question) on the Korean War Lesson

I teach in a public high school in a rural county just outside of an urban area. The student body is not highly diverse; approximately 80% of the student body is White, 15% African-American, and 5% Latino/a, and most students come from middle class families. We do not have a large population of ESL students, and the ESL students we have tend to be quite proficient in English. The classroom setting takes place on a block schedule of 90 min with approximately 25–32 students per class.

This unit includes a series of instructional lessons (Table 4.6) leading to how to write a Document Based Question (DBQ). A DBQ is a type of essay that is written based on informational sources provided to the writer. Each DBQ is very similar in that it consists of certain components: a historical context, a task which is the question the student is going to be responding to, and documents and/or scaffolding questions. This lesson covers the North Carolina Essential Standards for American History II (North Carolina Department of Education, 2016), as well as the Common Core State Standards (2016a, 2016b) that focus on reading informational texts and developing a sound argument. In subsequent lessons, students develop the skill of using primary sources to answer questions and write their DBQ. The use of primary sources to answer an inquiry will also hit on several dimensions of the C3 Framework (National Council for the Social Studies, 2013). Specifically, students engage in an inquiry (Dimension 1), use disciplinary concepts and tools (Dimension 2) and evaluate sources using evidence (Dimension 3). The current narrative focuses on the introduction to writing a DBQ and centers around providing students with the background information needed to understand the historical context, to identify and define important concepts, and to respond to questions targeted at ensuring comprehension.

Once students are seated, I begin my lesson by capturing students' attention by posing a controversial question asking them to imagine that they are the one in charge of deciding whether or not to drop a nuclear bomb against another nation. After students respond by sharing their opinions which are often focused on ethical or political reasons, I briefly review the United States' decision to drop the atomic bomb on Hiroshima and Nagasaki. In my discussion I build on previous knowledge about the Cold War and the next crisis facing the U.S., Korea.

To motivate the students further, I show the students 15 min from the History Channel's *The Century: America's Time* from the episode entitled, "The Best Years 1946–1952" which covers the end of World War II and the start of the Cold War. This segment covers the Soviet acquisition of the atomic bomb, communist take-over in China, and North Korean invasion of South Korea. The whole class instruction then begins by my asking students to consider the increasing threats posed by the communist expansion such as the fall of China and the Soviet Union's acquisition of the atomic bomb. They are given a background reading from History.com which describes what happens to Korea after WWII and a worksheet

which has vocabulary words and essential questions that hit the main points of the passage for them to answer later in the period (see Table 4.7 at the end of the lesson plan for both the passage and the worksheet).

As I read, I model skills for how to look for important elements of a reading, as opposed to details that historical writers often include to make history more interesting. I also stop periodically and restart the video so that they can visually see what is occurring in the background reading. When we encounter one of the key terms from the worksheet, I ask students to offer their ideas on what the term may mean based on the context clues. We come to a consensus with my guidance and define the terms and continue until the background reading is complete. At the bottom of the background reading (Table 4.7) in big bold letters is the ultimate question for their task, the essay question. In this lesson the question is, "*Should the U.S. use nuclear weapons against North Korea and China in the Korean War?*" I introduce the question early on so that students know what the final assignment, writing the DBQ, will be on and so that they can make connections to what we are doing in class to this upcoming essay.

After we finish the reading the students independently answer the background reading questions to demonstrate their comprehension of the text and the story. I collect the student responses and assess them based on whether or not the students answered the questions correctly. Depending on the nature of their response, I may offer them general feedback on why their answers may have been incomplete. I return these assignments during the next class. This lesson lays the foundation for the subsequent classes culminating on the DBQ essay which are briefly described below. However, the lesson plan before this narrative applies only to the description above.

In the next class, I use a brief 10–15 min lecture illustrated by video clips projected on my smartboard from the aforementioned History Channel video to reinforce the previous day's reading. While I do so, students copy the main points of the lecture (e.g., the military timeline of the Korean War) which I have already listed on the smartboard before they come into the room. I then distribute the "Documents" (Table 4.8) which contains the primary source. All of the documents are given to students at one time, although I tell students not to look at them until we have gone over the first document together. Each document is a primary source, which we have defined as artifacts that were created or occurred during the period of time under study. Primary sources are important for preparing a DBQ because students need to learn how to differentiate primary from secondary sources and on how to use them effectively when writing an essay. I model the strategy for analyzing the first primary source document for the students by reading it, pausing throughout the reading, and showing students how to derive meaning from context clues. In short, I am trying to show them how I think as I read a primary source.

As a class, we answer the primary source analysis questions that accompany the first document. I give the students the opportunity to independently analyze the rest of the primary sources and complete the questions that accompany them. While they do so I circulate through the room and observe their answers, asking them questions about things that I see that are clearly misconceptions (e.g. when students

get tripped up by vocabulary so that they perceive the source as actually saying the opposite of what it means) so they reconsider and examine the source more closely.

When students have finished their responses they categorize the sources they analyzed into containers that are drawn on their assignment sheets (Table 4.9). For example, they label one bucket, "The U.S. should drop the atomic bomb on North Korea and China," and the other, "The U.S. should not drop the atomic bomb on North Korea and China." Then they categorize the sources that support each case accordingly into each bucket. At the end of this process I collect the students' work and return it to them the next day with feedback.

On day three, students are put into small groups of three or four students and asked to justify their answers to the primary source analysis questions to their fellow group members. I give them approximately 2 min per source (timed on my smartboard through my countdown tool in Activinspire, which is a presentation program that enables the embedding of video, graphics, and sound in the text of lecture notes presented on a smartboard) to discuss, and then I question each group about their answers in a whole group setting.

On day four, I divide the students into debate teams. I assign them to defend one of the two primary viewpoints that they have categorized their primary sources in on day two. I do not concern myself with their individual opinions; they must simply argue their position and support it with evidence. I give each group 5 min or less to prepare their arguments and then give each student a card for the debate. The card is used for an opportunity to speak. Each student must use one, but may only use it once. This ensures that their comments, questions, or responses must be considered carefully because they are only entitled to one opportunity to contribute. With my class sizes, I typically have two debates of six to eight students per debate team. When the debate is over, students will write a sentence that answers the essay question and put it on a graphic organizer (Table 4.9). This sentence serves as the thesis statement for the DBQ which they will write at our next class meeting. I model the process for them and then they complete the task independently. I circulate around the room as they do so.

On the final day I model some "dos" and "don'ts" as I instruct them to write their DBQ (document based question) essay on the question. They must include their thesis statement that they wrote on the main line in their graphic organizer (Table 4.9) in the introductory paragraph. They must separate the essay into paragraphs by writing separate paragraphs for each reason that they put on their graphic organizer. They are to include specific evidence from the sources in the "buckets" that support their position in the proper place in their body paragraphs and are, therefore, allowed to use the graphic organizer and any other notes to write their essay. I demonstrate the difference between using evidence to support the argument and using the argument to support the evidence, since many want to let the source give the opinion and then be there to support the source. I instruct them to use their own words and thoughts to make the argument and use the specific evidence from the source to support their words. When students are done I assess their essays using a rubric (Table 4.10), which has been given to the students prior to the activity.

This lesson provides many opportunities for students to not only learn what happened in history but also analyze sources and evaluate them to make the same decisions that Americans in the past have made. The more they engage in this lesson with other topics the better they become using these skills. However, proper modeling and monitoring is essential. Small group activity needs to be timed and carefully monitored, questions asked, and responses evaluated. The most difficult part is getting students to heed the instruction about writing that is modeled prior to the essay. Students may try to take a shortcut by not being specific about evidence or by using the evidence to do the talking instead of elaborating on their own reasoning, even at the expense of their grades. Continuous practice, assessment, and correction are essential.

4.3.1 *Self-regulated Learning Analysis of the Social Studies Lessons*

Self-regulation refers to self-directed cognitions, behaviors, and affects that are systematically directed by individuals toward attainment of their goals (Schunk & Usher, 2013). When the goals involve learning, the process is referred to as *self-regulated learning*. The focus of this chapter is on secondary social studies learning, which has not received as much self-regulated learning analysis compared with other content disciplines (Greene et al., 2015; Greene, Bolick, & Robertson, 2010; VanSledright & Limon, 2006).

There are several models of self-regulated learning that have been applied to education. Regardless of perspective, they share common features. One is that self-regulated learning involves being behaviorally, cognitively, metacognitively, and motivationally active in one's learning and performance (Zimmerman, 2001). A second feature is that self-regulated learning is a dynamic and cyclical process comprising feedback loops (Lord, Diefendorff, Schmidt, & Hall, 2010). Self-regulated learners set goals and metacognitively monitor their progress toward them. They respond to their monitoring and to external feedback in ways to attain their goals, such as by working harder or changing their strategy. Attained goals lead to setting new goals. Third, goal setting helps to keep learners focused on goal-directed activities and use of task-relevant strategies (Sitzmann & Ely, 2011). Lastly is an emphasis on motivation, or why learners choose to self-regulate and sustain their efforts. Motivational variables are critical for learning (Schunk & DiBenedetto, 2014).

In this chapter we employ Zimmerman's (2000) model, which comprises these features of self-regulated learning and fits well with social studies learning. There are two central aspects of this model. One addresses the operation of self-regulation, whereas the other suggests a means for helping students develop self-regulatory skills.

4.3.2 Model of Self-regulated Learning

Zimmerman's (2000) three-phase model of self-regulated learning is described in depth by DiBenedetto (2018/this volume), so we reiterate only a few points here. This model builds on Bandura's (1986) social cognitive model and includes forethought, performance, and self-reflection phases that operate in cyclical fashion.

To teach students to be better self-regulated learners, the model postulates four levels of self-regulatory development: observation, emulation, self-control, and self-regulation. These levels begin with social (external) sources and shift to self (internal) sources.

Internalization is a key element in this social-to-self developmental progression (Schunk, 1999; Schunk & Zimmerman, 1997). When skills and strategies are internalized, they are under the learners' self-regulatory control. Although learning can occur without internalization (such as when learners are directed what to do), internalization is necessary for maintaining self-regulated learning over time and transferring it beyond the original context. Internalization results in learners with personal (self) influences, such as goals, progress self-evaluation, task strategies, self-monitoring, and self-efficacy, that they can regulate to enhance their motivation and learning.

Throughout the phases and levels of self-regulation, several self-regulatory processes come into play. With respect to the phases, Zimmerman (2001) postulated that important self-regulatory processes during forethought were goal setting, strategic planning, and motivational beliefs such as self-efficacy (perceived capabilities to learn or perform actions at designated levels), outcome expectations (beliefs about consequences of actions), interest (liking), value (perceived importance of actions), and learning goal orientation (desire to learn because it is important). During the performance phase, learners regulate by observing their performances and exerting self-control through focusing attention, implementing strategies, and engaging in self-instruction. While engaged in self-reflection, learners react to their performances (e.g., feel satisfied) and evaluate how well or poorly they are doing. They also may make causal attributions (perceived causes of outcomes) for their performances.

A primary self-regulatory process in the levels of self-regulatory development is modeling, where observers pattern their thoughts, behaviors, and affects after those of the model. Other self-regulatory processes that learners use at various phases include goal setting, strategy planning and implementation, cognitive monitoring of learning progress, self-evaluation, and cuing beliefs that instigate and sustain motivation such as self-efficacy for learning, interest, value, and desirable attributions.

In the following sections we highlight evidence of the phases, levels, and processes of self-regulated learning in the lessons and narratives. We also point out some places where further emphasis on self-regulated learning could be placed.

4.3.3 Phases of Self-regulated Learning

The phases of self-regulated learning are seen clearly in the guided and independent practice portions of the social studies lessons. Amber Alford's lesson on the Neolithic Revolution begins with a class activity where some students participate in a seminar while others observe and take notes. Preparation for this activity occurs during forethought where students mentally review their knowledge and strategies to use during the activity. While participating they are assessing their skills, and afterwards reflect on their performances based on student and teacher feedback. The performance phase is repeated when students respond to a blog post and do homework. Receipt of the feedback is likely followed by self-reflection where learners evaluate their performances and decide whether to adapt their strategies for the future.

In Jennifer Watson's class students analyze the Declaration of Independence. Special emphasis is given to the structure: preamble, rights, grievances, and conclusion. Following whole-class instruction, students work in groups during guided practice to rewrite the Declaration as a song or rap. Prior to beginning this activity, they are likely to review their knowledge during the forethought phase and their plans for the rewrite. During the performance phase they implement their strategies and receive feedback from the teacher and peers. They use the feedback during periods of self-reflection to alter their strategies as needed.

In Michael Belter's lesson, students analyze and evaluate primary sources, develop positions, and communicate their positions using evidence. An important goal is to learn how to write Document Based Questions (DBQs). Prior to these activities there is whole-class instruction that emphasizes such strategies as examining the dates and contexts and looking up the sources and background information. The whole-class instruction also serves to build students' motivation and self-efficacy for succeeding. Prior to students beginning the guided practice they engage in forethought by considering goals and strategies they will use to attain them. As they work on this task they implement their strategies and monitor how well they are working. During self-reflection they pause and evaluate their progress and the effectiveness of their strategies. Researchers have substantiated the importance of these activities for self-regulated learning (Schunk & Ertmer, 2000).

During the independent practice, students engage in forethought prior to answering background questions. They are likely to monitor their performances based on the feedback they receive. During periods of self-reflection they evaluate how well their strategies are working.

4.3.4 Levels of Self-regulated Learning

These lessons illustrate how the teachers attempt to foster self-regulatory development in their students through application of the levels of self-regulatory

development (Zimmerman, 2001). In Amber Alford's lesson, students in groups A and B serve as models for one another as they observe the others and then attempt to emulate their observed actions when they change roles. While they are serving as participants or observers, they begin to develop self-control as they have to adapt their strategies to accommodate to the way the seminar proceeds. Subsequently as they work on the blog in class and at home they transition into the self-regulation level as they work independently.

A similar progression is seen in Jennifer Watson's lesson, where teacher observation and emulation occur during whole-class instruction as students answer questions about the Declaration of Independence with teacher guidance. Working in small groups during guided practice, students develop self-control as they adapt their skills to produce a re-written Declaration. During this time they utilize principles of *reciprocal teaching* (Palincsar & Brown, 1984), in which the teacher and students alternate the role of teacher. Students initially develop their self-regulation processes through the social sources of teacher and students and internalize these processes as their self-regulation increases (Schunk, 1999). Greater self-regulation is evident during independent practice; for homework students must adapt their skills to write a protest letter using the same four sections as are found in the Declaration.

Michael Belter's lesson begins with whole-class instruction that includes observation (modeling) and emulation (student performance and teacher questioning). Students transition to the self-control level during guided practice that includes teacher and student feedback. Greater self-regulation with internalization is attained by students during independent practice where they adapt their strategies and apply their skills to answer the background questions.

4.3.5 Processes of Self-regulated Learning

Several self-regulated learning processes that fit well with the goals of the social studies curriculum can be seen in these lessons. In this section we discuss the following processes: modeling, goal setting, self-motivation, strategy use and adaptation, self-instruction, and self-evaluation.

4.3.6 Modeling

These three lessons exemplify many uses of modeling. Researchers have shown that modeling self-regulatory processes helps students develop them (Schunk, 1998). By observing models, students acquire skills and strategies. They also can feel more self-efficacious about learning because by observing models they may believe that they can implement the same skills and strategies that will help them learn.

Student modeling is prevalent in the discussions in Amber Alford's class. Students learn from one another in the circle activity, both as participants and observers. They are likely to acquire skills and strategies for effectively participating in the discussion, and the modeled actions of peers can increase observers' self-efficacy for making productive contributions.

In Jennifer Watson's class, teacher modeling is evident in the whole-class time as she serves as a model for students having difficulty answering questions. Student modeling comes into play during guided practice as students work in groups and share ideas. Some teacher modeling also may occur here when she monitors students' activities and provides guidance as needed.

Michael Belter's whole-class instruction includes modeling skills for examining primary sources; specifically, a strategy for how to use the passage's context to define important concepts rather than less-important details. During guided practice students work in small groups, where they are exposed to peer models. Models to whom students believe they are highly similar are important for motivation and learning (Schunk, 1998). Students are apt to believe that if the models can learn, they can as well. Additional teacher modeling occurs during the guided practice and the ensuing independent practice. During the next class, he again models the strategy for analyzing a primary source document.

These examples also illustrate the importance of modeling within many fundamental aspects of social studies education. For example, historical thinking is often framed as an "unnatural act," and research has shown that historians tend to analyze primary sources and other historical documents more sophisticatedly than students (Wineburg, 1991, 2001). However, recent research suggests that expert modeling of the historical thinking process (e.g., evaluating the legitimacy of sources, corroborating and contextualizing sources) aids in the scaffolding of the process for novices (Achinstein & Fogo, 2015).

Similarly, having students engage in tolerant discussions of controversial public issues is a hallmark of civic education (Hess, 2009; Parker & Hess, 2001). Research, however, has found that although students generally enjoy discussing political issues, they often struggle to do so tolerantly (Journell, 2012; Journell, Ayers, & Beeson, 2013). Given that non-school discussions of politics (e.g., cable news, social media) often do not exhibit tolerant discourse, it is essential that social studies educators model how to articulate one's political beliefs tolerantly (Journell, 2016a, 2016b; Kelly, 1986).

4.3.7 Goal Setting

Goal setting is integral to self-regulation (Sitzmann & Ely, 2011). Goals help focus students' attention and efforts on the task at hand. Goals also can raise motivation (Schunk & Ertmer, 2000). Students compare their performances against their goals to determine progress. The belief that they are making progress learning raises their self-efficacy and motivation to continue to learn.

All three lessons incorporate goals in the form of lesson objectives and rubrics. Amber Alford's students' goals are to evaluate the costs and benefits of the Neolithic Revolution and discuss and disseminate their opinions with their classmates. Jennifer Watson's students are to learn the reasons for colonial unrest and rebellion and to produce a song or rap rewrite of the Declaration of Independence. In Michael Belter's class, the goals are for students to learn to analyze and evaluate primary sources, develop positions and communicate them using evidence, and write an essay. Although the lessons do not make this entirely clear, presumably the teachers communicate these goals to students at the outset of the lessons so the goals can help guide the students' self-regulatory efforts.

Importantly, for goals to foster motivation and self-regulation, students must adopt them as their own and believe they are challenging but attainable (Schunk & Ertmer, 2000). In these lessons, students know what to expect and believe that their teachers would not set goals that students were incapable of attaining. The lesson goals also incorporate other important goal properties such as specificity and proximity (Locke & Latham, 2002). Goals that are specific and close at hand motivate better than those that are general and more-temporally distant. These lesson goals are specific and intended to be accomplished during the lesson (with or without homework) and thus are proximal.

Goal setting is also an essential aspect of inquiry-based social studies, which is the focus of the new *College, Career, and Civic (C3) Life Framework* (National Council for the Social Studies, 2013) that is designed to accompany state social studies standards. The *C3* encourages teachers to engage their students in disciplinary inquiries using an *inquiry arc*. The inquiry arc is a process by which teachers transform content areas from static, fact-based disciplines to student-centered ones where students investigate compelling questions using disciplinary concepts with the goal of taking informed action about a historical or current issue. The first step is to develop compelling questions to guide the inquiry. For students to successfully navigate the inquiry arc, they must recognize the compelling questions and then set goals and strategies for how to answer them. They engage in aspects of disciplinary thinking, such as thinking historically (Wineburg, 2001), civically/politically (Journell, Beeson, & Ayers, 2015), economically (Schug & Wood, 2010), or geographically (Nagel, 2008), which means they use the tools and thought processes of disciplinary experts to answer the compelling questions. Students then gather and evaluate available evidence. After evidence has been evaluated, students make an informed conclusion to the compelling question and take reasonable informed action to communicate that conclusion to a wider audience (e.g., writing a letter to the editor, holding a school meeting).

4.3.8 Self-motivation

The teachers employ several mechanisms for enhancing students' motivation for self-regulated learning. Amber Alford arouses interest by having students watch a video and then discuss it. The video helps motivate students to learn more about the topic. In Jennifer Watson's class, students are presented with a scenario (a hypothetical locker tax) that arouses their interest. This activity then is linked with taxation without representation in the American colonies. This linking helps to instill value to the students. Michael Belter links historical actions with the current emphasis on security to raise students' interest in evaluating primary sources and to highlight its value in current decisions. Students who value content and are interested in learning are more motivated to engage in activities (Zimmerman, 2001).

All three lessons serve to instill a sense of self-efficacy for learning in students. Students who are interested in a topic and value the learning are more apt to believe they can perform well (Schunk & DiBenedetto, 2014). This belief then can increase their motivation for learning and self-regulation during the learning activities.

4.3.9 Strategy Use and Adaptation

During these three lessons learners employ strategies to self-regulate their learning. Use of learning strategies is a critical component of self-regulation (Zimmerman, 2001). During the forethought stage, students decide which strategies they will use and then monitor their progress during the performance stage. During self-reflection, they evaluate the effectiveness of their strategies and make adaptations they feel are needed to improve performance.

Amber Alford's students need strategies for participating effectively in the seminar and for deciding on points to raise to address the issue of whether the benefits of a sedentary lifestyle outweigh its costs. Jennifer Watson's students formulate a strategy to comprehend the Declaration of Independence and answer questions about it. In Michael Belter's class students decide on a strategy to use to identify primary sources, which they then apply. Although the strategies students use are not specified, it seems likely that in all three lessons learners are evaluating their performances and adapting their strategies as necessary, especially because they are receiving feedback from the teacher and peers. The cyclical nature of self-regulated learning is portrayed.

The *C3 Framework* relies on students using appropriate strategies to answer disciplinary inquiries. These strategies should be couched within the relevant disciplines related to the inquiry being presented. For example, Michael Belter and Jennifer Watson have their students engage in processes of historical thinking to evaluate their respective sources, whereas Amber Alford has her students practice both the civic process of deliberation and the economic process of cost-benefit analysis in her activity on sedentary lifestyles.

4.3.10 Self-instruction

Another evident self-regulatory process is self-instruction. This is an effective process as learners apply strategies during the performance phase and guide their application. Researchers have shown that strategic self-instruction leads to better self-efficacy and self-regulated learning (Zimmerman, 2001).

Amber Alford's students have opportunities for self-instruction during homework as they formulate questions for the seminar and when they reply to blog posts. Jennifer Watson's students engage in self-instruction as they write their letters to the superintendent using the same four-section structure as in the Declaration. Opportunities for self-instruction are provided in Michael Belter's lesson as students participate in guided and independent practice with teacher questioning and feedback.

Self-instruction is important to social studies education because research has shown that students often lack self-efficacy, particularly with respect to seeing themselves as an active participant within a democratic society. Yet, research also suggests that when students can engage in self-instruction tasks, even simple tasks such as maintaining a blog of their own opinions or writing a letter to an elected official, it increases their political efficacy (Levy, 2011; Levy, Journell, He, & Towns, 2015). Similarly, research on students' historical reasoning has found that their self-efficacy toward thinking historically and their ability to engage in processes of historical inquiry improved following completion of self-instruction tasks (Hernandez-Ramos & De La Paz, 2009; Monte-Sano & De La Paz, 2012).

4.3.11 Self-evaluation

Self-evaluation is a critical aspect of self-regulated learning. Students respond evaluatively to their performances and make decisions about what to do next. They experience affective reactions to the outcomes of their performances, such as feeling satisfied or disappointed. They also formulate attributions (perceived causes) for their outcomes, which can affect their motivation to learn (Graham & Williams, 2009). Providing students with periodic opportunities to self-evaluate leads to better self-regulation, learning, and motivation (Schunk & Ertmer, 2000).

Self-evaluation also is fostered in all three classrooms through use of the rubrics. Because these are given to students prior to the start of activities, they serve as benchmarks and self-evaluation tools for students. They also allow for fair and uniform grading of students' work.

Although these lessons include forms of evaluation, most of it is provided by the teachers. But some self-evaluation may occur. Students often self-evaluate after guided practice and before independent practice because they receive feedback during guided practice and self-evaluation can be prompted by feedback. They likely judge their progress toward the lesson goals.

Attributions are formed during times of self-reflection where students attribute their progress to one or more outcomes such as effort, ability, task difficulty, and so forth. Although attributions do not explicitly appear in these lesson plans, it seems likely that students are making them. Learners' perceptions of progress, coupled with desirable attributions such as effort and good strategy use, raise self-efficacy, motivation, and performance.

4.3.12 Recommendations for Self-regulated Learning

These lessons contain several applications of principles of self-regulated learning. We can see many self-regulated learning processes being implemented and numerous examples of self-regulation phases and levels as described in Zimmerman's (2000) model. Given that research on self-regulated learning in social studies is under-represented relative to other domains, additional research on social studies learning is clearly needed. In this section we offer three recommendations for how the emphasis on self-regulated learning could be strengthened in these and similar lessons.

One recommendation is that lesson goals be made clear to students so that they adopt them as their own and have standards against which to compare their progress as they engage in learning. Students' perceptions of learning progress are informative because these perceptions indicate how well students are mastering the learning goals and whether their current strategies are effective. Perceptions of little progress can signal to students that they need to alter their strategies. Perceptions of progress also can motivate learners. The belief that they are making progress substantiates their self-efficacy for learning and raises motivation (Schunk & DiBenedetto, 2014). Self-efficacy should not suffer much if students believe that they can modify their strategies to make better progress.

A second recommendation is to ensure that students understand how to apply effective strategies that will help them learn. These include not only strategies to accomplish the task but also strategies to monitor their learning progress and maintain their motivation. Having learners self-monitor their performances and assess their progress helps build their self-regulatory skills (Schunk & Ertmer, 2000). These activities give them the opportunity to adjust their task strategies as needed. Assessments of progress also sustain learner motivation to attain goals.

A third recommendation is to build in explicit opportunities for learners to self-evaluate their learning and their motivation for continued learning. Although these lessons include forms of self-evaluation (e.g., rubrics), most of it is done by the teachers. Students may not automatically self-evaluate because they are accustomed to teachers providing evaluative feedback. Research studies have shown that giving learners self-evaluation opportunities helps to convey learning progress, substantiates their self-efficacy and increases their motivation for learning, and raises their learning and achievement (Schunk & Ertmer, 2000). Self-evaluation

opportunities can be built into instruction, especially during periods of guided and independent practice.

These recommendations should help raise students' development of self-regulated learning competencies in the context of social studies instruction. We are encouraged by how much attention already is being devoted to self-regulated learning in lessons. Some small adjustments will help further students' development as self-regulated learners.

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Part IV
STEM: Science (Biology, Chemistry, Physics), Technology & Engineering, and Mathematics (Nine Lessons)

Chapter 5
Applications of Cyclical Self-regulated Learning Principles to Life Science

Timothy J. Cleary, Erin Peters-Burton, Caroline Gergel and Katherine Willet

Abstract In this chapter, we present lessons plans for high school life science courses addressing the topics of natural selection, and the processes of cellular respiration and photosynthesis. Each lesson plan emphasizes the use of innovative motivational- and SRL-enhancing instructional activities embedded within science activities. Using Zimmerman's three-phase cyclical feedback loop of SRL as a general framework, Cleary and Peters-Burton provide a critical analysis and commentary regarding the extent to which each lesson plan addressed the cyclical aspects of the SRL process and how the plans nurtured students' motivation beliefs, such as self-efficacy, task interest, and task value. The unique and exemplary characteristics of each lesson plan along with specific recommendations for how these lesson plans can be enhanced to optimize student learning and performance are presented and discussed.

T. J. Cleary (✉)
Rutgers, The State University of New Jersey, Piscataway, NJ, USA
e-mail: timothy.cleary@gsapp.rutgers.edu

E. Peters-Burton
George Mason University, Fairfax, VA, USA
e-mail: epeters1@gmu.edu

C. Gergel
Annandale High School, Annandale, VA, USA
e-mail: cegergel@fcps.edu

K. Willet
Williamsburg Middle School, Arlington, VA, USA
e-mail: ktawillet@gmail.com

M. K. DiBenedetto (ed.), *Connecting Self-regulated Learning and Performance with Instruction Across High School Content Areas*,
https://doi.org/10.1007/978-3-319-90928-8_5

Table 5.1 Natural selection lesson plan

Teacher: Caroline Gergel, BA Biology, M.Ed. Curriculum & Instruction VA Teacher Certification and License—Biology	**Grade Level(s)**: 9
School: Annandale High School	**Subject**: Biology 1 and Honors Biology
City and State: Annandale, VA	
Instructional Plan Title: Natural Selection	
Common Core State Standards: CCSS.ELA-Literacy.RST.9-10.1: Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions CCSS.ELA-Literacy.RST.9-10.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics **Next Generation Science Standards**: **Science and Engineering Practices** Analyzing and Interpreting Data: Analyzing data in 9–12 builds on K-8 experiences and progresses to introducing more detailed statistical analyses, the comparison of data sets for consistency, and the use of models to generate and analyze data **Disciplinary Core Ideas** LS3.B: Variation of Traits: Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus, the variation and distribution of traits observed depends on both genetic and environmental factors **Crosscutting Concepts** Scale, Proportion, and Quantity: Algebraic thinking is used to examine scientific data and predict the effect of a change in one variable on another (e.g., linear growth vs. exponential growth)	
Learning Objectives: 1. Students will accurately describe the process of natural selection using appropriate terms relating to genetics, ecology and evolution 2. Students will accurately predict likely allele distribution changes in a population over time	
Instructional and Learning Materials Needed: Lesson 1: (per group of 2–3 students): lab packet that includes background information on the bunny population (see Table 5.2 at the end of the lesson plan), pre-lab guided questions (see Table 5.3 at the end of the lesson plan), task directions (see Table 5.4 at the end of the lesson plan), a partially completed data table (see Table 5.5 at the end of the lesson plan), and guiding questions to facilitate students' understanding of the link between natural selection and genetic change (see Table 5.6 at the end of the lesson plan); 50 white beans; 50 red beans; 1 paper bag; 4 paper cups; 1 marker Lesson 2: video on Darwin's Theory of Evolution (natural selection with music); work sheets to facilitate student identification of varied species' traits and how these traits can be significant to natural selection processes (see Table 5.7 at the end of the lesson plan); pie chart on mole alleles and sample of student "geometric illustration" (see Fig. 5.1 at the end of the lesson plan)	

(continued)

Table 5.1 (continued)

Lesson Duration: Two 90-min classes		
Teaching and Learning (Lesson 1)		
Min on this Activity	**Targeted Activity**	**Purpose of Activity**
5	**Orienting Students to Lesson**: • Upon entering the classroom, students pick up a lab packet at the front table and sit with their preassigned groups • Teacher asks students to take out and read their pre-lab guidelines	• To help students become familiar with lab procedures and objectives to enhance the efficiency of the process
5	**Motivation**: • Teacher announces that students will read passages about trends in rabbit reproduction (Table 5.2) • Students develop hypotheses on the expected fur traits of the rabbits prior to answering the pre-lab questions in the packet (Table 5.3)	• To pique student interest by mentioning the topic of reproduction • Pre-reading the lab provides a review of genetic terms relevant to evolution and activates prior knowledge
10	**Whole Class Instruction**: • Teacher and a selected student model and demonstrate efficient procedures to facilitate rapid data collection • Teacher announces the expected time needed to collect one generation of alleles; she advises students to check the reasonableness of their data before proceeding to the next generation	• To provide students with an illustration of the process for reporting results and to enhance their expectations regarding trends in the data
Between 5 and 10 min (varies between groups	**Guided Practice/Providing Feedback**: • Teacher instructs students to begin collecting data for the first generation rabbit matings, monitors student progress, and provides scaffold supports, as needed (Table 5.4) • Students who are successful proceed to Independent Practice	• To provide support, feedback, and advice in a timely fashion for all groups, so that students can effectively use data collection within scientific thinking practices
Between 50 and 55 min. (varies between groups)	**Independent Practice**: • Students independently carry out subsequent generations of rabbit mating/use data table (Table 5.5)	• To help students better understand how they can use their data to enhance learning about natural selection, including how it is influenced by environmental pressures and genetic parameters

(continued)

Table 5.1 (continued)

	• After data collection, students graph their work and write lab conclusions (Table 5.6) • Teacher provides additional support as needed, monitors student progress, and encourages student reflection on data trends as they unfold	
Ongoing throughout the lesson	**Evaluation of Learning and Assessments**: • Teacher grades students' individual written lab responses including graphs of allele frequency trends (Note: students are permitted to submit the materials during the second lesson)	• To provide quality feedback that enhances students' conceptual understanding of natural selection and skills in graphing
10	**Closing Activities**: • Teacher prompts the class to collaboratively compose and edit a summary of the day's lesson, which is then written on the board • Teacher assigns homework for students to review lab responses, complete graphs and write lab conclusions (if not completed during class), and review for a quiz the following day	• To facilitate students' summarization and organization of big ideas from the day and to encourage those not yet confident in their conceptual and vocabulary knowledge to seek help after school
Teaching and Learning (Lesson 2)		
Min on this Activity	**Targeted Activity**	**Purpose of Activity**
10	**Orienting Students to Lesson**: • Students take quiz to check basic knowledge and conceptual understandings from previous day	• To help the teacher assess student knowledge gained from previous lesson and identify key concepts to review
10	**Motivation**: • Teacher shows video clip on evolution and geologic processes linked here: https://sites.google.com/site/naturalselectionlesson/ Students watch video clips and explain the connection between the images, the accompanying song, and principles of evolution	• To stimulate student interest and enjoyment while simultaneously helping them make connections between prior knowledge of geology and species variation, with images that show populations changing over time • To enhance student confidence via positive feedback to responses and reactions to videos

(continued)

Table 5.1 (continued)

10	**Whole Class Instruction**: • Teacher gives a brief direct instruction lesson on Darwin's findings, pointing out key vocabulary for students to record in their notes	• To provide the necessary word knowledge that can be used in the context of Darwin's findings of specific instances of natural selection
15	**Guided Practice/Providing Feedback**: • Teacher gives students pie chart data about mole alleles to transform into a geometric illustration (see Fig. 5.1) • Students color 30 geometric figures using two different colored pencils to signify each homozygous and heterozygous allele pair	• To reinforce student understanding of natural selection by focusing on allele frequency data in alternate graphic forms
35	**Independent Practice**: • Teacher assigns problems with descriptions of different species with distinct gene variants; students note which variant is beneficial or harmful (see Table 5.7) • Students work on the problems by predicting the expected change in trait frequency	• To engage students with principles of natural selection from a new perspective • To enhance student mastery of the relationship between allele combinations and resulting traits
Formative assessment is ongoing throughout the lesson Homework is graded after class	**Evaluation of Learning and Assessments**: • Teacher administers quiz to formatively assess student knowledge • Teacher evaluates accuracy of lab data and of transformation of pie chart into graphic illustrations • Teacher provides individualized written feedback to students for both independent practice activities	• To provide teacher with information about student mastery of essential concepts and vocabulary • To provide feedback that reinforces student understanding of natural selection and to give multiple types of data/feedback from which to self-evaluate
10	**Closing Activities**: • Teacher conducts a discussion with the whole class to summarize the big ideas of the lesson	• To prompt students to reflect on concept mastery of ideas from two days of lessons • To help students who have not yet mastered the material to recognize their level of

(continued)

Table 5.1 (continued)

	• Students collaborate with their peers to compose and edit a summary of the big ideas from the lesson	competency and seek help after school

Specific Strategies used to Address Exceptional Students and/or Students for whom English is a Second Language:

- Additional handouts and links to videos on natural selection/evolution are available to interested students
- Teacher groups students by academic level which enables the teacher to spend more time with struggling students and to provide additional language support to non-native speakers
- Students are invited to spend time with teacher/peers after school to review concepts using online activities, further discussion, and additional written practice

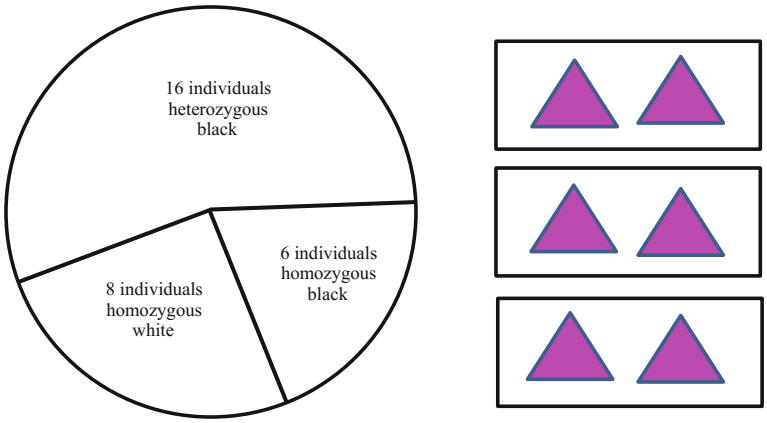

Fig. 5.1 Pie chart and geometric illustration handout sample

Table 5.2 Background information on bunnies for pre-lab

Rabbit breeders are aware that bunnies show a variety of genetic traits and that these traits can affect rabbit survival rates in the wild. One trait seen in some rabbit populations is the trait for furless rabbits (naked bunnies). These rabbits were identified in populations of rabbits living in England as long ago as the early 1900s. However, wild furless bunnies are rarely seen in the wild because the cold English winters select against the naked bunnies who, naturally, die when winter temperatures turn cold

Table 5.3 Pre-lab guided questions

Remember while you do this lab:

→ The DOMINANT ALLELE for normal fur is represented by_____.

→The RECESSIVE ALLELE for no fur is represented by _____.

→ The red beans = F allele.

→ The white beans = f allele.

Hypothesis: What change, if any, do you expect to see in allele frequencies over time? (consider information from background information above):

If _____

_____

_____ then _____

_____

_____

_____.

Preparatory Procedures – Complete phenotype

1. Note cup labeled FF for the HOMOZYGOUS DOMINANT genotype (phenotype is _____)
2. Note cup labeled Ff for the HETEROZYGOUS condition (phenotype is _____)
3. Note cup labeled ff for rabbits with HOMOZYGOUS RECESSIVE genotype (phenotype is _____)
4. Note cup labeled FF for the HOMOZYGOUS DOMINANT genotype (phenotype is _____)
5. Note cup labeled Ff for the HETEROZYGOUS condition (phenotype is _____)
6. Note cup labeled ff for rabbits with HOMOZYGOUS RECESSIVE genotype (phenotype is _____)

Table 5.4 Task directions presented at pre-lab

Generation 1

7. Shake up your bag containing 50 red and 50 white beans to "mate" the rabbits
8. Without looking inside the bag, select two beans at a time (to represent the 2 alleles for the fur trait), and record the results on the data table (on the next page) next to "Generation 1" *Ex*: if you draw one red and one white bean, place a mark in the chart under "Number of " Ff" individuals"
9. Continue drawing pairs of beans and recording the results in your data table until all beans from your paper bag have been selected and sorted
10. Place the "alleles" into the appropriate cup (marked FF, Ff, or ff) as soon as you have noted each on your table. (Also remember that the total number of individuals will be half the total number of beans because each rabbit has 2 alleles for this trait)
11. Before beginning the next round, place the beans from the "ff" container aside in the discard cup. (The "ff" bunnies are born furless. The cold weather kills them before they reach reproductive age, so they cannot pass on their genes. Because the furless bunnies die during their first winter, their alleles have been removed from the gene pool of the next generations)
9. Then, count the "F" and "f" alleles (beans) that were placed in each of the cups in the 1st round. Record your data on the chart in the columns labeled "Number of "F" alleles" and 'Number of "f" alleles" for the first generation
10. Total the number of "F" alleles and "f" alleles for the 1st generation and record this number in the column labeled "Total Number of alleles"
11. Place the alleles for all of the surviving rabbits, which have grown, survived and reached reproductive age, back into the bag and mate them again to get the next generation. Do NOT include the alleles from the homozygous recessive bunnies as these were, again, removed from the gene pool

Generation 2–10:

12. Repeat steps 5 through 11 to obtain generations two through ten. *If working as a team, make sure everyone in your group has a chance to select the beans and record the results*
12. Determine the gene frequency of "F" and "f" alleles for each generation and record each in Table 2 (as a decimal)

Table 5.5 Ideal data table

Generation	# of "FF" bunnies	# of "Ff" bunnies	# of "ff" bunnies	# of "F" alleles	# of "f" alleles	Total number of alleles
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

Note Students can be given this data table or either a table without any column headings or one with half of the headings missing and then asked to design/complete the table themselves. Adapted from "Bean Bunny Evolution: Modeling Gene Frequency Change (Evolution) in a Population by Natural Selection," by National Math and Science Initiative. Copyright 2012 by the National Math and Science Initiative

Table 5.6 Guiding questions to facilitate understanding following lab completion

Write your Conclusion on the back of this page: • Make sure to address the following points: • Was your hypothesis supported or refuted? (Reference your DATA in your explanation) • What is the pattern for these allele frequencies, and how does that pattern relate to Natural Selection? • In real life, populations of rabbits are not constant as rabbits immigrate INTO the population and/or some might emigrate OUT OF the population, taking their alleles with them. How could you better account for these movements in this lab? • Explain errors, limitations and/or improvements that would make this lab procedure more accurate • Research one other detrimental trait found in nature today. On the following page, briefly describe the organism and the detrimental trait. Then cite your article below (list author, publishing date, article name, journal name and page #)

Table 5.7 Problems with descriptions of different species

Species scenarios	Student identifies the following points
There are 2 types of worms: worms that eat at night (nocturnal) and worms that eat during the day (diurnal). The birds eat during the day and seem to be eating ONLY the diurnal worms. The nocturnal worms are in their burrows during this time. Each spring when the worms reproduce, they have about 500 babies, but only 100 of these 500 ever become old enough to reproduce	Population has variations
	Some variations are favorable
There are 3 types of polar bears: ones with thick coats, ones with thin coats and ones with medium coats. It is fall, and soon will be winter. Temperatures are dropping rapidly and the bears must keep warm or they will freeze to death. Many of the bears have had 2 cubs each, but due to the extreme temperatures, many mothers only have one cub left by spring	More offspring are produced than survive
In ostriches, there are 2 types: those that run fast and those that run slowly. The fast birds can run at speeds of up to 40 miles an hour. Jackals love to eat ostriches and they can reach speeds of up to 35–40 miles/h. A flock of ostriches will lay about 10 eggs (each mother only lays 1), but many rodents break into the eggs and eat the fetuses before they hatch	Those that survive have favorable traits
	A population will change over time

5.1 Narrative of the Natural Selection Lesson

I teach this lesson on natural selection in a public high school that serves a highly mobile, semi-urban population where over 58% of the students qualify for free or reduced lunch. My school is noted for its cultural and racial diversity and represents myriad ethnicities and native speakers from dozens of countries throughout the world. Approximately 15% of the student population receives Special Education services while over 22% demonstrate Limited English Proficiency. Class size varies by section and course level, ranging from 30 students in honors biology sections to

fewer than ten in self-contained, special education sections. This lesson presented in this chapter is for my regular biology classes.

Understanding natural selection as the primary mechanism for evolution is intrinsic to understanding biological systems. Because full conceptual understanding of this lesson is dependent on students' prior knowledge of the nature of science, the interplay within and between ecosystems, the process of meiosis, and the basics of Mendelian genetics, this two-day lesson plan is an effective culminating high school biology lesson (Table. 5.1).

The purpose of the *first lesson* is to help students understand how natural selection results in gene pool change over time. As soon as they enter the room, I give each student a lab packet that includes background information on the bunny population (Table 5.2), pre-lab guided questions (Table 5.3), a partially completed data table, task directions (Table 5.4), and guiding questions to facilitate their understanding of the link between natural selection and genetic change. As part of the pre-lab activity, I ask students to read a short text about bunnies that live in a climate where having fur (F) is beneficial while no fur (f) is a fatal condition (National Math and Science Initiative, 2012), which addresses the Common Core literacy standards for this lesson (National Governors Association Center for Best Practices, 2010). Before continuing through pre-lab questions designed to stimulate prior genetics knowledge, students are asked to state a hypothesis describing the direction of expected change in frequency of the fur trait. I circulate around the room to monitor the quality of student responses to pre-lab questions and, when appropriate, reinforce accurate recall, provide prompting questions, and teach word analysis tactics regarding key terms in genetics.

Following pre-lab activities, students randomly select pairs of red and white beans representing alleles for fur (F, red representing dominant) or no fur (f, white representing recessive), record data on allele and trait frequency over ten generations, and analyze the data (National Math and Science Initiative, 2012). Students are expected to observe and explain the natural phenomenon of decreasing frequency of the detrimental "f" allele over time. To begin the procedure, I first ask students to devise a data collection table. I then select a student to help me demonstrate a procedure for accurately collecting data on allele pairings as I randomly draw beans from a paper bag filled with 50 red and 50 white beans. Each bean represents one allele (*red*, F; *white*, f) and are drawn as pairs to simulate the random combinations that result from the union of paired haploid gametes. I then identify each pair as either "homozygous red", "heterozygous", or "homozygous white", while the student partner models how to record allele data. In order to engage students who may have language weaknesses, students are allowed to identify the bean pairs by color (e.g., "two red", "one red and one white" etc.) rather than using genetics terms.

The key objective in this part of the lesson, however, is to emphasize accurate data collection. As students watch this modeled demonstration, I prompt them to assess the functionality and appropriateness of the data tables that they constructed. Keeping their initial hypotheses and the lab goal in mind (i.e., to determine how allele frequency might change over many generations), students are directed to

confer with lab partners and then with nearby groups in a quick *think, pair, share* activity to determine the most useful type of data. I then distribute a partially completed table that students use to assess the quality of their own data table. After this development process, I draw a completed data table on the board to help all groups further solidify the components of an exemplary data table (Table 5.5; National Math and Science Initiative, 2012). In this table, the rows represent ten bunny generations and the columns represent the number of alleles and allele combinations per generation. After students modify their data recording tables as needed, I lead a class-wide discussion on the data recording process; the first three columns (numbers of FF bunnies, Ff bunnies, and ff bunnies) will hold simple counts (each *pair of beans* represents two alleles for *one bunny*), while the data for the fourth and fifth columns ("number of F alleles" and "number of f alleles") are generated from data in columns 1–3. Immediately before students begin data collection, I ask them to predict the number of "F" and "f" alleles they should have counted for the first generation, offering the hint that they began with 50 white and 50 red beans.

I then guide students through steps for sorting and analyzing allele pair combinations for first generation bunnies. Students are asked to describe how they will sort the beans by allele pairings and how they will segregate the homozygous recessive alleles (ff). I encourage students to identify the phenotype represented by each allele pair and to describe what will happen to the furless bunnies (ff, two white beans) during their first winter. The concluding point is that the contents of the "ff" cup are discarded because bunnies with the homozygous recessive genotype (no fur) will not survive the winter or pass on any genes.

As students collect and record data in their tables across the ten bunny generations, I circulate the room to check for procedural and computational accuracy. Teacher proximity gives students frequent opportunities to ask questions in a spontaneous and informal manner and allows me to give frequent feedback and confirmation about their accuracy and emerging knowledge and skills. After the groups record allele data for up to ten bunny generations, students begin their individual analysis of group data, computing the frequency of each allele per generation and graphing results to compare trends in beneficial "F" and harmful "f" allele frequencies over time. Students typically complete the data analysis and conclusions during class (Table 5.6), but also have the option of completing it with my support after school and or as a homework assignment. By the end of this lesson, students have addressed the Disciplinary Core Ideas and Science and Engineering Practices from the NGSS (NGSS Lead States, 2013).

The *second lesson* involves the use of videos, direct instruction, an activity describing alleles in a mole population, and analysis of gene variations in several different species. All activities reinforce the premise that genetic change in a population occurs as a result of natural selection due to environmental pressures on organisms exhibiting varied traits. Students who submitted their lab work after the first lesson receive written feedback on their labs at the start of the second lesson; students who submitted their lab during the second lesson receive feedback during the following class.

After taking a natural selection quiz to start the second lesson, I show the students video images of Galapagos species and Earth-shaping geologic processes. The video is purposefully accompanied by a video game theme song that students typically find intriguing and that some recognize and associate with the challenge of surviving in a rapidly changing environment. I also offer a 10 min history of Darwin's travels and define several natural selection terms. To reinforce the premise that each visible trait represents the interaction of two alleles, students complete a second allele activity that requires them to transform pie chart data about mole alleles into a geometric illustration (see Fig. 5.1). Students color two triangles (alleles for each genotype) within one rectangle (represents one mole) to signify each homozygous and heterozygous allele pair, which addresses the Crosscutting Concept from the NGSS for this lesson (NGSS Lead States, 2013).

As a culminating practice activity, students read descriptions of different species with distinct gene variants and note which variants are beneficial or harmful (Table 5.7). I prompt students to predict the expected change in trait frequency after identifying aspects of Darwin's principles of natural selection for each scenario (e.g., variation exists among species members, competition results from limited resources). As students complete the problems, I circulate to informally assess concept mastery and to offer immediate verbal feedback and scaffolding, as appropriate. To conclude the second lesson, I lead a class-wide collaborative discussion and summarization of the precepts of natural selection. The two lessons allow students to solve problems on core concepts in natural selection and genetics from a variety of different perspectives. Because students need to practice their problem-solving skills from many different starting points, they are learning the core content in an iterative way that helps them master the concepts (Table 5.8).

In terms of science instruction in general, students' under-developed reading and graphing skills present challenges to all teachers. These impediments can be ameliorated through explicit instruction, verbal and behavioral modeling, questions that prompt prior knowledge recall, and extensive practice with feedback to continually motivate students. One challenge that is often encountered when providing the natural selection lesson, however, is getting each student to first accept natural selection as a scientific theory rather than a personal belief. To this end, it is critical that all students begin the lesson with a strong, pre-established understanding of the nature of science. Regardless of their cultural/religious perspective, students who have internalized the idea that science is based on observable, factual evidence tend to be more receptive to the investigation of how populations change over time (Trowbridge and Bybee, 1996). Thus, to better prepare students for this fuller understanding of natural selection, this lesson is always presented subsequent to an opening course lesson that clearly establishes the nature of science as logical, fact-based, and observable.

A second challenge in teaching the natural selection lesson is motivating students to work through the multi-step lab and collect sufficient data. Teaching this lesson late in the course allows students time to increase proficiency in gathering and analyzing data. In addition, assigning the task of developing a hypothesis before they begin this lab helps to develop student curiosity that encourages them to follow through to find out if the data they collect will indeed support their hypothesis.

Table 5.8 Respiration and photosynthesis lesson plan

Teacher: Katherine Willet BA Integrated Life Science Education; M.Ed. Curriculum and Administration National Board for Professional Teaching Standards License VA State Teaching License—Biology; MD State Teaching License—Biology	**Grade Level(s)**: 9
School: Williamsburg High School	**Subject**: Biology
City and State: Arlington, VA	
Instructional Plan Title: Respiration and Photosynthesis	
Common Core State Standards: CCSS.ELA-Literacy.RST.9-10.1: Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions CCSS.ELA-Literacy.WHST.9-10.2: Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes CCSS.Math.Content.HSN.QA.2: Define appropriate quantities for the purpose of descriptive modeling **Next Generation Science Standards**: **Science and Engineering Practices** Developing and Using Models: Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds **Disciplinary Core Ideas** LS1.C: Organization for Matter and Energy Flow in Organisms: The process of photosynthesis converts light energy to stored chemical energy by converting carbon dioxide plus water into sugars plus released oxygen **Crosscutting Concepts** Systems and System Models: Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales	
Learning Objectives: 1. Students will explain the differences between the processes of photosynthesis and respiration 2. Students will identify and follow the movement of molecules through cells during energy transformations	
Instructional and Learning Materials Needed: Teacher guidelines for assigning work stations (see Tables 5.9 and 5.10 at the end of the lesson plan); student guided notes and questions (see Tables 5.11 and 5.13 at the end of the lesson plan); Photosynthesis and respiration foldable instructions; equations on cards for sorting graphic organizer (see Table 5.12 at the end of the lesson plan), and story guide (comic, iMovie, children's book, song); individualized learning technology (iPad, computer, etc.)	
Lesson Duration: Two 55-min class periods	
Teaching and Learning (Lesson 1)	

Min on this Activity	**Targeted Activity**	**Purpose of Activity**
5	**Orienting Students to Lesson**: • Teacher begins lesson by reminding students about different types of animal and plant cells and important differences between them	• To help activate students' prior knowledge on cell structures

(continued)

Table 5.8 (continued)

6 (4 for video + 2 for discussion)	**Motivation**: • Teacher shows TedEd Photosynthesis video (https://youtu.be/eo5XndJaz-Y) • Teacher gives students apple slices as a way to connect the lab objectives to their daily lives	• To stimulate student interest and prior knowledge, and to break down photosynthesis into simpler parts • To enhance motivation by making associations between pleasant aspects of their daily lives and science learning
10	**Whole Class Instruction**: • Teacher sets up six stations for students to rotate through in groups (Table 5.9) • Teacher groups students based on the amount of background knowledge they have (see Table 5.10) • Teacher provides direct instruction at station 1 going in group order. While group 1 is at station 1, groups 2 and 3 rotate through stations 2–5	• To introduce students to key concepts, provide visual representations of molecules, promote kinesthetic interactions, deeper learning, and opportunity to apply and demonstrate understanding • To promote high levels of student self-efficacy by having multiple "success" opportunities across the stations
14	**Guided Practice/Providing Feedback**: • Students consult with peers within and across groups to answer questions at stations 2–5. Station 6 is not started until students complete stations 1–5 • After teacher provides station 1 instruction to all groups, the teacher circulates to monitor and support students.	• To build knowledge by having students continually address similar content using different perspectives • To provide students with opportunities to self-assess their knowledge • To enable students to check and evaluate via feedback from their peers and teacher.
15	**Independent Practice**: • Students direct much of their own behavior as they rotate through and answer questions at stations 2–5	• To provide students with the opportunity to practice directing their own thinking and understanding of the course material
Ongoing throughout the lesson	**Evaluation of Learning and Assessments**: • Teacher directly assesses student learning during station 1 with checks for understanding • Teacher provides students feedback and checks for understanding as she circulates the room • Teacher guides students to use self-evaluation to focus their learning at stations 2, 3 and 5	• To assess student knowledge at the pre-lab stage to ensure students possess the pre-requisite knowledge to complete all stations • To address student misconceptions • To facilitate student growth in self-assessing and monitoring their learning and understanding at stations 2–5

(continued)

Table 5.8 (continued)

5 min.	**Closing Activities**: • Students will contribute responses to questions on a Padlet. The responses will be assembled and grouped to provide context to a group discussion about the learning objectives	• To enable students to express their understanding of the main content objectives for the day
Teaching and Learning (Lesson 2)		
Min on this Activity	**Targeted activity**	**Purpose of activity**
5	**Orienting Students to Lesson**: • Teacher gives examples of 10 organisms and asks students to sort the organisms into autotrophs and heterotrophs • Teacher monitors students' learning by asking questions (e.g., What clues did you use to sort the organisms?)	• To help students connect prior knowledge to the cellular processes and to make students aware that it is a common misconception that only heterotrophs do cellular respiration
5	**Motivation**: • Teacher asks students to express what they did well and what they need to improve upon from yesterda's activity at the stations • Teacher prompts students to use video game at station 6	• To help develop student self-efficacy by getting them to share helpful strategies that could be adopted by other students • To enhance student interest and enjoyment
5	**Whole Class Instruction**: • Teacher reminds students about the stations still left to complete • Teacher prompts students to play the video game at station 6 as a summative assessment only after stations 2–5 are completed	• To help prompt and guide students in their completion of all required tasks and activities
5	**Guided Practice/Providing Feedback**: • Teacher encourages students to consult with peers within group and across groups to answer questions at stations 2–5 • Teacher monitors and prompts students to enable work completion	• To build knowledge by having students continually address similar content but using different perspectives • To provide students with opportunities to self-assess their knowledge
10	**Independent Practice**: • Students continue to rotate through stations 2–5 and answer questions at each station	• Students practice the content through a variety of means, which allows them to interact and process the content in multiple ways
20	**Evaluation of Learning and Assessments**: • When students have completed stations 1–5, they complete a virtual game that requires synthesis of content learned at prior stations	• To use the video game as a summative assessment that provides information about student knowledge and mastery

(continued)

Table 5.8 (continued)

5	**Closing Activities**: • Students take a short quiz, which will include questions regarding their strategies for content acquisition from the activities	• To provide feedback about how individual students understand the material and how they are able to assess their own learning

Specific Strategies used to Address Exceptional Students and/or Students for whom English is a Second Language:

- Stations are adapted to the student needs to make sure that tiered notes chunk the material to align with reading levels
- At station 1, the teacher provides students who need explicit, direct instruction with content in small chunks; those with greater content knowledge are given the opportunity to extend their learning and delve deeper into the content
- At station 4, materials are presented for students at varying levels of reading comprehension, as indicated by student performance on Fall Lexile tests
- At station 5, the students will conduct the virtual lab based on the pre-assessment placement

Table 5.9 List of station activities and purposes for lessons 1 and 2

Station 1—Teacher Directed Notes. Teacher gives notes through direct instruction to small groups based on pre-assessment. Questions are scaffolded to assess and activate student knowledge of photosynthesis and respiration	**Station 1 purpose**: To introduce students to concepts and to build foundational knowledge
Station 2—Foldable Model. Teacher assigns students to create a 3D foldable models that are designed to guide students and provide feedback. Students make a foldable model of photosynthesis and respiration	**Station 2 purpose**: To enable students to visualize the movement of molecules
Station 3—Equation Sort. The teacher assigns students to assemble the chemical equations explaining the processes of photosynthesis and cellular respiration. Students complete a card sort to organize information about photosynthesis and respiration processes; they also complete a graphic organizer comparing and contrasting these two processes	**Station 3 purpose**: To promote students' kinesthetic interactions with the equations
Station 4—Leveled Guided Readings. The teacher provides readings and guides for students to independently learn the content knowledge. Students use leveled readings and other materials to create a story/comic strip/iMovie/song about photosynthesis and respiration	**Station 4 purpose**: To enhance students' use of deeper learning competencies to explain the processes and their understanding
Stations 5—Leveled Virtual Labs. The teacher provides labs with direct observations that students use to explain the processes of photosynthesis and cellular respiration	**Station 5 purpose**: To enable students to conduct and observe photosynthesis at a molecular level

(continued)

Table 5.9 (continued)

Students conduct a virtual lab in leveled groups based on their background knowledge demonstrated on the pre-assessment a. Group 1—http://www.scholastic.com/magicschoolbus/Games/sciencenews/index.htm b. Group 2—http://www.pbs.org/wgbh/nova/nature/photosynthesis.html c. Group 3—http://www.wonderville.ca/asset/photosynthesis	**Station 6 purpose**: To enable students to apply their knowledge about the processes of photosynthesis and respiration
Station 6—Virtual Game. The teacher assigns students to conduct a virtual game that requires synthesis of content learned at prior stations (http://www.biomanbio.com/GamesandLabs/PhotoRespgames/phorespgame.html). Students use the virtual game to make connections between the processes of photosynthesis and respiration	

Table 5.10 Grouping strategies for completion of all station activities

Group 1—weak background knowledge and needs guidance to build content
Group 2—weak background knowledge but able to assemble content knowledge from various sources
Group 3—some background knowledge and able to independently assemble knowledge

Table 5.11 Guiding questions for station 1

1. What are some molecules that use carbon (hint: we had already learned about organic molecules)?
2. What similarities do you notice between both equations? What is different? How do the equations relate to each other?
3. How do you benefit from photosynthesis? How do you benefit from cellular respiration?
4. Why are healthy plants important for you? How would something disrupting either process affect you?

Table 5.12 Sorting cards used at station 3

Photosynthesis	$6CO_2 + 6H_2O$ + Sun Light →	$C_6H_{12}O_6 + 6O_2$
Cellular respiration	$C_6H_{12}O_6 + 6O_2$	$6H_2O$ + ATP

Table 5.13 Guiding questions for station 4

What is photosynthesis?	
What are the raw materials (reactants) of photosynthesis?	
What are the products of photosynthesis?	
What happens to the glucose produced during photosynthesis?	
Why is the sun necessary for photosynthesis?	
What is cellular respiration?	
What are the raw materials (reactants) of cellular respiration?	
What are the products of cellular respiration?	
What happens to the energy (ATP) produced during cellular respiration?	
How are photosynthesis and cellular respiration related to each other?	
Now demonstrate your understanding of the processes by creating a song, poem, comic strip, or children's book about the content	

5.2 Narrative of the Photosynthesis and Cellular Respiration Lesson

I teach this two-day lesson on photosynthesis and respiration to an introductory level high school Biology class. My school is located in a semi-urban neighborhood, with about 20% of the student population receiving free or reduced lunch. Many students come from homes with parents holding multiple post-secondary degrees and are in a high socio-economic status category. Approximately 12 languages are spoken in my school, and about 15% of the student body receives Special Education supports. The classes are heterogeneously grouped by academic level, and class sizes vary from 15 to 24 students.

Photosynthesis and cellular respiration are some of the most important biological events that occur and are necessary in sustaining life as we know it. Photosynthesis is a crucial part of understanding life sciences because it explains how plants use sunlight to provide sugars that then provide the energy for living creatures. Likewise, cellular respiration is a key process to sustaining life on Earth in that it takes place in cells of organisms to convert nutrients into biochemical energy and to release waste products. Individually, these processes are fascinating in their complexity and elegance, but they are also interesting because photosynthesis is essentially cellular respiration in reverse, and vice versa.

The lesson presented in this chapter was developed for students possessing limited prior knowledge of photosynthesis and cellular respiration. Its general purpose is to help students learn about these two processes through engagement in six distinct yet interrelated instructional stations (Table 5.9). Prior to the lesson, I use pre-assessment scores to assign students to one of three groups (Table 5.10). Students within the three groups work together as they move through each of the six stations over the course of 2 days; however, all students have the autonomy to ask questions of any of their classmates during this activity.

My primary focus at the beginning of the first lesson is to meet separately with each group at Station 1. By meeting with each group individually, I am able to differentiate the station to the specific needs of the groups. As I meet with the first group at Station 1, the other groups are instructed to begin working on Stations 2 through 5. After the first group has completed the first station, I call over another group to complete Station 1. This process continues until all groups have met with me at the initial station. Following Station 1 instruction, I circulate the room to monitor, probe, and coach students through each of the remaining stations. Students must complete Stations 1–5 before they conduct the culminating Station 6, which typically occurs on day 2 of the lesson.

Although each station has a distinct purpose, the procedures and activities of the stations overlap, with all of the stations addressing the Disciplinary Core Ideas in the NGSS standards for this lesson (NGSS Lead States, 2013). At each station, students read directions and learn about the specific objectives and purposes for learning about photosynthesis or respiration. Students are encouraged to use the stated objectives to establish a specific learning goal prior to beginning the assignment at each station. Following the completion of a station but before rotating to another station, students will engage in a reflection activity that involves answering several questions: (a) "Did you meet your learning goal? If yes, what strategy helped you succeed? If no, what distracted you from meeting your learning goal?" (b) "What did you learn in this station that may help you at future stations?" (c) "What do you still feel confused about?" Since students may rotate through different stations on different lesson days, all of the students' narratives are organized by station number.

Station 1 involves teacher-directed instruction in background knowledge regarding the parts of animal and plant cells; topics to which students have previously been exposed (see Table 5.11). However, much of the instruction at this station is differentiated to meet the specific needs of each group. I begin by working with the group that exhibited the weakest knowledge and skills on the pre-assessment. The key area of focus for this group involves building their knowledge of key terms and concepts. Given that the two other groups begin or complete one or more of the other stations prior to meeting with me at Station 1, they will have already developed some ideas, and perhaps misconceptions, about the topic. Thus, for these groups, I provide feedback about any apparent misconceptions and/or gaps in their understanding. For the more advanced students, I have the flexibility to provide opportunities for them to extend the learning and to delve deeper into the target concepts.

Stations 2 through 5 are similar in that they address the concepts of photosynthesis and respiration, but they do so in different ways. At Station 2, I ask students to create a foldable model of ideas about photosynthesis and cellular respiration. Developing and using models is the NGSS science and engineering practices standard addressed at this station (NGSS Lead States, 2013). It also serves the purpose of providing a concrete visual for students who need scaffolding for abstract thinking. Specifically, the foldable modeling allows students to demonstrate that they are successful at organizing the movement of the molecules in a

logical, sequential fashion. It is expected that after completing this station, they will have a better understanding of the reciprocal nature of the photosynthesis and cellular respiration processes.

At Station 3, I prompt students to organize photosynthesis and cellular respiration *equations*, which addresses the CCSS mathematics standards (Table 5.12; National Governors Association Center for Best Practices, 2010). By comparing and contrasting the equations, students build on previous learning and are able to observe, again, that each equation is a reciprocal process. For students who begin at Station 3, this station is their initial introduction to the reciprocal process that will become reinforced as they tackle the other stations. This station is somewhat unique in that students are prompted to think about how carbon is cycled through the two processes, a concept that students spiral back to during later units in the quarter.

During Station 4, I arrange developmentally appropriate independent readings for students to reinforce student learning during Station 1, which addresses the CCSS literacy standards for this lesson (National Governors Association Center for Best Practices, 2010). Students encounter information initially presented in Station 1 reading again in the assigned text readings at Station 4. Although the assigned readings are leveled to challenge each student, they simultaneously promote independent reading. In addition, all of the readings address identical content. Examples of the leveled readings are Group 1—*Cycles of Photosynthesis and Respiration* (http://www.vtaide.com/png/photosynthesis.htm), Group 2—*Connection Cellular Respiration and Photosynthesis* (http://www.ck12.org/Life-Science/Connecting-Cellular-Respiration-and-Photosynthesis-in-Life-Science/lesson/Connecting-Cellular-Respiration-and-Photosynthesis-MS-LS/), and Group 3—*Photosynthesis versus Cellular Respiration* (http://scienceline.ucsb.edu/getkey.php?key=153). Guiding questions are used to focus student reading on key information (see Table 5.13). Most students take about 20 min to complete these readings, but some require additional time; thus they will finish the creative activity as homework. Students who are more inclined toward verbal-linguistic or musical activities are able to start creating their story, comic strip, or song immediately. However, other students tend to take more time to plan how they use the words or pictures to demonstrate the processes. Students perform the song or poem with the group and record the performance on their iPads to submit for grading. Comics and stories are uploaded from the iPad, and I grade the submissions the night students turn them into return them to students with feedback the following day.

The key purpose of Station 5 is for students to observe the processes that occur during photosynthesis. Because plant photosynthesis is difficult to observe in a classroom, I emphasize virtual, interactive labs. These types of labs enhance efficiency while presenting the information in a platform that allows students to observe the process in action. In the virtual labs, the students are also able to manipulate the molecules of the processes to observe how plants grow as the molecules or light change. Because the plants grow immediately, students can more efficiently understand the process than if they were asked to observe the process in a natural setting.

Station 6 is the culminating station. It utilizes a game format to facilitate students' synthesis of knowledge and principles learned from all of the stations.

Students must use equations to collect enough of the molecules in order to perform well in the game. A key element is that students will use that synthesized knowledge to advance through increasingly difficult levels of the game. The game also provides students with an opportunity to self-check their understanding. Thus, when students experience difficulty passing a particular level they are given an opportunity to review the information, to connect understanding gained during Stations 1–5, and to proceed successfully through the level. At all six stations, students have multiple opportunities to converse with their classmates. As students work together, they often collaborate and share insights and experiences. This level of collaboration is particularly helpful when students exhibit misconceptions because all students attempt to deal with the same content.

Although this lesson was beneficial to students in many ways, teachers need to recognize a few inherent challenges. First, given that the teacher needs to spend a fair amount of time leading Station 1 with the different groups of students, there is less time for the teacher to provide feedback and guided practice for the other stations. Further, if certain groups need more time than originally planned, the teacher will also have less time to devote to other groups when circulating throughout the room. To address this challenge, teachers can create a "parking lot" for students to post questions on sticky notes during the class period. During the last 5 min of class, the teachers could address student questions to correct any misconceptions. During Day 2, the teacher should have groups targeted for specific checks for understanding to provide feedback and guidance. The groups are targeted based on review of submitted stations and observations during Day 1.

Another challenge is to identify student misconceptions in a timely and accurate way. Because students proceed through the stations at their own pace and may not always have access to teacher feedback, they may reinforce their own misconceptions. That is, students may develop a misconception at one particular station, and then rotate to another station that confirms the misconception. If students do not rotate through stations in an order that challenges their misconceptions, they will continue to develop a deeper misconception that is more difficult to modify. One way to address individual students is analyzing their online submissions and providing specific feedback to students each night of the lesson. From the analysis of the Day 1 submissions, the teacher can create small groups of students with similar misconceptions. At the start of Day 2, the teacher works with specific groups to address their misconceptions.

Given the constant shifting between stations, teachers are often challenged to keep students on task. Some students are able to rotate through and synthesize the information rapidly, whereas others are still developing their ability to regulate their behavior, and to remain focused on the task. Because the teacher often needs to address the learning needs of a particular group or an individual student other students who possess weak self-control may have difficulty handling the high level of self-direction and freedom provided in this lesson. One way to address students completing work quickly but not thoroughly, is to have them complete a self-assessment of the product for each station. As students reflect on their work, they frequently find careless mistakes and can use the time to address their

mistakes. This will also highlight misconceptions for the students and create opportunities for them to address their own misconceptions. Another option to address off-task behavior is having extension opportunities. If students quickly complete the stations, they can work on extension menu activities that engage them in the content at a deeper level.

5.3 Scholars' Analysis—A Self-regulated Learning Perspective

As students matriculate through secondary school, many experience anxiety, self-doubts, and frustration, particularly when taking STEM-related courses, such as science and mathematics (Lee, Robinson, & Sebastian, 2012). Part of the reason why these courses are viewed in a negative light is because the course content tends to be less humanized and less relevant to student experiences and ways of life, as compared to courses in English and social studies. Particularly in science courses, researchers have also speculated that negative attitudes result from students' limited perspectives about science (Peters-Burton & Baynard, 2013) and insufficient knowledge about *ways of knowing* in science (Hogan, 2000). Consider the phenomenon of natural selection which is best understood by examining change in the phenotype over many generations (Brumby, 1979). If novice learners simply observe one or two generations of breeding, they will likely focus on minor details of the phenomenon rather than the overarching way of knowing theme of *change over time*. Similarly, to fully understand photosynthesis (the ways plants make food from the sun's energy) and the corresponding process of cellular respiration (the conversion of nutrients to biochemical energy), students must examine the molecular processes and flow (Barker & Carr, 1989). In this case, merely knowing the definitions for each term will not help students think scientifically; they need to come to recognize the premise that photosynthesis and cellular respiration are mirror image processes of each other.

To perform well on science activities, students need to engage in a goal-oriented, systematic, and reflective approach to learning (Cleary & Platten, 2013; Peters & Kitsantas 2010a, b). For example, as part of the bunny alleles investigation, students need to understand the objectives of the task, and how to plan effective ways of systematically collecting and organizing data that can later be used for analysis. Scientific thinking also involves critically evaluating and reflecting on this recorded data and examining peer review or feedback that might establish other credible conclusions. A key point of emphasis in our analysis in this section is that effective instruction and learning activities are not simply focused on science content and material; they also provide students with opportunities to become more self-aware, strategic, and self-directed—components of a process called self-regulated learning (SRL).

From our perspective, there is a natural symmetry between the cyclical aspects of SRL as enumerated by Zimmerman (forethought, performance, and self-reflection) and effective ways of knowing or models of scientific thinking (Peters-Burton, 2015). As highlighted in this volume (see DiBenedetto, 2018/this volume), sophisticated self-regulated learners think and act in strategic ways as they approach the learning activity (goals, plans), during the act of completing the activity (using task-strategies, monitoring strategy use), and upon receiving data about performance on that activity (self-evaluation, strategic attributions). These types of learners are highly motivated, goal-directed, and are aware of their strengths and weaknesses.

In this section, we analyze the extent to which the two lesson plans (natural selection and photosynthesis/respiration) utilize principles of SRL and motivation processes to promote students' scientific thinking. Using Zimmerman's three-phase cyclical feedback loop of SRL as a general framework (DiBenedetto, 2018/this volume), we examine the extent to which each lesson plan addresses forethought, performance, and self-reflection phase processes and whether the plans directly nurture students' motivation beliefs, such as self-efficacy, task interest, and task value (see Table 5.14). We then go on to highlight unique and exemplary characteristics of each lesson plan, and conclude with specific recommendations for how the lesson plans can be enhanced to optimize learning.

5.4 SRL Processes Within Natural Selection and Photosynthesis/Respiration Lesson Plans

Both the natural selection and photosynthesis/respiration lesson plans provided an excellent illustration of how SRL principles can be infused within science-based classroom activities. Although we cannot review all of the positive characteristics of these lesson plans (see Table 5.14 for a detailed overview), we highlight a couple of key points regarding the commonality between the two lessons along and offer insights into innovative, unique features. Regarding points of symmetry or conceptual overlap, both lessons addressed at least some aspect of each phase within the cyclical feedback loop. That is, they both emphasized goal-setting to some extent (forethought), prompted students to engage in some type of self-monitoring (performance), and facilitated frequent self-evaluation during the learning activity (self-reflection).

Both teachers also emphasized the value and importance of providing immediate and frequent feedback to students as they performed the labs, and then prompting students to use that feedback information to evaluate and reflect on their learning. This focus on immersing students in data-based "cycles" of thinking and action is of theoretical importance and is largely consistent with the feedback literature (Hattie & Timperley, 2007; Shute, 2008) and intervention research showing that training in multiple phase SRL processes typically leads to more desirable

outcomes than providing instruction using a single or more narrow set of SRL processes (Cleary, Zimmerman, & Keating, 2006; Dignath & Buettner, 2008; Zimmerman & Kitsantas, 1997).

The two lesson plans also addressed different sources of student motivation, with task interest and instrumentality being the most heavily emphasized. Learning in science, or in any content area for that matter, is often optimal when students actively engage with the material. Ms. Gergel and Ms. Willet targeted a variety of different motivation beliefs as part of the lesson plans. Ms. Gergel used interesting videos and music to capture student attention and interest, while Ms. Willet emphasized the importance of strategic attributions and student autonomy during the lesson. Crafting lesson plans that infuse both SRL and motivational processes is important in supporting students, particularly as they encounter challenges during learning (Hidi & Reninger 2006; Reeve, Ryan, Deci, & Jang, 2008; Robertson, 2000).

Exemplary and unique SRL features—Natural selection lesson. Despite much overlap, the two lesson plans exhibited innovative and unique qualities. Ms. Gergel's natural selection lesson included several prediction activities that provided students with multiple opportunities to engage in structured self-evaluation. Across both days of the lab activity, Ms. Gergel prompted students to make a variety of estimates or predictions. For example, students were asked to: (a) make hypotheses regarding the direction of the expected change in bunny trait frequency before beginning the lab, (b) estimate the number of alleles that they needed to count before engaging in data collection, and (c) predict the expected change in trait frequency before beginning the Darwin activity. Although predictions are not synonymous with goals, they both represent forethought thinking because they are made prior to students beginning the activity (Zimmerman, 2000).

Making predictions or hypotheses is extremely important from a regulatory point of view. When students predict how they will perform on a learning activity or what they might observe during the activity, their prior knowledge of the topic is activated. This can lead students to actively think about and to become more engaged in the activity. Researchers have emphasized that a key aspect of most learning activities is to prompt students to become active participants in the learning process (Pressley & Harris, 2006). A second reason why predictions are important is that, like personal goals, they are likely to become the standards or reference points against which students evaluate or judge their learning (Chen & Rossi, 2013). In a sense, predictions provide a snapshot into students' perspectives regarding what they think will occur at some point in the future. By encouraging students to make predictions or estimates, teachers can set the stage for self-reflective thinking, such as, "Did my prediction turn out to be true?" (self-evaluation) and the more important question, "Why was this the case?" (attribution). What we felt was particularly impressive about Ms. Gergel's use of predictions, however, was how she embedded the predictions at various points throughout the lab experience. By doing this, she increased the likelihood that students became more cognitively engaged in the lab activity and had multiple opportunities to assess and evaluate their learning.

The *diversity* of Ms. Gergel's approach to engaging students in self-evaluation was another pedagogical innovation in her lesson plan. In addition to using predictions, Ms. Gergel encouraged students to use other forms of self-evaluative standards, such as when she helped students to identify goals at the outset of the lesson. Research has shown that goals are important because they can serve both a motivational function as well as an evaluative one (Peters, 2012; Zimmerman, 2008). As noted previously, goals are similar to predictions in that they are stated at the outset of a learning activity and will often become the benchmarks or standards against which learning is evaluated. Thus, because Ms. Gergel helped students identify and continually refer back to the primary goal of the lab exercise (i.e., being able to explain allele frequency changes over many generations), she naturally provided them with an explicit standard to determine if they were making progress on the lab ("Am I making progress towards the goal?").

Ms. Gergel's use of the completed data table represented another type of self-evaluative standard for students. On Day 1, she asked her students to work in groups to identify the most relevant types of data to collect during the lab and then to construct their own data table. After this activity, Ms. Gergel provided students with an exemplary data table that conveyed all of the key aspects of data collection for this particular lab activity. Thus, the exemplary data table served as the point of comparison or benchmark that students could use to make judgments regarding the quality of their own data tables.

Exemplary and Unique SRL Features—Photosynthesis and Respiration Lesson. Similar to Ms. Gergel's lesson plan, Ms. Willet's lesson exhibited several innovative features. Two exemplary components include her emphasis on multiple goals and her use of structured reflection exercises following each lab station. The innovative aspect of the goal dimension of the lesson was that it consisted of both *outcome* goals (i.e., an understanding of the biochemical processes of photosynthesis and cellular respiration) and *process* goals (i.e., how students will attain outcome goals; Zimmerman, 2008). While the outcome goal was the same across all six stations of the lab exercise (i.e., to be able to explain the process of photosynthesis and cellular respiration), the process goals (i.e., how they will learn or approach the activity) were distinct for each station due to differences in task materials and requirements.

Each type of goal served a particular function. Regarding the outcome goal, because students were focused on a similar theme at each station, they continually were prompted to use that goal as the benchmark to judge their learning. The process goals, however, had a much different purpose. They directed students' focus and attention to the *strategies* or *processes* needed to perform each station successfully. For example, the strategies needed to demonstrate life processes in the form of equations (station 3) versus strategies to create a foldable model (station 2) are very different. What made this lab activity exciting from an SRL perspective, is that the students were continuously prompted to learn about the same principle or content (outcome goal) across the stations, yet were prompted to focus on different tactics or strategies (process goal) to attain that outcome. Emphasizing a joint outcome-process approach to learning is often viewed as a more desirable approach

than simply focusing on outcomes (Zimmerman & Kitsantas, 1997) because it helps to cultivate the premise for students that focusing on the learning process makes it more likely that they will attain the desired outcome goals.

Another innovative feature of Ms. Willet's lesson was her use of highly structured reflection activities. Given the challenges and lack of time often observed in today's schools, most students are not provided with sufficient and structured opportunities to reflect on, process, and understand their performance. That is, many students think about their challenges and struggles in superficial or maladaptive ways (Cleary, Velardi, & Schnaidman, 2017), such as attributing their struggles to low intelligence, poor ability or other uncontrollable factors. These types of attributions are problematic because they lead to a host of negative emotions, such as shame or guilt, and maladaptive behavioral reactions, such as withdrawal and disengagement (Borkowski, Weyhing, & Carr, 1988; Schunk, Meece, & Pintrich, 2016).

Ms. Willet's lesson plan is impressive because it provides students with structured opportunities to self-reflect on both the quality of their learning outcomes as well as the processes or strategies used to complete each station. At the end of each station, students are given the opportunity, but not required, to respond to a series of reflection-phase microanalytic SRL questions (e.g., Did you meet your learning goal? If yes, what strategy helped you succeed? If no, what distracted you from meeting your learning goal? What did you learn in this station that will help you at future stations?). Based on these microanalytic prompts (Cleary, 2011), students are formally encouraged to evaluate their progress towards their goals at each station and are explicitly prompted to think about and reflect on the processes or strategies that were most effective. This reflective activity is important because it prompts students to think about their successes and failures in terms of strategies (i.e., "I could not figure out what photosynthesis meant because I was missing some steps when writing the equations"). When students attribute outcomes to strategy use there is a greater chance that they will seek to adapt or tweak such strategies when they learn in the future (Cleary et al. 2006, 2017; Zimmerman, 2000).

5.5 Recommendations for Enhancing Lesson Plans

Although both of the lesson plans embody regulatory-enhancing instructional practices, we believe that each lesson can be modified to more fully enhance students' SRL skills. We organize our recommendations in terms of two broad themes: (a) strategic thinking and action, and (b) adaptive self-efficacy and motivation.

An integral aspect of SRL involves the notion of strategic thinking and action. That is, effective self-regulated learners will often approach, monitor, and reflect on their learning in highly strategic ways (Butler, Beckingham, & Lauscher, 2005; Graham & Harris, 2009). These types of learners will set process goals and develop

Table 5.14 Overview of SRL processes embedded in science lesson plans

SRL and motivation processes	Gergel's natural selection lesson	Willet's photosynthesis/ respiration lesson	Author reflections on potential impact on student thinking
Forethought: Goal-setting	• Teacher delineates the overall goal of the activity (i.e., to understand how allele frequency might change over generations)	• Teacher prompts students to use station objectives to create goals • Teacher emphasizes outcome goals (understanding processes of photosynthesis and cellular respiration) and process goals (how students will approach and complete each station)	**Gergel**—Goals can serve a motivational function and can act as criteria or standards against which students evaluate progress **Willet**—In addition to the potential motivation and self-evaluation benefits, the use of outcome and process goals helps students specify what they hope to attain and the processes needed to attain that outcome
Forethought: Predictions	• Teacher asks students to make predictions: (a) expected change in frequency of the fur trait (beginning of activity), (b) number of "F" and "f" alleles counted for the first generation (before data collection), (c) expected change in trait frequency (Darwin exercise)	None specified	**Gergel**—Predictions promote active student engagement as they approach and engage in the learning activity. Predictions can also become standards against which students evaluate or self-assess their learning **Willet**—The absence of predictions may minimize the extent to which students actively think and self-assess during learning
Performance: Strategy use	• Teacher models and explains the procedures needed to perform the activity. However, the teacher does not appear to label these procedures as "strategies"	• Teacher encourages students to independently think about and use procedures for each of the stations (process goals)	**Gergel**—Modeling and explaining strategies can help students display more strategic thinking. However, not labeling these methods as "strategies" may minimize the extent to which students engage in strategic thinking **Willet**—Although students are provided freedom and autonomy to use strategies, they may struggle unless they can actually identify and implement the required strategies

(continued)

Table 5.14 (continued)

Performance: Self-monitoring	• Teacher asks students to record and graph allele and trait frequency as part of the class activity	• Teacher encourages students to answer questions about their learning after each station via prompts (see self-reflection) but does not require them to monitor or track anything	**Gergel**—Enables students to keep track of information about the core concepts emphasized in the lesson, which can enhance student awareness **Willet**—By tracking their self-reflection reactions at each station, students have the potential to identify trends regarding the facilitators and/or barriers to their learning
Self-reflection: Evaluative standards	• Teacher provides students with an exemplary data table that they use to judge the quality of their own self-recorded data. • Students may use goals as standards but it is unclear whether the teacher encourages students to use goals in this way	• Teacher prompts students to use outcome goals to evaluate themselves after each station ("Did you meet your learning goal?") • Teacher enables students to self-check their performance during the virtual game	**Gergel**—Self-evaluation is facilitated through provision of markers or benchmarks for judging success **Willet**—Student evaluations of outcome goals following each lab station provides them with a more nuanced and specific understanding of performance
Self-reflection: Strategic attributions and adaptive inferences	• Teacher prompts students to engage in a broad reflection activity at the conclusion of the lab	• Teacher prompts students to reflect strategically after each station ("What strategy helped you succeed?"; "What did you learn that will help you at future stations?") • Teacher provides students with an opportunity to return to stations to clarify misconceptions	**Gergel**—Without opportunities to engage in structured self-reflection during the lab, it is unclear whether students will reflect in meaningful ways **Willet**—By prompting students to answer key self-reflection phase questions after each lab, students will have an increased likelihood of identifying the strategies needed to be successful. Enabling students to return to stations naturally encourages adaptation
Motivation beliefs: Self-efficacy	• Teacher provides informal feedback and comments about student success	• Instruction is differentiated based on students' prior skills and knowledge	**Gergel**—There is potential for student efficacy to be enhanced, but the clarity with

(continued)

Table 5.14 (continued)

	• Teacher structures multiple assessments of student learning (potential impact on self-efficacy)	• Teacher provides students with multiple stations to demonstrate learning and success	which efficacy is addressed is not clear **Willet**—By matching the lab activities to student abilities and providing students with multiple opportunities to learn, students will have an increased likelihood of experiencing success and increased self-efficacy
Motivation beliefs: Task values (interest, instrumentality)	• Teacher presents a short video clip of the Galapagos species • Teacher embeds a theme song from popular video game into video clip • Teacher uses activities that help students relate the content to real-life experiences	• Teacher uses TedEd videos and apple slices and creates novelty and diversity of lab stations • Teacher provides rationale for how learning about cells is integral to all life forms and functions • Teacher uses activities that help students relate content to real-life experiences	**Gergel**—The use of videos and music to which students can easily relate can make the lab more personally meaningful and enjoyable **Willet**—The use of multiple tactics to enhance students' situational interest is important to encourage student engagement in the learning activity
Autonomy supportive practices	• None specified	• Allow students to proceed through stations at their own pace. • Teacher encourages students to establish their own process goals	**Gergel**—Without providing freedom and choice, student may experience an overly controlling environment. **Willet**—Students may experience increased motivation and engagement because of enhanced perceptions of control over the learning activity

strategic plans, self-monitor their use of strategies during learning, and continually make judgments about whether their strategies are effective in helping them learn.

Both lesson plans touched upon strategic thinking to some extent, but we believe that they can be modified to enhance the frequency and quality with which students *think in the language of strategies* (Cleary, 2018). As teachers develop lesson plans for science investigations, it is important that they not only identify the most important strategies aligned with those activities (e.g., how to create effective data tables, how to use graphic organizers etc.), but that they also explicitly describe and

model these strategies to students. In Ms. Willet's lesson, students are provided with much latitude and autonomy regarding the development of process goals at each lab station. Although some students may elect to set process goals on their own, this task will be difficult for students who do not naturally think about learning in terms of strategies or who do not even know what an appropriate process goal entails (Cleary & Platten, 2013). Students may benefit from observing their teachers model how to develop process goals prior to initiating attempts to learn. For example, at Station 3, Ms. Willet can state, "Let me see…how will I figure out how to link the equations? I know that the flow of chemicals is important, but what makes sense to examine? Hmmm, perhaps I should try to identify the chemicals available at the beginning and end of photosynthesis. This strategy may help me think about how to organize the cards and figure out how to link equation by equation. So my goal is look at the chemicals at the different parts of the process to figure out the equations." Through modeling one's thinking and approach to this activity, Ms. Willet can help her students think about task processes or strategies in a more goal-directed manner. Although observing models display strategic thinking is an important first step, students will often need high levels of repetition and practice before they will naturally shift their focus from outcomes and performance to their use and mastery of strategies.

Across the two lesson plans, the teachers asked students to engage in some type of self-monitoring; that is, a process whereby students track an aspect of their behavior or performance. Generally speaking, self-monitoring is designed to increase student awareness about some area of their learning or functioning (Zimmerman, 2000). In the natural selection lesson, Ms. Gergel asked students to self-record allele and trait frequency. This recording activity was designed to provide students with data or information that they can use to identify the core theme of natural selection—thus the monitoring in this situation was more about the science concept than their behaviors or thinking. In contrast, Ms. Willet set up the photosynthesis lesson to encourage students to answer several reflection questions following each station. This activity could be particularly beneficial (from a self-monitoring perspective) because it can increase student awareness about the types of strategies that are most helpful or powerful in enhancing their learning.

Teachers can increase the quality of students' strategic thinking during learning by encouraging them to monitor and think about strategies as they practice a skill and attempt to learn (Peters & Kitsantas, 2010a, b). For example, because a key part of Ms. Gergel's natural selection lesson involved the use of procedures to facilitate rapid data collection, she could encourage students to track their use of these procedures (strategies) during the creation of a data table. Along a similar vein, Ms. Willet can create a more efficient monitoring experience for students by getting them to use a checklist to track strategy use during attempts to complete one or more of the stations. Thus, in contrast to the open-ended self-reflection questions presented in her lesson, Ms. Willet could create a checklist that includes the most essential steps or components of a strategy linked to a given station.

While self-monitoring is one way that students can obtain information about their use of strategies during learning, the types of feedback or instructional resources that teachers provide students can also play a vital role. Both Ms. Willet and Ms. Gergel indicated that they provide continuous support and feedback to students during the labs. As the literature indicates, however, certain types of feedback are more effective than others in promoting SRL. Research has shown that teachers tend to provide self-feedback (e.g., praise, broad statements about self) or corrective feedback (i.e., level of correctness; Hattie & Timperley, 2007). Although corrective feedback can help to stimulate students' self-evaluative thinking, it often does not provide explicit clues or information about the *process* students used to perform an activity or how they might need to adapt or change in order to improve (Cleary et al. 2017). As both teachers circulate around the room to provide feedback to students, it is important that they direct their feedback messages on the processes or strategies that they believe students need to focus on.

Because the prevision of individualized feedback during a classroom activity can be a daunting task, teachers can also provide structured or "canned" feedback prompts or hints that students can independently access. For example, Ms. Willet can provide hints or suggestions at each station so that students can receive some type of feedback when struggling. At Station 3, students compare photosynthesis and cellular respiration using a graphic organizer. A potentially effective hint might entail information about the way two of the more difficult cards are sorted and/or an indication of how this information can be translated into the graphic organizer. Ms. Willet could include a type of flip chart that is covered up with a sign stating, "if you are stuck, lift this flap for a helpful strategy to do this task" or "lift this flap for a helpful strategy about what you need to do." The hints provided in these prompts could give students information about the types of knowledge and skills they have not yet mastered; an experience that struggling learners could use to shift their focus away from distractions or irrelevant task demands and towards the most critical task components (Corno, 1993).

To further stimulate students' thinking in the language of strategies, it is important that students receive structured opportunities to reflect. Previously, we underscored the importance of the structured reflection activities included as part of Willet's photosynthesis lesson plan. We believe that Gergel's lesson on natural selection can also utilize this type of reflection. For example, as part of that lesson, students were asked to make numerous predictions and hypotheses. It seems reasonable for Ms. Gergel to have her students engage in a brief self-reflection or "stop and think" activity after they assess the accuracy of their predictions and estimates. It is important to note that calibration activities (comparing predictions to actual performance) have frequently been used as part of applied, school-based SRL intervention programs (Chen & Rossi, 2013; Cleary & Platten, 2013). Cleary and colleagues teach high school students to compare predictions of biology test grades with their actual test grades. A key goal of this activity is to increase student awareness about discrepancies between expectations (predictions) and reality

(actual grades). But reflection does not stop at that point. Students are also prompted to engage in collaborative conversations with their peers and teachers about the reasons for the discrepancy (i.e., attributions) and potential ways to adapt and improve (i.e., adaptive inferences). Thus, Ms. Gergel can build off of her prediction activities by probing students to dig deeper and to make the connection between an evaluative question ("*Was* my prediction correct?") and other reflection questions ("*Why* was my prediction wrong?" and "*What* can I do to improve?").

Our final recommendation pertains to enhancing student self-efficacy. Broadly speaking, the primary way to enhance student self-efficacy is to increase the frequency with which they experience success or mastery (Bandura, 1997). Two specific approaches to accomplish this objective are to increase the number of opportunities for students to evaluate their progress and to provide effective feedback messages (Cleary, 2018; Pajares, 2006). In reviewing the two science lesson plans, it is clear that both teachers actively provided feedback and supportive statements to their students during the lab activities. Because the actual content of these feedback messages was not clear, we offer a couple of general recommendations. As noted previously, praise often involves very broad, ambiguous comments ("Good job!") or statements that reflect personal attributes or qualities ("You are smart"; Hattie & Timperley, 2007). While praise statements can enhance students' feelings of worth or capability, they can be problematic from a regulatory perspective because they shift student attention towards their general ability and away from the processes or strategic aspects of learning. Effective efficacy-related statements will often emphasize how well students perform specific task-related behaviors or skills (Pajares, 2006). Thus, when circulating around the room to check student work, comments such as "Great job! The level of detail that you provided made your points very clear" is a much more powerful statement than, "Great job! You are really good at this."

Both lessons also do an exemplary job of creating multiple efficacy-enhancing moments for students. For example, by crafting a lesson plan that involves six stations and a self-evaluation task after each station, students in Ms. Willet's class have multiple opportunities to demonstrate progress and mastery. We believe that this component of the lesson can lead to greater gains in student self-efficacy by helping them identify what they know before each station and the new process skills they learned after completing each station. Teachers could provide students with checklists including all of the process-oriented tasks required to successfully complete the stations. For example, at Station 2, where students must create a 3D model, Ms. Willet could ask students to mark off checklist items including, "I organized the information so that each level of the model represents different ways of understanding photosynthesis" or "I placed information in the first column that represents the beginning of the processes." By keeping track of the specific behaviors or processes that they completed at each station, students will be naturally collecting empirical evidence that conveys a better sense of competency or mastery.

5.6 Conclusions and Future Research Directions

Enhancing student skills to strategically engage in scientific-oriented thinking during classroom lesson activities and/or related assignments is an important objective in today's schools. In this chapter, we illustrated that although different lesson plans in high school life science courses can involve distinct learning activities and instructional formats, it is possible to address similar and overlapping motivation and SRL processes. The central premise underlying this integration of scientific pedagogy and SRL theory is the notion of the cyclical feedback loop.

From this perspective, it is essential to first get high school students to become mindful of the demands and expectations of their assignments and to learn to think about strategies and tactics while completing these tasks. But students will also need assistance in gathering accurate, task-specific data or information about their learning (self-monitored or external feedback) that allows them to not only address the question of "How am I doing?" but also, "Why am I struggling?" and "What do I need to do to improve?" Thus, regardless of whether this data is directly provided by teachers as feedback or generated by the student, it is important for educators to realize that becoming more *scientific-minded* entails continuous gathering and evaluation of data that relates to a particular objective, hypothesis, or goal—the very essence of what it means to be a sophisticated self-regulated learner.

Future research can play a critical role in advancing our knowledge of the ways in which cyclical feedback loops can most effectively be intertwined with classroom tasks and activities. For example, examining the additive effects of different phases of SRL training (i.e., forethought, performance, and self-reflection) or perhaps investigating the relative advantages of combining teacher feedback with student self-monitoring of performance processes are potential ways to enhance our understanding of the most critical SRL processes linked to student success. It is also of relevance to examine the utility and feasibility of concurrently deploying multiple motivational tactics during science lessons, rather than simply focusing on one motivational process over another. Thus, do science-based lessons that simultaneously target multiple sources of student motivation during learning, such as self-efficacy, interest, perceived value and sense of autonomy, lead to optimal levels of engagement, persistence, and achievement in students?

We also believe that researchers need to consider how event forms of SRL measurement, such as think alouds, SRL microanalysis, behavioral traces, and observations (Schunk & Greene, 2017), can be used to enhance the quality of information that teachers have access to regarding students' strategic and reflective thinking during science learning activities. With access to formative assessment data about students' SRL skills while engaged in science practices, teachers may be better able to modify instructional plans and to provide more targeted and individualized feedback to directly address student misconceptions and to enhance their regulatory functioning and learning.

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Chapter 6
Fostering Self-regulated Science Inquiry in Physical Sciences

Jeffrey Alan Greene, Janice L. Anderson, Christina E. O'Malley and Nikki G. Lobczowksi

Abstract Science education in the twenty-first century must not only teach students what science is, but also how to understand and engage in scientific reasoning and argumentation. In this chapter, we review two inquiry lessons in the physical sciences, one based in chemistry and the other based in physics. These lessons demonstrate how to engage students in active, collaborative learning, which is likely to lead to deep conceptual understanding. Such lessons require students to engage in self-regulated science inquiry. They also serve as mediums for teachers to teach, support, and model self-regulated learning. These lessons illustrate empirically-supported tenets of self-regulated learning including planning, monitoring, and controlling what happens before, during, and after learning; providing just-in-time teacher support and modeling; and structuring lessons to promote positive reflection, self-efficacy, and growth mindsets. Further, the lessons in this chapter illustrate how to move students from co-regulation to socially shared regulation of learning, which in turn provides students with the tools they need to engage in scientific argumentation, inquiry, and discourse.

J. A. Greene (✉) · J. L. Anderson · N. G. Lobczowksi
The University of North Carolina at Chapel Hill, Chapel Hill, NC, USA
e-mail: jagreene@email.unc.edu

J. L. Anderson
e-mail: anderjl@email.unc.edu

N. G. Lobczowksi
e-mail: ngl@unc.edu

C. E. O'Malley
Carroll High School, Dayton, OH, USA
e-mail: comalley@carrollhs.org

M. K. DiBenedetto (ed.), *Connecting Self-regulated Learning and Performance with Instruction Across High School Content Areas*,
https://doi.org/10.1007/978-3-319-90928-8_6

Table 6.1 Density and proportional reasoning lab lesson plan

Teacher: Christina E. O'Malley, Ph.D. License: Adolescent-Young Adult, Integrated Science B.S. Biology, B.S. Chemistry, M.S.T. Earth Science, M.S. Geology, Ph.D. Geology, M.S.Ed Secondary Science Education	**Grade Level(s)**: 9–12
School: Carroll High School	**Subject**: Chemistry (Physics)
City and State: Dayton, OH	
Instructional Plan Title: Density and Proportional Reasoning Lab	
Common Core State Standards—Mathematics MP.2—Reason abstractly and quantitatively MP.4—Model with mathematics HSN-Q.A.1—Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays **Next Generation Science Standards** HS-PS1-7—Use mathematical representations to support the claims that atoms, and therefore mass, are conserved during a chemical reaction HS-PS2B—Types of Interactions (DCI) Cross-cutting Concepts—Patterns, Cause and Effect, System and System Models	
Learning Objectives: 1. Given a graph of mass versus volume of a various substances, students will relate the slope to the density of the substances 2. Students will recognize that density is a characteristic property of matter (i.e., it can be used to help identify an unknown substance) 3. Students will use density as a conversion factor between mass and volume; and apply this to quantitative problems 4. Students will use differences in density of solids, liquids and gases as evidence for differences in the structure of matter in these phases	
Instructional and Learning Materials Needed: Density blocks, rectangular samples of materials (different types of plastics), rulers, scales, access to Vernier Graphical Analysis (Chrome book)	
Lesson Duration: 60 min class period	
Teaching and Learning	

Min on this Activity	Targeted Activity	Purpose of Activity
5	**Orienting Students to Lesson**: • Students enter the classroom and prepare for class by getting their science notebook (i.e., a composition book), and a pen/pencil • Briefly discuss the prior activity (bellringer): *Select two points from the graph you generated yesterday (cm^3 vs. mL) and draw particle diagrams for them. Is there a relationship between the size and amount of matter of a sample? How could that relationship be determined?*	• Students preparing immediately sets the tone for promptly beginning the lesson • This warm-up inquiry serves as a review of the previous day's lesson and an introduction to the current lesson • Students determine experimentally the relationship between cm^3 and mL for water

(continued)

Table 6.1 (continued)

5	**Motivation**: • After discussing the opening questions, teacher and students use scales to determine the mass for some rectangular samples of materials, made from different kinds of plastics, rulers to determine volume, and the Vernier Graphical Analysis app to determine the algebraic expression of the relationship between mass and volume for each kind of matter	• At the end of the unit, students will be asked which materials will float, based on data they collect about their samples • These activities provide students with the opportunity to apply prior knowledge and apply critical thinking skills
	Prior objectives in this unit (AMTA, 2013a): • Define mass. Define volume • Give appropriate units for each • Demonstrate that you can use a multiple beam balance to determine the mass of various objects. Record the value of an object's mass in a manner consistent with the limit of precision of the balance • Represent class data using a histogram; use the histogram to interpret trends in the data • Develop, from experimental evidence, the law of conservation of system mass • Relate the volume of a container (in cm^3) to the volume of liquid it contains (in mL) • Recognize that instruments have a limit to their precision; relate the data recorded to the quality of the measurement	• This activity is part of a larger unit on matter, and connects back to previous lessons that have allowed the students to engage with the scientific tools (rulers and balances) and collect data using those tools • Students track the units objectives in their binders, and track the activities where we address each objective
20	**Whole Class Instruction**: • Students (briefly) reflect on prior learning about matter and the relationship water illustrates between volume and mass • Students engage in hands-on inquiry using the scales, rulers and blocks to	• Student observations engage the students in the activity. The activity is open, but it is important for the teacher to focus students on the learning objectives • Demonstrations are used to illustrate for students the

(continued)

Table 6.1 (continued)

	determine density and construct internals models about the behavior and structure of matter • Use Just-In-Time teaching to push student thinking and allow them to develop causal models that account for their patterns. Sample Questions: *"I'm confused by what your are doing here, can you tell me more about …?" or "How did you get this point?" or "Why do you think that is occurring?"*	function and use of the tools of the lab • Modeling plays a large role in instruction (see http://modelinginstruction.org) • Group work allows for differentiation to occur in smaller groups and ESL issues addressed
Part of the 20 min Whole Class Instruction	**Guided Practice/Providing Feedback**: • Students should have prior experience, using water, in measuring mass and volume • Students practice what they have learned about measurement by measuring mass and the dimensions of the block; calculating and significant figures by calculating the volume of the blocks; students design their own tables, and practice graphing and analysis skills by drawing a graph (i.e., on graph paper, with only the instruction "draw a graph of your data"), potentially using technology tools	• Students previously completed an investigation to answer the question, "What is the relationship between mL and cm^3?" using water as the substance of interest, rather than a solid. This serves a dual purpose: first to practice this type of measurement, and also to introduce students to the idea that the slope of the mL versus cm^3 line is the property density
20	**Independent Practice**: • Students identify characteristics associated with density. Students demonstrate mastery by producing a whiteboard showing their experiment, data, graph, algebraic expression and written relationship, then presenting it to the class • Activity is focused not on "right" and "wrong" but rather discourse to identify	• Students have multiple opportunities to demonstrate mastery of the material, and they may not do so all at once or the first time • Work is monitored through observations and listening to student discourse • Avoid incentives for "correct" responses as these might disrupt the discourse among the group members • Whiteboards serve as a structure for discussion

(continued)

Table 6.1 (continued)

	and challenge misconceptions and reach consensus • Students record whiteboards and notes from discussion in their notebooks	
Ongoing through independent practice and closing activities portions of the lesson	**Evaluation of Learning and Assessments**: • Students are assessed for understanding throughout using questioning to probe student thinking and Just-In-Time teaching. Student understanding is assessed during the Board Meeting Presentations in the whole class discussions – Board meetings allow groups to present their data on their white boards to the class and take questions from their peers • Feedback is provided through probing questions for clarification of ideas on their written work, comments are discussed and used as a learning tool. Students submit corrections on these assessments	• The purpose of assessment is to identify student learning. By requiring students to discuss their ideas, alone or in groups, it is possible to identify not only what their misconceptions and errors in reasoning are, but to work to correct them through questioning • Assessment is in three phases: (1) during inquiry; (2) Board Meetings; and (3) Problems, quizzes and tests. 1 and 2 are formative, 3 is summative • Goal of the board meetings is to reach consensus in their conclusions; creating scientific arguments
10	**Closing Activities**: • Build consensus during the board meeting where students agree that the slope of the mL versus cm^3 graph describes density • Move discussion to what it means for a material to float —recall that water has a density of 1 mL/cm^3, and because things that float are "light" they conclude that materials/objects with a density less than 1 will float, and items with a density greater than 1 will not float	• Students have experimental plan, data, analysis and conclusions in their notebooks. Students are developing models to demonstrate their understanding • Students sketch matter at the particle level to describe the density of matter • Students make a prediction about whether materials will float, and test their predictions
Specific Strategies used to Address Exceptional Students and/or Students for whom English is a Second Language: • Students for whom English is a second language are helped by careful monitoring of what ideas mean • ESL students may use commas in place of decimals • Differentiation should be based on the needs of students, and the best way to identify what those needs are is to discuss what the students are doing *as they are doing it*		

6.1 Narrative of the Density and Proportional Reasoning Lab Lesson

Carroll High School is a private Catholic school in suburban Dayton, Ohio with an enrollment of 900 students (500 female). The student body is primarily white (95.7%) with Indian (0.7%), Asian (1.7%), Hispanic (1.1%) and African American (0.9%) students making up the remaining population. Carroll has an overall student to teacher ratio of 11:1 with a target class size of 24 students for science classes; specialized and advanced science classes have smaller class sizes. Less than 2% of the student population have documented special needs with Individualized Educational Plans.

The goal of this lesson (see Table 6.1) is to introduce students to the concepts of density and proportional reasoning in the context of chemistry. Therefore, students will (a) collect data and create a graph of matter versus volume in order to relate the slope to the density of the substances; (b) recognize that density is a characteristic property of matter; (c) use density as a conversion factor between mass and volume; and (d) utilize differences in the density of solids, liquids and gasses as evidence for structural differences in matter within these phases (American Modeling Teachers Association, 2013a). This activity addresses Next Generation Science Standards (NGSS Lead States, 2013) and Common Core Standards in Mathematics (National Governors Association Center for Best Practices, 2010) that emphasize using mathematical ideas to communicate proportional relationships, a key concept.

Class begins with bell ringer activities based on the previous lesson. These reflective or analytical questions challenge students to engage prior knowledge. In this case, the students are asked to: *Select two points from the graph you generated yesterday (cm^3 vs. mL) and draw particle diagrams for them.* At this point in the course students have the skills of measurement for both the size (i.e., volume) and amount of matter (i.e., mass) of a sample. I challenge students to answer the questions with little input or instruction from me. The discussion following the bellringer introduces the next activity. Simply, I ask the class: 1. *Is there a relationship between the size and amount of matter of a sample?* and 2. *How could that relationship be determined?* All ideas are written on the class board and students notebooks. As a class, we discuss the list and restrict our day's work to measuring mass and volume for the set of plastic blocks.

Next, I ask how the students would measure mass and volume. One challenge I encounter is when they respond that they would use a graduated cylinder for volume and a balance for mass. I show students a density block and they suggest calculating the volume, and some try using displacement using a graduated cylinder. After manipulating the density block, they realize that it does not fit in the graduated cylinder and they may try a less precise, and typically unsuccessful, attempt at measuring displacement with a beaker. A common solution is to use a ruler to calculate the volume of the rectangular prism. This critical thinking and problem solving helps students become invested in their educational process. Determining mass is straightforward.

Next, students are shown additional samples of various materials, and are reminded of the goals for the activity. Students are directed to choose two materials, and make measurements on five samples of each material, so they can plot both materials together on one graph of mass versus volume. Some students do not realize they should make multiple measurements, so I make this clear to them, along with why it is helpful. This allows students to compare the data, particularly with respect to the slope of the lines generated and the y-intercept of each material; plotting two materials on the same graph helps students see that different materials have different slopes, which can sometimes be a challenge for them to see otherwise.

Students are responsible for scientific practices and producing models in this activity. These include: measuring mass and volume for multiple items, generating a data table, graphing the mass and volume data (i.e., mass on the y-axis, volume on the x-axis), and using graphical analysis to generate a best fit line generating an equation that represents this mathematical relationship (i.e., I ask the students to replace "x" and "y" with their variables to determine the units for the slope), and creating a written expression [e.g., mass (g) equals a constant (g/cm^3) times the volume (cm^3)]. Students complete this work in their science notebooks, not on a blank lab form that is prepared for them.

I move around the room trying to identify misconceptions as they occur and challenge them. Group work makes differentiation easier because small groups of students can be addressed in relative privacy while making sure there have been no translation errors for the English as a Second Language (ESL) students; some ESL students may struggle with vocabulary, and group work can help to reveal that. Also, I push student thinking through questioning strategies. I am constantly asking students *why* they do things or perform certain steps. This is critical to ensuring their logic and reasoning are sound. This is the notion of "Just-In-Time" teaching (Novak, 2011), allowing the students to develop their own models that account for the patterns they are seeing, as well as make predictions about future models. Through presentations using whiteboards, students are forced to respond to critiques of their peers, resulting in further justification of their models or a re-focus of their ideas, as they discuss trends in data to reach consensus.

All students are required to participate within the group structure. Students are responsible for setting or assigning group roles, such as data collector or equipment manager. As I move about the room, I look for groups where students are being excluded from leadership roles. Students know what they learn during this activity will be the basis for the rest of the unit. Therefore, it is critical that they work carefully, and positive feedback is highly valued. Students build confidence by getting confirmation about the accuracy of their work.

However, for later discussion during Board Meetings it is important for students to have developed conceptual models, so while I am positive with students during work time, I try to refrain from telling students whether they are right or wrong. Rather, I discuss their reasoning with them. During these "Just In Time" interactions, I refrain from offering solutions, particularly when students have not recognized a potential problem. One challenge with this exercise is that some groups

will finish too quickly. For those groups that are moving forward and working well, I ask them to complete a supplemental task to enrich their understanding of the material (i.e., I ask for a "favor") such as performing an alternative test or confirming the results of another group. Students continue to work until they have the data and results ready to share with the larger class.

Students have multiple opportunities to demonstrate mastery of the material, but they may not do so all at once. Board Meetings allow me to formatively assess student learning, while also providing students the opportunity to present their data and outcomes to the larger class, and participate in a larger class discussion. These discussions are aimed at developing consensus around student findings in order to further develop their understanding of what their data represents. Students prepare a whiteboard (i.e., a 2′ × 3′ piece of bathroom paneling) with dry erase markers[1] and present their data table, graph, equation, and written relationship. Students or groups take turns presenting their results. Then, students reach consensus about their findings.

During the Board Meeting, students should realize (a) the graph of mass versus volume for different materials produce different slopes, (b) the data from the same materials consistently produce the same slope, and (c) there is a y-intercept that reflects the mass of the container being weighed if the container's mass is not subtracted out. When Board Meetings do not elicit all the goals of the lab, some probing questions that might be posed to the students include: "*What does the y-intercept mean? Does error mean you did something 'wrong'? What specific error might have produced it? What does the slope mean?*" The slope of a mass versus volume graph describes density, but I encourage students to identify the idea before introducing the proper term.

My goal in facilitating conversations around these Board Meetings is to help students develop alternative ways to discuss the concept or idea of density, and for me to assess student learning. For example, students should realize it is not just a value of 1 g/cm^3, but also "one gram of mass for every cm^3." Some groups of students may identify this idea as density, whereas other groups may articulate the conceptual idea, but not have a name to connect with their idea. The Board Meeting discussion reveals student misconceptions and errors in reasoning, and provides a way to immediately challenge and correct them through questioning.

Following this board meeting, students use their data to predict if their material(s) will float. This requires that they understand (a) water has a density of 1 g/cm^3, (b) when the density of an object is greater than one, it will sink, and (c) objects with a density of less than one will float. I listen for misconceptions or inaccurate language. For instance, students may say a block will float because it is "heavier," which infers mass, rather than because it is "denser." This should be corrected by referring back to the discussion that occurred during the Board Meeting.

[1]Note: This could also be done collaboratively through a web-based collaborative planning space such as Padlet or lino. Both of these applications allow for the attachment of photos and videos, or in the case of this inquiry, graphs.

Overall, in this activity students are actively engaged through questioning strategies that challenge them to investigate the concept in a variety of ways with little, if any, teacher-led instruction. Students enjoy the "Will It Float?" challenge at the end, because it helps them identify practical applications. Students frequently begin to think about which aspects of the data might change for different materials, and at what point in the range of data various materials will float.

Table 6.2 Introduction to constant velocity lab lesson plan

Teacher: Christina E. O'Malley, Ph.D. License: Adolescent-Young Adult, Integrated Science B.S. Biology, B.S. Chemistry, M.S.T. Earth Science, M.S. Geology, Ph.D. Geology, M.S.Ed Secondary Science Education	**Grade Level(s)**: 9–12
School: Carroll High School	**Subject**: Physics
City and State: Dayton, OH	
Instructional Plan Title: Introduction to Constant Velocity Lab	
Common Core State Standards—Mathematics: MP.2—Reason abstractly and quantitatively MP.4—Model with mathematics HSN-Q.A.1—Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays **Next Generation Science Standards**: HS-PS2-1. Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass and its acceleration HS-PS2-2. Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system Cross-cutting Concepts—Patterns, Cause and Effect, System and System Models	
Learning Objectives: 1. Students will describe the motion of an object based upon its position versus time graph 2. Students will draw a velocity versus time graph form a position versus time graph 3. Students will draw a position versus time graph from a velocity versus time graph 4. Students will write an algebraic equation to model an object moving with constant velocity 5. Students will calculate the average velocity of an object 6. Students will, given a set of data points, plot the position versus time graphs and the velocity versus time graph 7. Students will develop an evidence based argument that supports the development of the concept of constant velocity	
Instructional and Learning Materials Needed: battery powered buggies for each student group, tracks for each group (e.g., wood frame 2-m tracks with whiteboard "floors"), metersticks and stopwatches, whiteboards and dry erase markers, access to Graphical Analysis	

(continued)

Table 6.2 (continued)

Lesson Duration: 100 min class period		
Teaching and Learning		
Min on this Activity	**Targeted Activity**	**Purpose of Activity**
<1	**Orienting Students to Lesson**: • Prior to the class period, a buggy and track are placed on a lab bench in front of the room • Students enter the classroom, curious about the buggy, and prepare for class by taking out their science notebooks (i.e. a composition notebook), and a pen or pencil • Immediately after the bell, the teacher plays with the buggy, which captures the students' attention	• Students getting ready immediately upon entering the room sets the tone for promptly beginning the lesson • The buggy grabs the students' attention and interest
10	**Motivation**: • As students settle in, the teacher draws their attention to the buggy and solicits observations • The teacher asks for a volunteer to turn on the buggy and students are instructed to quietly observe the buggy's motion, observations are solicited	• The buggy and its speed are of great interest to the students because it means the class will be doing an inquiry lab • Student observations engage the students and, while the inquiry is open-ended, the initial event helps to focus the students on the objectives • Driving sparks excitement in students as they are just getting their driving permits and licenses
10	**Whole Class Instruction**: • Using the responses from the motivating demo, students identify clear variables, e.g., direction of movement and end point where buggy stops • Define common terms for students before letting them go to design inquiry • Learning is monitored during classroom circulation through questioning	• Demonstrations are used to illustrate for students the function and use of the tools of the lab • Students design their own experiment to determine the relationship between distance and time of motion • Classroom movement allows for identification of issues with experimental design. Goal is not to prevent problems, but help students work out problems. Questions can help to encourage students to change their focus or correct reasoning, when necessary
35	**Guided Practice/Providing Feedback**: • Students work together in groups of three to identify and describe the relationship between distance and velocity • Scaffolding is purposefully integrated into the lesson by beginning with a teacher-led demonstration, then	• Students have the opportunity to test the questions raised during the demonstration through their experimental design. Then they can apply what they learn during the activity in future lessons in the unit • Students know that what they learn during this activity will be the basis for

(continued)

Table 6.2 (continued)

	allowing students to apply what they learned in the demonstration during the hands-on activity • Monitor student learning during group work time (i.e., the lab) and during the Board Meeting	the rest of the unit. Therefore, it is critical that they work carefully, and positive feedback is highly valued. Students build confidence by getting confirming their accuracy • It is important for students to have different models, so while teacher can be positive with students during work time, the teacher should try to refrain from telling students if they are right or wrong, and instead discuss their reasoning with them
25	**Independent Practice**: • The goal of the lesson is for students to identify that velocity is the relationship between distance and time, and that velocity is the slope of the distance versus time graph	• Students have multiple opportunities to demonstrate mastery of the material, and they may not do so all at once the first time. This is an important way to formatively assess understanding • Students show mastery by producing a whiteboard showing their experiment, data, graph, algebraic expression, and written relationship, as well as presenting it to the class • Students use the equation they derive ($v = d/t$) throughout the rest of the mechanics units. Work is monitored through observations and listening to group discourse
Ongoing	**Evaluation of Learning and Assessments**: • Formative Assessment begins during the activity (i.e., velocity is the relationship between distance and time). It continues during the "Board Meeting," and into third class time when they apply $v = d/t$ to problems – Board meetings allow groups to present their data on their white boards to the class and take questions from their peers • Summative assessment occurs on tests and quizzes	• The purpose of assessment is to identify student learning. By requiring students to discuss their ideas, alone or in groups, it is possible to identify not only what their misconceptions and errors in reasoning are, but to immediately work to correct them through questioning by both peers and the teacher • Comments are given and discussed so they can be used as a learning tool
20	**Closing Activities**: • As a class, reach consensus about the relationship between the variables (i.e., distance and time) following the Board Meeting to discuss the groups' results. The product of their work is "There is a proportional relationship between distance and time" or "the slope of a	• At the end of the activity, students should have their experimental plan, data, analysis and conclusions recorded in their notebooks for future reference • This lesson is the foundation of a unit on velocity, which leads into acceleration and 2-D motion. Students know the sequence of ideas in the

(continued)

Table 6.2 (continued)

	distance versus time graph is velocity of an object in motion"	course, but many have poor definitions of those ideas, so projecting this idea forward is merely a statement of fact for students, and not worth spending significant time in class on

Specific Strategies used to Address Exceptional Students and/or Students for whom English is a Second Language:

- Students for whom English is a second language are helped by careful monitoring of what ideas mean. It can be hard for English speaking students to understand complex ideas like distance versus displacement, or speed versus velocity, and that problem is often compounded when ESL translators do not distinguish between technical terms
- Tailoring learning experiences is important for all students to achieve in the classroom. Differentiation should be based on the needs of students, and the best way to identify what those needs are is to discuss what the students are doing *as they are doing it*

6.2 Narrative of the Constant Velocity Lab Lesson[2]

The purpose of this lesson (see Table 6.2) is to introduce students to the concept of constant velocity. By the end of this lesson, students will be able to (a) describe the motion of an object based upon its position versus time graph; (b) draw a velocity versus time graph from a position versus time graph, as well as vice versa; (c) write an algebraic equation to model an object moving with constant velocity; calculate the average velocity of an object; (d) use given data points to plot the position versus time graphs and the velocity versus time graphs; and (e) develop an evidence-based argument that supports the development of the concept of constant velocity (American Modeling Teachers Association, 2013b). This lab addresses both Next Generation Science Standards (NGSS Lead States, 2013) and Common Core Standards for Mathematics (National Governors Association Center for Best Practices, 2010). These standards emphasize the analysis of data that support Newton's second law of motion, as well as the ability to describe the mathematical relationships between the net force on the object and its mass, velocity, and acceleration.

As students arrive at the classroom, I have a track with a battery powered buggy set up on a table in the front of the room. Students take their seats and prepare for class by getting out their science notebooks and a writing tool. As class begins I, or a student volunteer, turn on the buggy found on the track in the front of the room. Students are instructed to quietly observe the motion of the buggy as it moves along the track. After a few moments, I ask the students, "What do you observe about the motion of the buggy?" Some example responses from the students might include: "*It moves down a track, left to right, kinda slow and doesn't turn.*" "*The buggy was stopped at the end.*" "*The buggy moved under its own power.*" or "*The buggy*

[2]See the previous narrative for a description of school and class characteristics.

seemed to move at a constant speed." These student observations serve to engage the students in the inquiry.

Following these student responses, I note that we want to focus on a variable that we can clearly identify. Many students struggle to understand what a measureable variable is; in these cases I walk them through a series of questions and examples to help them understand the idea. For example, we can tell which direction the buggy moves; this is a defined direction. Second, we can identify an end point variable where the buggy stopped. Conversely, there are some variables that will not give us information about how the buggy moved on the track. For example, the "levelness" of the track does not give us much information about *how* the buggy moves; however, what it does tell us is *where* we observe the movement on the track. We end this discussion by focusing our inquiry on the relationship between the distance traveled by the buggy and the time that passes while the buggy moves over a set of distances down the track.

There are two different questions I can pose to set up the inquiry: "*How can we show that the speed is constant?*" or "*What is the relationship between distance and time?*" Some students struggle to identify the proper variables, therefore I prefer the latter question because it best models the way to ask scientific questions and emphasizes searching for the relationship between variables, an important science process skill. Then, I pose the question, "How could this be measured?" With the question on the board (i.e., *What is the relationship between distance and time?*), I draw an arrow from "distance" to "time" and ask "How can we determine this?" Students typically offer responses including a meter stick and a stopwatch. This begins the inquiry activity. I tell students that at the end of the inquiry we will have a Board Meeting where students conduct a short presentation to share their results with their classmates.

In order for our later class discussion to be understood by all, it is important I make sure everyone understands the terms we are using in our descriptions. Therefore, we agree on common terms such as "position" and "passage of time" as opposed to simply time. Students break into groups and begin to plan their experiment. I allow students to choose how to set up their experiment. This is student-led open-ended inquiry. I circulate around the room, helping students to identify issues with experimental design and troubleshoot any problems that have emerged. When students struggle to set up the experiment correctly, I scaffold them to the proper design. My role is not to prevent problems, but to help students work out the problems they encounter through questioning strategies.

A common misconception encountered in this lab is students will often find a positive slope emerging from their data on a distance versus time graph, and wrongfully conclude that the buggy is "speeding up." Students who are beginning to understand will frequently recognize that once we have the mathematical model, we can predict where the buggy is at any time. Some students reveal misconceptions about what the graph shows regarding motion. One way I address this issue is to stop a group who has marked distance on the track (i.e., one with students who have very strong math skills). I ask them to start the buggy at the 2 m line and move toward the 0 m line. This produces a graph with a negative slope.

To prepare for the Board Meeting, students utilize a whiteboard (i.e., a 2′ × 3′ piece of bathroom paneling) with dry erase markers. They present a data table, graph, equation, and written relationship of their findings to the larger class, allowing for discussion and critique. Students take turns showing their results. From these conversations, students are able to reach consensus about their findings. The discussions and critiques help them to strengthen their justifications and give to support their evidence-based claims.

During the board meeting, students observe that all students have a straight line in their graph, which can have positive or negative slope. When students produce anomalous data that does not produce a straight line during the activity, I ask them to collect more data to confirm their results. Students should also observe that student groups have similar equations (i.e., in the slope intercept form $y = mx + b$). Advanced students may recognize the equation as distance equals slope with units distance/time multiplied by time. I allow students who determine this to introduce this idea to the class. Sometimes no group offers the correct solution; in these cases, I can ask what the y and x in the equation represent during the Board Meeting discussions. A negative slope for their distance versus velocity best-fit line prompts discussion about what the slope of the graph actually means. If students' discussion goes off-topic, I refocus class discussion on the idea that slope gives the magnitude of the speed and sign indicates direction relative to the start. I believe it is helpful for students to have different models, because it challenges their conclusions.

This activity gives all students a common experience to use as a basis for understanding constant velocity, as well as a simple situation that students can manipulate, collect data and derive claims based upon evidence. This inquiry allows the students the opportunity to identify and confront their misconceptions. The flexibility of this activity allows students to make changes in the experiment while still getting accurate results. Students gain a tremendous amount of confidence in their scientific abilities, both in content and in process, from conducting this type of lab inquiry. This experience reiterates that memorizing formulas is not the same as gaining deep understanding of content. This inquiry activity puts common formulas in authentic contexts and demonstrates to students how these formulas are derived.

6.3 Analysis of Self-regulated Learning in the Physical Sciences Classroom

The proliferation of information in the 21st century, including varying views, arguments, and potentialities, has led to calls for fundamental shifts in the curricula and desired outcomes of primary and secondary education in the United States (Goldman et al., 2010; OECD, 2013). Policy documents such as the Common Core State Standards (CCSS; National Governors Association Center for Best Practices, 2010) and the Next Generation Science Standards (NGSS; NGSS Lead States, 2013) share a common goal of building on the education system's focus on

foundational knowledge to include the kinds of critical thinking and expert practices necessary to understand, vet, and produce the knowledge needed for success in the modern world (Elby, Macrander, & Hammer, 2016; Greene, Sandoval, & Bråten, 2016; National Education Association, 2014). Acquiring and successfully using such complex knowledge and expertise depends upon people's ability to effectively self-regulate their learning. As secondary school science educators incorporate CCSS and NGSS standards into their practice, it will be critical for them to teach, support, and model self-regulatory processes (e.g., the planning, monitoring, and control of cognition, metacognition, motivation, behavior, and affect to achieve valued goals; Schunk & Greene, 2018). In this analysis, we demonstrate how instruction on self-regulated learning (SRL) can be infused throughout lessons in the physical sciences. We also illustrate how teacher moves can support and model effective self-regulation, increasing students' capacity for acquiring the necessary knowledge and skills to use scientific perspectives and practices to understand and shape the modern world.

Scientific inquiry includes knowledge, skills, and dispositions that are often not natural, but thankfully are learnable (Kelly, 2016; Sinatra, Kienhues, & Hofer, 2014). The core of this kind of inquiry is self-regulation: students must inhibit natural inclinations to infer from anecdote or seize upon the first solution and replace them with more reliable scientific epistemic practices, such as systematic hypothesizing, measurement, and testing (Greene, 2018; Sinatra & Chinn, 2011). Zimmerman's SRL model delineates the kinds of thinking necessary for students to engage in this kind of self-regulated scientific inquiry (see DiBenedetto, 2018/this volume). Further, the model makes explicit the importance of self-regulation not just during inquiry, but before and after as well. Finally, Zimmerman's work delineates how students acquire effective SRL knowledge, skills, and dispositions through a process of internalization, moving from the observation and emulation of a learned other, such as a teacher, to autonomous self-control and, finally, self-regulation. The lessons in this chapter are examples of how teachers can use Zimmerman's work to support science inquiry and learning.

6.4 Broadening Students' Understanding of Science Inquiry

The first thing to note about the lessons in this chapter is that they are designed to model scientific inquiry as a process extending beyond just what is done during inquiry, but to what should occur before and after inquiry as well. One of Zimmerman's (2013) most powerful contributions to the science of learning was this delineation that successful learning has multiple phases, including forethought before learning performance as well as self-reflection after performance. The explicit structuring of the lessons in this chapter into before, during, and after phases allows teachers to model each of the phases of self-regulated science

inquiry, and show students the importance of each phase. One way to expand the lessons in terms of SRL would be to include explicit instruction on critical before and after learning processes, which has been shown to bolster the students' internalization of SRL processing (Kistner et al., 2010).

Before learning. Each lesson begins with a scenario grounded in authentic problems mirroring students' lived experience, such as why certain materials float whereas others do not, and how speed and motion are determined. By using materials and asking questions that come from the students' lived experience, these lessons facilitate the transfer of the science inquiry knowledge, skills, and dispositions they acquire in school to outside-of-school contexts (Bricker & Bell, 2016). Further, the teacher is positioned as a partner in inquiry, encouraging students to observe the scientific phenomena, activate their prior knowledge about the problem, and explore multiple explanations for the scientific phenomena under investigation. The teacher also builds on past knowledge, activating students' interest and developing their self-efficacy for the task. Again, each of these processes is a critical aspect of expert science inquiry (NGSS Lead States, 2013). An additional focus that could be added to this lesson, and which is a ripe area for future research, is the inclusion of instruction on metamotivation, or how students can monitor and control their motivation for the task (Wolters & Benzon, 2013).

During learning. These lessons illustrate a number of important teacher moves in the *during* or performance phase of self-regulated science inquiry. The choice to use small-group discussion derives from empirical research suggesting the optimal size for groups is between four and six students (Loyens & Rikers, 2011; Murphy, Wilkinson, Soter, Hennessey, & Alexander, 2009). Small-group inquiry allows for guided discovery learning, which has been shown to be more effective than either pure discovery learning or direct instruction (Alfieri, Brooks, Aldrich, & Tenenbaum, 2011; Hmelo-Silver, Duncan, & Chinn, 2007). In guided-discovery learning, the teacher provides "Just-In-Time" support allowing students to practice scientific inquiry without the threat of becoming mired in unproductive tangents on the learning progression to scientific modeling expertise (Schwarz et al., 2009). Effective questioning allows the teacher to model metacognitive monitoring and strategy use. Teacher support should include effective feedback focused on the task, rather than the students (van de Pol, Volman, & Beishuzien, 2010) to model a growth mindset toward experimentation and learning (Yeager & Dweck, 2012). Such feedback builds the self-efficacy necessary for continued guided discovery learning, while helping students acquire the necessary scientific knowledge to ask appropriate questions and understand their results. Both lessons in this chapter fall within larger units on disciplinary core ideas, such as the structure of matter and the nature of forces and motion (NGSS Lead States, 2013). The model building, measurement, and testing necessary to engage in inquiry in this lesson are core scientific practices that are revisited numerous times in each science course, providing opportunities for self-regulated scientific inquiry. Research has shown that distributed practice of inquiry leads to better internalization, application, and transfer of these practices (Dunlosky, Rawson, Marsh, Nathan, & Willingham, 2013; Schwarz et al., 2009).

After learning. Finally, what happens *after* the students engage in discovery learning is just as important as what happens *during* learning (Zimmerman, 2013). Board meetings are a wonderful example of how students can engage in the authentic scientific practices of communicating, evaluating, critiquing, and refining their models (NGSS Lead States, 2013; Sinatra & Chinn, 2011). During this time, teachers must reinforce a focus upon the models as more or less accurate in terms of scientific phenomena, rather than focusing on "wrong or right answers" or student capability (Yeager & Dweck, 2012). All students, but in particular high-school students, engage in self-evaluation and make causal attributions regarding why they were or were not successful in modeling the phenomenon (Efklides, 2011). By focusing on the process of scientific inquiry, and normalizing model evaluation and revision as desirable scientific practices, teachers increase the likelihood that students maintain a growth mindset toward learning and avoid falling into a vicious cycle of harsh self-evaluation, attribution to internal, stable, and uncontrollable qualities (e.g., lacking "science" intelligence), and negative emotions that often accompanying such reflections (Linnenbrink-Garcia & Pekrun, 2011). More research is needed into the kinds of attributions students make during problem-based learning, and how teachers can positively shape those attributions to be adaptive for future learning (Weiner, 2010).

Beyond the board meeting, each lesson includes internalization processes that encourage students to not only understand the phenomenon under study, but also the scientific practices they used. For example, keeping detailed notes and self-reflection upon the adequacy of their experimental plan, data, analysis and conclusions helps students develop the metacognitive skills necessary to move from guided discovery learning to truly self-regulated science inquiry (NGSS Lead States, 2013; Zimmerman, 2013). Likewise, the "Will It Float" exercise encourages students to engage in near-transfer processes with authentic materials that can lead to internalization of scientific knowledge, skills, and dispositions, as well as their use beyond the classroom (Bricker & Bell, 2016). As Schunk (1999) has shown, true *self*-regulation requires observing, emulating, and then internalizing the regulatory processes modeled by teachers in lessons such as these.

6.5 Regulating Cognition, Metacognition, Motivation, Behavior, and Affect

Science inquiry requires that students effectively self-regulate not only their scientific practices, but also the motivation, behavior, and affect necessary to persist through the task and collaborate with others (Efklides, 2011). In the lessons in this chapter, the teacher is positioned to co-regulate students' learning, with the intention of helping students to internalize those processes (Hadwin, Jarvela, & Miller, 2018). For example, there is important intentionality in the questions and materials used at the start of each lesson. These authentic questions and materials co-regulate

students' interest by first "catching" their interest, and then "holding" it through the questions and scientific processes used to better understand the scientific phenomena under study (Linnenbrink-Garcia & Pekrun, 2011). Likewise, the explicit focus on inquiry, rather than student evaluation, helps to create a classroom goal structure focused on mastery of the content, rather than performance comparisons among students (Meece, Anderman, & Anderman, 2006). Mastery classroom goal structures are more likely to promote students' deep understanding, and the risk-taking needed to engage in true scientific inquiry. Co-regulation of scientific inquiry and learning continues through Zimmerman's performance and self-evaluation stages in these lessons. For example, when just-in-time scaffolding includes the teacher asking questions about student models, rather than immediately identifying what is problematic about them, the teacher demonstrates how self-questioning can be a powerful metacognitive tool. Likewise, there are numerous science-specific inquiry strategies that the teacher can model for students, such as coordinating among multiple sources of information and the control of variables strategy, among other scientific practices (Greene et al., 2015; Kuhn, 2016).

Further, students must also be able to engage in socially shared regulation of learning (SSRL; Hadwin et al., 2018), where students mutually support each other in common pursuit of learning, as compared to co-regulation where a more knowledgeable other supports a less knowledgeable student's internalization. Collaboration between students must occur not only in terms of the modeling and scientific reasoning used, but also in the ways that SRL processes such as forethought, performance, and self-evaluation occur between and among members of the group. The teacher's co-regulation seen in the lesson plans serves to strengthen the regulatory skills of the group members. Without these skills being present at the individual level, the likelihood of SSRL is small (Miller & Hadwin, 2015). At the same time, whereas co-regulation and SRL help students complete individual work, SSRL is considered optimal in collaborative settings (Järvelä, Malmberg, & Koivuniemi, 2016). The lessons in this chapter provide teachers with numerous opportunities to observe and foster not just co-regulated science inquiry, but also socially shared aspects as well. The internalization of self-regulation requires extensive guidance and feedback, and the lessons in this chapter afford teachers with the kinds of context and opportunities necessary to meet the knowledge, skill, and dispositional goals of NGSS, CCSS, and the science education literature (e.g., Schwarz et al., 2009). Clear instruction on effective collaboration and more research on how such instruction leads to changes in students' SSRL could helpfully expand lessons such as this (Järvelä et al., 2016).

6.6 Conclusion

Education policy makers, researchers, and parents are asking much of today's science educators. Not only must they effectively teach complex and often abstract content about the world, they must also help students develop the critical thinking and scientific practices necessary to understand and confront whatever new challenges arise in the future (Kelly, 2016; Rudolph, 2014). Both Common Core State Standards (National Governors Association Center for Best Practices, 2010) and the Next Generation Science Standards (NGSS Lead States, 2013) make clear that the outcomes of science education must include the knowledge, skills, and dispositions necessary to critically consume and produce scientific arguments, and that requires self-regulated learners (Schunk & Greene, 2018). As standards evolve to better encompass all of the knowledge, skills, and dispositions necessary for critical thinking about science in the 21st century, we are heartened by teachers' creative and comprehensive responses to this challenge. Today's students, who are also tomorrow's leaders, will greatly benefit from the lessons of self-regulated science inquiry.

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Chapter 7
Applying Self-regulated Learning to the Dynamic STEM Classroom

Teomara Rutherford, Dan Spencer, Roger Azevedo and Adam W. Davidson

Abstract The current chapter uses the Pintrich social cognitive model of self-regulated learning to analyze the self-regulatory processes evident in an integrative design and engineering high school classroom. In particular, the analysis focuses on the evidence that the teacher creates an environment rich for both teacher and student self-regulation, and on how he leverages this environment to model and scaffold self-regulated learning. Three areas of strength in the classroom with respect to SRL are highlighted: (1) the motivational climate within the classroom and the motivational affordances of the curriculum, (2) the teachers' practices regarding assessment and evaluation, and (3) the modeling and scaffolding of SRL-supportive skills inherent in the structure of and activities within the course. Analyses reveal the importance of the teacher's own regulatory process as well as the use of the social context in the scaffolding and modelling of self-regulatory processes. Recommendations for practitioners and future research are discussed.

T. Rutherford (✉) · D. Spencer
Department of Teacher Education and Learning Sciences, North Carolina State University, Raleigh, NC, USA
e-mail: taruther@ncsu.edu

D. Spencer
e-mail: daspence@ncsu.edu

R. Azevedo
Department of Psychology, North Carolina State University, Raleigh, NC, USA
e-mail: razeved@ncsu.edu

A. W. Davidson
Riverside High School, Durham, NC, USA
e-mail: adam.davidson@dpsnc.net

M. K. DiBenedetto (ed.), *Connecting Self-regulated Learning and Performance with Instruction Across High School Content Areas*,
https://doi.org/10.1007/978-3-319-90928-8_7

Table 7.1 Design brief-shopping cart lesson plan

Teacher: Adam W. Davidson, NBCT Bachelors of Science in Technology Education Certified in three Project Lead The Way (PLTW) courses; Introduction to Engineering Design (IED), Civil Engineering and Architecture (CEA), Aerospace Engineering (AE)	**Grade Level(s)**: High School grades 9–12
School: Riverside High School	**Subject**: Technology Education/ Engineering
City and State: Durham, NC	
Instructional Plan Title: Design Brief—Shopping Cart	
Common Core State Standards: ELA Standard AS.R.4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone AS.SL.1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively AS.SL.4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience **Technological Literacy Standards**: 2.9-12.Z. Selecting resources involves trade-offs between competing values, such as availability, cost, desirability, and waste 2.9-12.AA. Requirements involve the identification of the criteria and constraints of a product or system and the determination of how they affect the final design and development 2.9-12.BB. Optimization is an ongoing process or methodology of designing or making a product and is dependent on criteria and constraints **Next Generation Science Standards: Engineering Design**: MS.ETS1.2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem MS.ETS1.3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success MS.ETS1.4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved	
Learning Objectives: 1. Students will demonstrate how to critique a company's design process through class discussions and responding to questions 2. Students will demonstrate an understanding of the design competencies (leadership, cooperation, and modeling) by writing a three-five sentence statement documenting what they learned during the lesson 3. Students will learn about design briefs and their functions 4. Students will learn how to identify clients, end users, target consumers, criteria and constraints, and how to create succinct and responsive problem and design statements	
Instructional and Learning Materials Needed: Projector/TV, DVD player, and DEEP DIVE DVD and activity	
Lesson Duration: This lesson takes two periods to complete. One period for guiding the class through the DEEP DIVE video and design process and one period for students to create a design brief using the activity	

(continued)

Table 7.1 (continued)

Lesson duration: Two 90-min periods		
Teaching and Learning (Day 1)		
Min on this Activity	**Targeted Activity**	**Purpose of Activity**
5	**Orienting Students to Lesson**: • Upon entering room students read warm-up and objectives on the board • They copy and respond to the warm-up in their engineering notebooks (ENBs) • Students share their responses	• Engage students with an immediate task aligned with the day's objectives • Reinforce ENB documentation and soft skills such as teamwork, conflict resolution, and communication
7	**Motivation**: • The teacher introduces the company IDEO and leads a discussion about its practices	• Provides students with a cursory knowledge about the company, its designers, and problem solving process • Connects the PLTW design process flowchart with one that is used by a successful company in the design and engineering field
8	**Whole Class Instruction**: • Teacher introduces the DEEP DIVE activity • Teacher provides directions for watching the video and answering the guiding questions	• Provides students with an opportunity to ask any questions they have about their tasks • Introducing the activity and providing directions for each part of the activity provides students with an understanding of the teacher's expectations for correct answers and a timeframe for completion
40	**Guided Practice/Providing Feedback**: • Students watch the DEEP DIVE video while answering 16 chronological guiding questions • Teacher pauses video periodically to guide students through reflecting on what they watch and the questions they answer	• Watching a video about professionals that use a design process similar to the PLTW process helps validate the necessity for design briefs; an integral beginning to a design process • Stopping the video at critical moments, the teacher is able to discuss the students' answers and confirm the responses with the class • Stopping the video provides additional time for students to make corrections and for the teacher to assist with spelling and misunderstandings by writing student responses and general notes about the video on the board
15	**Independent Practice**: • Students begin answering conclusion questions and reflect on the video	• Students need time to begin answering the conclusion questions and flush out any further questions they may have about IDEO

(continued)

Table 7.1 (continued)

10	**Evaluation of Learning and Assessments**: • The teacher will lead students in an open discussion about the DEEP DIVE process • Probe students with questions related to the conclusion questions	• Probing students with related questions prompts them with a collection of ideas and helps them avoid getting stuck on a question they previously did not understand • A post discussion helps students reflect further on the video and collect their thoughts for their daily accomplishments
5	**Closing Activities**: • Students record daily accomplishments in their ENBs	• Recording daily accomplishments allows students to express how well they understood the concepts and what they need to work on while also providing an opportunity to further practice their documentation skills
Teaching and Learning (Day 2)		
Min on this Activity	**Targeted Activity**	**Purpose of Activity**
5	**Orienting Students to Lesson**: • When entering room students read warm-up and objectives on the board • They copy and respond to the warm-up in their engineering notebooks (ENBs) • Students create a problem statement for the design brief • Students share their responses	• Engage students with an immediate task aligned with the day's objectives • Reinforce ENB documentation and soft skills such as teamwork, conflict resolution, and communication
7	**Motivation**: • The teacher recaps a previous discussion of design briefs and design brief components	• Providing a recap helps students access their prior knowledge and helps them connect the multiday lesson
8	**Whole Class Instruction**: • Teacher recaps previous day and provides directions for filling out the design brief • Teacher reminds students of the proper way to answer conclusion questions	• Provides students with an opportunity to ask any questions they have about their tasks • Students reflect on their thoughts about the current activity and conclusion question answers from previous activities
40	**Guided Practice/Providing Feedback**: • Teacher guides students in filling out a design brief • Teacher helps students identify client, end user, target consumer, constraints and criteria • Teacher demonstrates how to write a succinct problem statement and a	• Students need help when working as a class to make many decisions and brainstorming • Students have difficulties with identifying clients, end users, target consumers, constraints, and criteria • Students struggle with generating clearly written problem statements and responsive design statements

(continued)

Table 7.1 (continued)

	design statement that responds to the problem statement	
15	**Independent Practice**: • Students record their own problem and design statements • Students continue answering conclusion questions and reflect on how this activity helps them write future design briefs	• Students need time in class to create problem and design statements that meet the criteria • Students need time to continue answering the conclusion questions and to consider how this design brief can be altered for their final project
10	**Evaluation of Learning and Assessments**: • The students read out their problem and design statements and the teacher provides immediate feedback and suggestions • The teacher continues probing students with questions related to the conclusion questions	• Probing students with related questions prompts them with a collection of ideas and helps them avoid getting stuck on a question they previously did not understand • Giving students immediate feedback provides expectations and more examples of well written problem and design statements
5	**Closing Activities**: • Students record daily accomplishments in their ENBs	• Recording daily accomplishments allows students to express how well they understood the concepts and what they need to work on while also providing an opportunity to further practice their documentation skills

Specific Strategies used to Address Exceptional Students and/or Students for whom English is a Second Language:
- Provide extra credit points to students with exceptionally well written problem and design statements as well as answers to conclusion questions
- Make the video available to students as a bulleted PowerPoint for reference outside of class
- Allow some students to dictate when to stop the video and potentially even leading the discussions about the guided questions
- Have a student scribe the brainstorming on the board for the class instead of the teacher
- Students that want to improve their grade have an opportunity to earn extra points by demonstrating an ability to go beyond the expectations
- A student who struggles with writing or struggles with directly answering on paper is given more opportunity to work out his or her responses on the board and with his or her classmates' input

7.1 Narrative of the Design Brief-Shopping Cart Lesson

Riverside High School is a public school that reaches the students in my class by the use of a STEM cluster pathway. Although similar to a magnet program, there are no academic prerequisites—students simply enter a lottery and attend sessions about the rigor of our engineering program. Our program has served 350+ students to date. We have seen an increase from 10 to 28% female students, with a steadily increasing rise in the typically underserved demographics. Riverside as a whole serves 1,800+ students, although built for sustaining only 1,500. Most

non-engineering classrooms, especially for core classes, house 30+ students at any given time. The engineering program has a cap of 20 students per classroom because of technology and space constraints. Our classes contain students with a range of learning and physical abilities. Our graduation rate is 99% with 25% of graduates pursuing engineering in college.

For 9 years I have taught and modified the curriculum for the *Project Lead the Way (PLTW) Introduction to Engineering Design (IED)* course. IED students are charged with completing a semester-long final project, the puzzle cube. This requires them to combine competencies and knowledge learned throughout the semester about designing with engineering in mind. Although the class is a design/engineering course, STEM topics are integrated throughout: we rely heavily on technology, mathematics, and science concepts and processes.

This lesson (Table 7.1) aids students in understanding design briefs, an essential part of the design process. The creation of an effective design brief is critical in helping students understand how word choices shape the meaning of a problem statement and design statement, aligning it with the ELA Common Core State Standard AS.R.4. The students are encouraged to create a list of constraints and criteria for the final stages of the design brief, aiding them with understanding the effect they have on the final development of a design. This aligns with the Technology Common Core State Standards of 2.9-12.AA.

Early in the semester they are learning the expected routine, being reminded how to use their Class Notebook (CNB) and to read over the daily objectives. At the beginning of the lesson, the first objective is always to record and respond to the warm-up in their Engineering Notebook (ENB), located in their CNB. For this lesson, the warm-ups are designed to activate prior knowledge about the design process. It is a good way to reinforce best practices for maintaining a CNB and for properly documenting in their ENB. Both are difficult tasks for high school freshmen.

Students share their responses and I encourage them to assess and discuss their responses with the class as a whole. Instead of focusing on quick determinations of a right or wrong answer, I provide feedback and encourage classmates to provide feedback—focusing each student on their opportunity to defend their response and thought process against the provided feedback. I encourage open discussions among students and help them discover characteristics of a proper answer.

When warm up responses are shared and response discrepancies are discussed, I introduce the Deep Dive activity. I explain my expectations and the rules for answering guided questions while watching a video about the DEEP DIVE design process used at global design company IDEO. I follow this by giving them some background about IDEO as a company and note that they have been asked to redesign the shopping cart in five days. I relate the business' location, Silicon Valley, to Research Triangle Park down the street from our school. I describe what it is like to work for a company like IDEO, an archetype like Google and Apple. I even explain that I would enjoy working for IDEO, a company that prides itself on solving problems, working in teams, and creating unique solutions. I finish by explaining how the guiding questions I provide can help them focus and recall

aspects of the video, which will assist them with the latter third of the assignment. Even though the questions guide them, I stop the video as the answers become apparent. As a way to motivate students, I have them share their answers and record them on the whiteboard to help them with spelling. I use this to keep their interest and encourage conversations about the content without talking over the video. I find that this helps them stay alert and engaged.

I direct them to read ahead to the next few questions. I instruct them to listen for certain keywords or phrases to signal the answer. My favorite question, early in the video, pertains to form following function, a crucial part of design and pragmatic approach used in almost all design work. I use this to introduce my favorite architect, Frank Lloyd Wright. We discuss that a school looks and feels like a school, because it is supposed to look and feel like a school. I often describe our school as a form resembling a spine (main hall) with ribs (secondary hallways) branching off it. We quickly discuss how the function of flowing students through the school is improved because of this form. I do not let this discussion last long because I don't want to be the "sage on a stage." I use this to break the monotony of watching a video. I continue to engage students, encourage their feedback, and elicit responses.

Some of the questions are open ended and require students to decide which step of our curriculum's design process the IDEO designers are currently using, and then infer how this could be possible if the DEEP DIVE process is different. We take a moment to discuss their reasoning. When students don't quite grasp the concept I often pull in another student opinion and come back to the first student later to help keep them involved and motivated to provide a correct answer. We conclude with discussing that the design process title (DEEP DIVE vs. six-step) does not matter; as long as it is iterative, starts with defining a problem, involves brainstorming solutions, helps to develop and select ideas, and concludes with testing and presenting results. This discussion ties in closely with one of the conclusion questions at the end of the activity.

After the video, I introduce the middle third of the activity, the design brief, and revisit it the following day. At the beginning of the next lesson, and as a new warm-up, students create a problem statement for a design brief. Students also use this time to look over activities returned to them. They often answer questions incorrectly, and taking the time to discuss best practices for creating complete answers helps them adjust their technique.

Once the warm-up is over, I instruct them to turn to the design brief section of this activity. We look at the blank layout of a design brief and I ask them to recall a previous discussion about creating design briefs for a familiar childhood product. At the end of that discussion I asked them to take a picture of a completed design brief. In this new lesson, I want them to compare what they see in the picture with what they see on this blank design brief. I don't take any responses, but ask them to read over the questions in the left margin of this blank brief. I explain that these questions are intended to jog their memory of the product they saw redesigned in the DEEP DIVE video; they are not intended to be answered directly.

I pause to take their questions about this portion of the assignment. Their questions help transition the class to filling out the beginning sections of the brief—identifying the client, end user/target consumer, and designer. The students typically suggest a grocery store chain. I explain that grocery stores do not manufacture shopping carts but do purchase them from a manufacturer. That always stumps them, but provides an opportunity for them to conduct research. They have never been asked to identify a shopping cart manufacturer and some even struggle with the concept that designs are not sold directly to the store. They reference the video, remembering that IDEO observed people using shopping carts in grocery stores; they test their shopping carts in grocery stores, and even get feedback from the grocery store employees and cart manufacturers. I ask them to identify the target consumer and end user. Once they realize that a grocery store purchases the carts in bulk, the concept of a manufacturer being the client starts to sink in. I point out that a grocery store has shoppers and employees and ask the students if they are also the target consumer. They settle on the fact that these are the intended end users of shopping carts.

We then move on to writing the problem statement: a simple, succinct statement that identifies problems, concerns, or issues that need to be addressed. The problem statement is the most difficult part of this activity to properly complete as students have a difficult time disconnecting from the fact that designers at IDEO have already solved this problem. They want to write their statements to reflect what IDEO found as problems and what IDEO designers did to solve the problems. The word "problem" being used in this context is also tough for them, so I also try to use "concerns" or "issues." I lead a class discussion about concerns they think shopping carts pose, encouraging them to work as a team to reflect on the video and to generate a list of issues with shopping carts. They share their ideas as I record the best of their lists on the whiteboard. If teams are still struggling, I prompt them with, "Are shopping carts safe for all users? Are they convenient? If not, what makes them unsafe or inconvenient?" This brainstorming session provides students an opportunity to witness proper brainstorming. To prompt their problem statement I say, "Shopping carts are …" and allow them to pick from the list. I follow this with, "For who? When? Why?" and typically combine their responses to form a problem statement on my whiteboard. For example, "Shopping carts are often unsafe for users in the store and in the parking lots when they are caught in the wind. Many users complain about shopping carts being inconvenient and cumbersome to use." I suggest that problem statements be limited to two sentences and I acknowledge that the design process is iterative, and they can come back to this if necessary. I give them a few minutes to individually record their problem statement and move on to design statements.

I remind students that a design statement must respond to the problem statement. Instead of brainstorming, I prescribe how they should start. I tell them, "Write this first. Design, build, and test. Now think about a short statement that illustrates what needs to be designed, built, and tested." I pause and then, "Design, build, and test what?" They typically respond with, "Shopping carts." I follow with, "Which do what?" and I remind them again that this part should respond to the problem.

I provide an example and give them a few minutes to record their own original statements and move them on to a discussion of constraints designers face.

We previously discussed constraints at length, but I remind them to think of these as limitations. I also remind them of the difference between constraints (limits) and criteria (requirements). Students immediately identify a time constraint, followed quickly by the other typical resources—capital being the most common. Once we have constraints on the board, I provide them time to record what they think applies to their design brief the most. The final portion of this assignment is to have the 16 questions, the design brief, and all six conclusion questions completed by the due date. Because this activity is early in the semester, students are still learning the best practices for answering open-ended questions. They struggle with adapting to high school and the increased writing requirements. I want them to be successful and allow the students who do not complete this task successfully to have until the end of the quarter (9 weeks) to correct their mistakes and resubmit the activity.

Table 7.2 Ruler game lesson plan

Teacher: Adam W. Davidson, NBCT Bachelors of Science in Technology Education Certified in three Project Lead The Way (PLTW) courses; Introduction to Engineering Design (IED), Civil Engineering and Architecture (CEA), Aerospace Engineering (AE)	**Grade Level(s)**: High School grades 9–12
School: Riverside High School	**Subject**: Technology Education/ Engineering
City and State: Durham, NC	
Instructional Plan Title: Ruler Game	
Common Core State Standards: **Technological Literacy Standards**: 2.9-12.DD. Quality control is a planned process to ensure that a product, service, or system meets established criteria 13.9-12.J. Collect information and evaluate its quality **Math Standards:** N.Q.1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays N.Q.2. Define appropriate quantities for the purpose of descriptive modeling N.Q.3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities	
Learning Objectives: 1. By the end of the lesson students will competently read a U.S. Customary scaled ruler with a 1/16” least count 2. Students will demonstrate their ability by competing in a class-wide competition	
Instructional and Learning Materials Needed: Interactive whiteboard system and computers with internet access, International System of Units (S.I.) and U.S. Customary Measurement activities, Engineering Notebook with class notes, and www.rulergame.net shared with students and parents in an email (see email at end of lesson plan) Ruler game: An online tactile learning tool. An S.I. or U.S. Customary system scale can be used, broken down into various least count increments from centimeters to 1/16 in.. A timer can be	

(continued)

Table 7.2 (continued)

used as students attempt to select the correct division of a scale (ruler). If the timer runs up three time or three wrong answers, game over		
Lesson Duration: This typically lasts one and a half 90-min periods (120 min). The first period is for discussing the units and measurement systems and is followed by a half period on the following day to play the game. With additional activities, the format of the first period can be repeated for more practice/instruction		
Teaching and Learning		
Min on this Activity	**Targeted Activity**	**Purpose of Activity**
5	**Orienting Students to Lesson**: • When entering room students read warm-up and objectives on the board • They copy and respond to the warm-up in their engineering notebooks (ENBs)	• Engage students with an immediate task aligned with the day's objectives • Reinforce ENB documentation and soft skills such as teamwork, conflict resolution, and communication
10	**Motivation**: • Challenge students by discussing why the U.S. Customary system is inferior to the S.I. system • Discuss the email sent to students and parents that included information about the ruler game	• By encouraging students to express their opinions, they feel invested in the activity and remain engaged • The email taunts students to play the ruler game and to involve their parents in preparing for the competition
30	**Whole Class Instruction**: • Use S.I. and U.S. Customary Measurement System PowerPoints and activities to discuss both systems and the systems' unit identifiers • Allude to Unit Conversions and Newton's laws being important in the future • Students take notes in their ENBs	• Students will activate prior knowledge of the measurement systems • Students will express their opinions about using these systems • Provides students opportunities to practice their research and documentation skills
15	**Guided Practice/Providing Feedback**: • Guide students through answering some of the measurement activity questions • Discuss and debate answers as a class	• Provides students with time to reinforce basic math, dimensioning and documenting skills • Provides an opportunity to debate answer validity and students' opinions
15	**Independent Practice**: • Encourage students to practice the Ruler Game at home • Students complete the activity on their own • Encourage application, transfer, and adaption of prior knowledge from previous activity conclusion questions	• Prepares them for the competition in class and involves their parents in the students' learning • Gives them an opportunity to practice their skills further and demonstrate their mastery • Helps students learn from their mistakes, stumble upon a problem and use the teacher as an available resource, not a solution

(continued)

Table 7.2 (continued)

	• Make suggestions and provide feedback as needed	
15	**Evaluation of Learning and Assessments**: • Use fist to five to know which concepts students understand • Students provide answers in accordance with the correct answers previously determined by the class during guided practice • Award points for the work submitted and how well criteria/ constraints are met • Compare individual work and then work with students that struggle; discuss what students know and do not know • Accept a range of answers based on proper rounding for independent practice. Conclusion questions criteria has complete sentences, proper punctuation, thorough answers with justifications • Students record daily accomplishments in their ENBs	• Using fist to five provides the teacher with instantaneous feedback • This allows students an opportunity to see what corrections need to be made and a chance for the student (s) to ask questions they didn't consider before or during the completion of the task • Points keep assessment techniques consistent and easy for students to understand what they earned and missed based on differing criteria and constraints • Recording daily accomplishments allows students to express how well they understood the concepts and what they need to work on while also providing an opportunity to further practice their documentation skills
45	**Closing Activities**: • Students play the Ruler Game as teams against the other teams in class • Teacher plays the winning team for the championship	• Provides the students a friendly competition and incentive to study and practice using the two measurement systems • Provides the teacher an assessment of students' abilities to quickly read and use the two measurement system rulers • Playing the teacher for championship provides further incentive to the students by awarding extra credit points if the team wins

Specific Strategies used to Address Exceptional Students and/or Students for whom English is a Second Language:

- Give extra credit points to students for exceptional advancements in their work
- Differentiate the teaming of students
- Allow students to come back during lunch and after school to play the ruler game and independently challenge the teacher to a round; if they win award them more extra credit points
- Provide general guidelines and constraints for all students but also provide opportunities for students to work out individual deals
- Allow students to type conclusion questions answers instead of writing them on the activity sheets
- The teacher's job is to educate students and to help them get back up, try it again, or try it a different way
- Allowing students to make deals with the teacher provides an opportunity for them to invest in their own learning structure encourages them to try harder

7.2 Narrative of the Ruler Game Lesson[1]

This lesson (Table 7.2) focuses on the measurements that designers and engineers manipulate on a daily basis and meets Common Core State Standards in Technology (2.9-12.DD, 13.9-12J) and Math (N.Q.1-3). It allows students to better understand the reasons quality control professionals collect information and evaluate a product's features. It also aids the students in completing mathematical tasks by understanding the units of various systems and how accuracy plays a vital role in reporting the quantity of a measurement.

As with other lessons, students know the routine of entering the room and recording in their ENBs. During this time, I also preview the Ruler Game by encouraging students to try out the game with their parents at home. This excites students about what is coming, involves their families, and brings out their competitive spirit. In order to orient students toward the topic, the lesson starts with predesignated teams participating in warm-ups about linear measurements and explanations of the U.S. Customary and SI (Metric) systems. Most students claim they are very familiar with both systems. Most overestimate their understanding of these measurement systems. I begin by describing SI measurements using a previously provided formula sheet with a breakdown of unit conversions and SI prefixes. As a way to motivate students, I provide humorous and anecdotal historical information. I reference how silly it must have been for people, prior to the SI system as a standard for measuring, to build various structures. I find a smaller student and deem them leader of a country or land. I deem myself as the former leader and state that I commissioned a 30 foot tall wall to be built while pointing to my shoe. I go on to state that this student's followers overthrew me and the wall was only partially built. "Now a foot is their foot's length. How do you know how tall to build it? Do you find a conversion factor between the two foot measurements? Do you scrap the project and start over, hoping to finish before the new leader is gone?" This helps students think about standard sizes. We discuss standards, eliciting some from their personal experiences, activating their prior knowledge. I start discussing concepts such as measurement, volume, and force. I probe them and identify misconceptions, like interchanging mass and pounds, units from two different systems. We breakdown SI prefixes for less than and greater than one (e.g., deci, kilo). It takes them a minute to realize the sizes these prefixes describe, so I use meter stick with US Customary and SI units as a visual aid. We also investigate how significant digits allow for measurements to have certainty and estimation. The discussion transitions into an activity that requires student teams to decide measurements for rectangles displayed above an SI ruler (scale) on their activity sheet. Students advocate for their answer and debate its comparison to the answer key.

This discussion includes an explanation of acceptable responses with regard to significant digits. This invokes certain challenges based on their preexisting

[1]See the previous narrative for a description of school and class characteristics.

conceptions of mathematics. Most that like math state that it provides one possible answer and think that by using math they will *always* arrive at only one outcome. It is difficult to explain that in the real world it is not so simple. Students begin understanding that significant digits implies there is a level of certainty and uncertainty. I guide students, and show them that one way of solving math problems, especially pertaining to measurements and unit conversions, can allow for multiple answers. I also display multiple ways of solving the problems and explain that often they will have to make their answer fit within constraints imposed by their employer. I even play that role for them throughout the semester. As with the habit of entering the room and recording in ENBs, at the end of each lesson day, students note their accomplishments in their notebooks. These reflections will be especially pertinent for our discussions on the subsequent days of this lesson.

To allow for better memory retention I often repeat the lesson, following the same structure, but with an additional activity to continue discussing the U.S. Customary system and its units the next day. I start with students trying to estimate different features of my classroom in inches, feet, yards, etc. Team one estimates the area, team two estimates the perimeter, team three estimates the volume, and team four estimates the hypotenuse of the right triangle created by my floor and a wall. This is a fun way to get the students participating, collaborating, and activating prior knowledge. Getting students out of their seats and looking at examples helps to wake them up and encourage memory retention. I tell them, "Get closer to the board (projection) and discuss it with each other. Decide the measurement for yourself!" It makes them move away from their notes and participate. It also demonstrates their ability to estimate and calculate using math concepts they already know and will use in the near future. All teams then share their response in an open discussion, allowing me to evaluate students' progress. Their attention is turned back to their formula sheets, the next activity, and a discussion about why the U.S. Customary system is inferior to the SI system. I state it like that to get them defending the system they know. Most disagree with me at first, but as they start to realize how little they know, they change their minds. Some don't want to give up on a system they have used their entire life. It can be disheartening for them to hear their teacher claim something with U.S. in the name is not perfect, especially when I have just explained that SI, the International System of Units, originated in a foreign country as the Metric System. Often there is a student from a foreign country or culture who is more familiar with SI and agrees that U.S. Customary is more challenging to use. I use this to advantage the simplicity of SI and, in the event that student comment is not provided, I explain my defense. This is an opportunity to explain why the United States still uses this system when the majority of the world uses SI. I tell the students that I aim to convince them I am correct and that, as a society, we should make the change as well.

The lesson culminates in playing an internet-based ruler game together as a group. This can start on day two if the main lesson isn't repeated, or, on day three if it is. I use it as a way to integrate technology in the lesson by having them use an interactive whiteboard system to select the correct answers. I also use it to reinforce the necessity of being able to quickly recognize a U.S. Customary ruler's fractional

marks. I encourage competition at this time by creating a tournament bracket and providing larger incentives for higher rankings with the 1st place team playing against me for the championship. I sometimes repeat this to demonstrate the simplicity of the SI system. I use this website, http://www.rulergame.net, and email it to students and parents prior to this lesson to encourage them to practice at home before class.

In this activity, and in many others in my class, I integrate friendly competition. I use it to demonstrate a market-driven society; the classroom being the market, the curriculum deliverables being the marketed product, the teacher the client, and the students being the center of it all. Teams help with this tremendously. I want students to constantly think about their actions, the results of their actions, and how both impact their team's functionality and success. I encourage students to use a logical approach when problem solving. I might say "… because the end user states that a BLANK is better for them in this instance because of their need for BLANK" instead of an egocentric approach, "… because it makes sense to me that the user wants BLANK." I demonstrate and encourage out-of-the-box thinking, creating a solution that fits the confines of the problem within box. Limiting criteria and constraints is vital to solving a problem. Giving free-reign means students have no structure to build upon. Foundations of a few, but not limitless, options will help them be successful.

7.3 Scholars' Analysis of Self-regulated Learning in the STEM Classroom

Mr. Davidson presents two lessons that highlight activities built around his integrative design and engineering curriculum. Our analysis focuses on the evidence within these lessons that he creates an environment rich for both teacher and student self-regulation and leverages this environment to model and scaffold self-regulated learning.

7.3.1 Theoretical Framework

Our view of Self-Regulated Learning (SRL) is situated within a *social cognitive* perspective consistent with the Pintrich (2004) model of SRL—one that seeks to explain individual processes in interaction with the environment (see also Schunk, Pintrich, & Meece, 2008; Zimmerman, 1989; Zimmerman & Schunk, 2011). Within this perspective, human functioning is explained by the interplay of personal factors, environmental factors, and behaviors (Bandura, 1986). Activities within the SRL cycle mediate the relations between student and environment to culminate in learning and achievement (Pintrich, 2004). Personal characteristics of the learner

and characteristics of the context each contribute to the student's regulation of learning. The context influences student motivation and behavior within the SRL cycle and it also must provide opportunity for the learner to engage in SRL: there must exist the potential for the learner to have control over his/her cognition, motivation, environment, and/or behavior (Pintrich, 2004; see DiBenedetto, 2018, this volume for a more detailed overview of Pintrich's model).

Mr. Davidson provides a classroom environment that allows and fosters that control. We highlight three areas of strength in his classroom with respect to SRL: (1) the motivational climate within Mr. Davidson's classroom and the motivational affordances of the curriculum, (2) Mr. Davidson's practices regarding assessment and evaluation, and (3) the modeling and scaffolding of SRL-supportive skills inherent in the structure of and activities within Mr. Davidson's course.

7.3.2 A Motivational Climate for Self-regulation

The Pintrich model of SRL specifically focuses on self-efficacy, task value beliefs, and goal orientations (Pintrich, 1999). In our description of the motivationally-supportive elements of Mr. Davidson's course, we focus on the first two, self-efficacy and task value beliefs. Additionally, we discuss the potential impact of motivationally-supportive elements of the classroom on affect, and note approaches Mr. Davidson incorporates to help students regulate their affect.

7.3.2.1 Self-efficacy

Self-efficacy, or a student's judgment that she or he will be able "to organize and execute courses of action required to attain designated types of performances" (Bandura, 1986, p. 391) is important in both goal-setting and beneficial SRL strategy use (Pintrich, 1999; Pintrich & De Groot, 1990). Mr. Davidson recognizes that the students in his class are both new to high school and to the type of design work required by the class. As self-efficacy is situation-specific (Bandura, 1977), students will still be forming their perceptions of competence for this coursework. Bandura (1977) proposed four major influences on the formation of self-efficacy beliefs: mastery experiences, verbal persuasion, vicarious experiences, and physiological arousal. Mr. Davidson provides a number of scaffolds to ensure that students are successful in their classroom endeavors. These scaffolds, along with his modification of assignments and assessments to meet individual student needs, provide each student with an opportunity for mastery experiences. The teamwork within Mr. Davidson's class allows opportunity for both verbal persuasion and vicarious experiences: students can encourage each other and demonstrate facility with different aspects of the problem at issue. These opportunities are also present in whole-class discussions. For example, as Mr. Davidson leads the students in

brainstorming about the design brief, he guides their answers to encourage both the student volunteer and those students who are observing the exchange.

7.3.2.2 Subjective Task Value

Within the Eccles et al. Expectancy-Value model, individuals actively engage in tasks that they positively value because they are interested in the task and/or find it useful and important (Eccles & Wigfield, 2002). As Mr. Davidson's class is a self-selecting group of students interested in engineering, students likely start with a base level of interest in the material. Mr. Davidson further "catches" (see Mitchell, 1993) student interest in specific classroom activities by using humor, such as when he discusses measuring by use of actual "feet." Mr. Davidson also activates situational interest in the course by relating course assignments to student personal experiences—discussing toys or personal experiences the students have had with shopping carts allows students to connect the lesson to their own lives. Activation of this kind of situational interest has been shown to be important for enhancing both student engagement and developing more long-term value for a topic (Linnenbrink-Garcia, Patall, & Messersmith, 2013).

A focus on the relevance or utility of science for students operates alongside interest—this focus can both enhance interest and improve performance (e.g., Hulleman & Harackiewicz, 2009). Utility-value is ever-present in Mr. Davidson's course. The entire structure of the course supports the usefulness of course activities for future design and activity work—students are engaged in an extended project of the kind they are likely to encounter as engineers or designers. They work in teams and on deadlines of the sort they will also encounter in their careers. Within the design brief lesson, the students can see the lesson's skills at play with the designers at IDEO, and, within his lesson plan, Mr. Davidson notes his efforts to help them see these connections.

7.3.2.3 Affect

Affect is important for learning, with those experiencing positive affect being more willing to take risks and be flexible and open to creative approaches (Efklides, 2011). Those who experience positive affect also show increased effort, performance, and satisfaction (Hirt, McDonald, & Melton, 1996). Alongside this, it has been suggested that affect can have a guiding and regulatory role in cognitive strategy use by increasing awareness of goal progress (Pintrich, 2003; Winne & Hadwin, 1998), with this perspective supported by research indicating that positive emotions foster students' self-regulation, whereas negative emotions lead to reliance on external guidance (Pekrun, Goetz, & Perry, 2002).

Experiencing emotion is not just a passive process for students—students can regulate their affect by inducing, modulating, or preventing emotions and their impact on goal attainment (Pekrun, 2006). Discussion of affect/emotion and its

regulation is a prominent part of the narratives, with Mr. Davidson frequently mentioning how he attempts to increase positive affect in the students and to help regulate their responses. Regulation of emotions can be achieved by directly addressing emotions themselves (emotion-orientated), targeting expectancies and attributions that are antecedents to the emotion (appraisal-orientated), acquiring skills to improve achievement and perceived control (problem-orientated), or by changing the environment/task itself (Pekrun, 2006).

Mr. Davidson describes how he targets student emotions through structuring of the environment during the ruler game, incorporating visual aids and using competition to help students battle boredom. Such processes help to build a positive emotional atmosphere and increase perceived quality of instruction shown to be positively related to the experience of enjoyment (Frenzel et al., 2009), and negatively related to anxiety, anger, and boredom (Frenzel, Pekrun, & Goetz, 2007). Alongside this, he also targets student expectancies. As highlighted above, student self-efficacy and subjective task value have been shown to impact the affective state of students as they enter a task (Pintrich, 2000). Mr. Davidson makes the externally imposed task personally relevant to his students by explicitly telling his students why they need to acquire new knowledge and skills. Such an approach may reduce the likelihood of students experiencing negative affect, which can lead to disengagement and avoidance (Boekaerts, 2010). Additionally, he provides students with tools and opportunities to increase their perceived control. Mr. Davidson encourages students to regulate their emotions by moving around, discussing with teammates, and taking ownership of their assignment completion process with flexible deadlines and even individualized assignments and/or instruction.

7.3.3 Assessment and Evaluation

7.3.3.1 Portfolio Assignments Allow Opportunity for SRL

As noted above, the types of activities students complete in Mr. Davidson's class support student motivation, including motivation to engage in SRL. They also include the types of complex tasks with multiple goals that provide the opportunity for SRL (Greene & Azevedo, 2007).

In the field of STEM, participation in authentic science tasks involving problem-solving and critical thinking activities have been found to promote SRL, as students are more likely to engage in planning, monitoring, and evaluation of their learning (Sinatra & Taasoobshirazi, 2011). The overarching course project, the puzzle cube, certainly meets the definition of an authentic task. The design brief, as one of the multiple benchmarks within this project, is itself a complex problem-based learning (PBL; see Barrows, 1996) task that requires students to combine what they've learned from the lessons with their everyday experiences and knowledge and apply this to a newly-learned format for writing about design. With the task centering on a complex problem that does not have a single correct answer,

students must think creatively and analytically and work with one another to complete the assignment (Hmelo-Silver, 2004).

In order to self-regulate within these lessons, the students must engage in a substantial amount of self-assessment. This self-assessment is itself a valuable practice that contributes to students' overall SRL skill-set and can lead to a deeper understanding of content and the promotion of flexible approaches to problem solving (Paris & Paris, 2001). Mr. Davidson not only provides the opportunity for self-assessment, but provides students with feedback and opportunity for revision. This engages students not only in evaluation, but also in using this information to plan and enact changes. These opportunities promote SRL, but in order to take full advantage, students must also be accurate in their self-evaluations of performance (Winne & Azevedo, 2014).

7.3.3.2 Monitoring Accuracy

It is clear from the design of the task outlined in the lesson plan that Mr. Davidson monitors his students', as well as his own, strategy use, explicitly noting in the narrative that students struggle with accurate calibration. In referring to The Ruler Game, he states, "Most [students] overestimate their understanding of these measurement systems." As outlined above, Mr. Davidson's students are early high school students, new to the increased regulatory demands of high school and still novice learners in the design and engineering domains. This novice status is likely to impact the students' ability to monitor in two ways: (1) students are unlikely to have a firm conceptual basis by which they can evaluate their performance and (2) they are less apt to be automated problem solvers in the domain, which means they have fewer cognitive resources for monitoring their performance (see Nietfeld & Schraw, 2002).

Mr. Davidson provides students with a framework to build their conceptual knowledge/basis from which they can monitor their understanding during the design task. He allows students to modify and expand their conceptual understanding by revisiting prior content and encouraging students to revise/update their notes in their engineering notebook as well as their design brief. Additionally, the use of group discussions and tasks not only allows individuals to create a more complex conceptual understanding of the content but also call upon the conceptual knowledge of the wider group when monitoring their own understanding.

Mr. Davidson also utilizes this awareness of students' monitoring ability in the structuring of the task, freeing up cognitive resources by breaking the larger project into subcomponents, reducing cognitive load, and allowing for greater instances of SRL through the constraining of parameters within these components. For example, during the subtask of solving mathematical problems within the measurement lesson, Mr. Davidson constrains the task by having teams of students estimate a geometric aspect (area, perimeter, or volume) of the classroom, using class discussion to reflect on how successful students were.

7.3.4 Modeling and Scaffolding of SRL

As an instructor, Mr. Davidson provides an exemplary model of SRL: he is constantly monitoring his students' reactions, responses, and behaviors in the classroom and making adjustments to his teaching—whether it be adjustments based on the students' current performance level, such as his noting that they need additional scaffolding to understand the concept of problem statements, the ways in which he challenges students to use technology to solve problems, or the ways in which he introduces competition in the classroom. Mr. Davidson is also highly self-efficacious in his practice, exhibiting in his reflective summaries behaviors that have been related to teachers with high self-efficacy, such as: high goal setting, persistence when tasks may not be successful, and willingness to adapt methods to meet the needs of his students (Jerald, 2007).

The choice and structuring of classroom tasks may have allowed Mr. Davidson to be more metacognitive in his practice (see Duffy et al., 2009). In particular, teachers implementing authentic, challenging tasks have been shown to adapt their instruction in more thoughtful ways than when they implement closed tasks, such as traditional worksheets. The problem-based design project implemented in Mr. Davidson's class provides a good example—the activities during this project, such as creating a design brief, were set at a challenging level for students and connected to the tasks carried out by designers in their day-to-day work. Not only does the enhanced opportunity for teacher metacognition benefit Mr. Davidson, but also his students, as the more teachers engage in metacognitive processes that help them understand their own thinking and practices, the better they can model this metacognitive thinking for students (Paris & Winograd, 2001).

The use of metacognitive processes during problem-solving is reliant on students' levels of expertise, and although development of expertise takes long periods of time, research has shown that students can develop some expertise through the use of systematic instruction, scaffolded experiences, and peer support (e.g., Schraw, Crippen, & Hartley, 2006). Mr. Davidson provides an example of this during the completion of the design portfolio. He structures the task to promote the use of problem solving strategies such as reflective practice and uses external representations, which enable students to reallocate their limited resources to engage in metacognitive processes, and in turn solve problems more efficiently (Schraw et al., 2006).

Overall, Mr. Davidson incorporates best practices for promoting regulatory processes in his classroom, such as the use of feedback and making misconceptions visible to students (Labuhn, Zimmerman, & Hasselhorn, 2010), discussing and modeling effective strategy use (Paris & Paris, 2001), as well as scaffolding of strategy implementation (Azevedo, 2014). Throughout the implementation of these practices, Mr. Davidson heavily incorporates the wider social context of the classroom, exemplified by his integration of social forms of regulation.

7.3.4.1 Use of the Social Context

Social context is important for the development of regulation (Schunk, 1999; Zimmerman, 2000). Some social models of SRL have outlined that the teacher serves as the model for SRL skills and behaviors (e.g., Pintrich, 2004; Zimmerman, 2000); however, such a view may be limiting as it focuses on teacher as the authority. The current perspective for this chapter is that students become self-regulated learners through their engaged participation in environments that allow them to work within their Zone of Proximal Development. From this perspective, SRL is the product of students striving to meet and adjust to the demands of their surrounding environment (Paris & Paris, 2001).

Mr. Davidson values the use of social context in his classroom, utilizing collaborative methods throughout his lessons and stating that one of his main goals is for his students to think about the impact of their actions on their team's functionality and success. In addition to this, he applies techniques highlighted in the collaboration literature (e.g., Webb, 2013) to broaden the status and competence of group members through making individuals aware of the multiple skills necessary to accomplish a task. In particular, Mr. Davidson implements suggestions to stress that the multiple skills needed to solve complex problems are not present in a single student. Alongside this, he publicly identifies contributions of others, sharing them with the class and commenting on their importance and value. This approach is evident when discussing epistemological beliefs and the complexity of knowledge: the teacher moves students away from making quick judgments of their own and others' responses, focusing on the value of group discussion.

7.3.4.2 Co-regulation

Collaboration is viewed as being highly effective in regards to the promotion of regulatory behaviors (Paris & Paris, 2001). Requiring joint and individual regulation of the interactions and learning processes taking place, social interactions involved in collaborative discussions allow individuals to share and assess their own and others' use of cognitive strategies and internalize regulatory knowledge and skills from these interactions (Bol et al., 2012). When students collaborate and recognize the contributions of all group members, as they do in Mr. Davidson's classroom, they can engage in co-regulation (Co-RL). Co-RL refers to the temporary guiding, prompting, or assisting that occurs between individuals to accurately monitor and control cognitive work in the production of a group product (Hadwin, Jarvela, & Miller, 2011). Co-regulatory processes have been found to support students' acquisition and refinement of SRL skills in high-SRL tasks, such as those implemented as part of PBL in Mr. Davidson's class (DiDonato, 2013).

Mr. Davidson incorporates three main design recommendations for the support of social forms of regulation such as Co-RL (DiDonato, 2013; Järvelä et al., 2015). For the first, to increase learners' awareness of their own and others' learning process, he uses the whiteboard to make misconception visible through discussion

and reflection. The second recommendation is that the environment support externalization of students' and others' learning process via sharing and interaction. This is evidenced by Mr. Davidson's encouragement of open and frank discussions among the students, as well as the help provided to guide them through deciding what makes for a solid answer. Evidence of the teacher's implementation of the final recommendation, to prompt the acquisition and activation of regulatory processes, can be seen in the tools he offers for planning (such as notebook and structured writing of design briefs), monitoring (the guiding questions during Deep Dive and his noting of why the students should use them), and discussions of the group process and how to work collaboratively with teammates. Mr. Davidson not only offers these tools, but directs the students' attention to how they can be used within an SRL framework. For example, he tells students that "the guiding questions I provide can help them focus and recall aspects of the video, which will assist them with the latter third of the assignment."

7.3.5 Recommendations

7.3.5.1 Recommendations for Practitioners

As noted by Mr. Davidson and throughout this chapter, the students are under increased cognitive demands of a new context, leaving limited resources for students to initiate SRL. This makes the level of external regulation and scaffolding of SRL that Mr. Davidson provides appropriate. However, moving forward (and as student orient themselves to high school and develop expertise), we would suggest that the teacher gradually reduces scaffolding for SRL processes. This can be done by having student teams create their own guiding questions or planning documents for future assignments, to allow them practice in SRL tasks such as planning and monitoring. Other teachers can use Mr. Davidson's narrative and our discussion as an example of how a master teacher uses discourse in the classroom to prompt and support student SRL processes and how a classroom can be structured with complex, authentic problem-based tasks to encourage both student motivation and SRL. These tasks are in line with those that support integration of the Common Core State Standards and Next Generation Science Standards. In particular, Mr. Davidson integrates a number of ELA, math, and technology standards that focus on reflection. For example, the ELA standard AS.R.4 involves understanding how word choices shape meaning—the activities in Mr. Davidson's lessons create opportunities for the application of this standard to not only the materials provided, but to the students' own design briefs, implicating the kind of reflective process inherent in SRL (Zimmerman, 1989).

7.3.5.2 Recommendations for Future Research

Mr. Davidson's class narratives provide insight into the complex process of fostering SRL while simultaneously improving the expertise and problem-solving skills of novice students. The narratives also highlight areas fundamental to Mr. Davidsons fostering of SRL—some of which are not those traditionally examined by researchers. For example, recent literature has encouraged researchers to focus more on emotion/affect, which has been somewhat neglected in the field of Educational Psychology or has been considered separately from cognition (see Efklides, 2011; Pekrun et al., 2002). The current narratives outline emotion and motivation regulation as important in the classroom and provide further support for calls to increase research in this area.

In addition to stressing the importance of emotion and emotion regulation within the high school STEM classroom, the rich opportunities for SRL within Mr. Davidson's design classroom highlight the need for greater focus on SRL within the field of engineering education. Prior work on the relation between SRL and problem solving has largely been conducted in in math (e.g., Fuchs et al., 2003) and the sciences (e.g., Rozencwajg, 2003); less is known about students in engineering contexts utilizing similar problem-based frameworks. Although the structure of the tasks are comparable, and research findings somewhat transferable, it would benefit research to investigate the transference of findings/research cited in the current chapter to engineering classrooms.

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Chapter 8
Self-regulated Learning and Mathematics Instruction of Algebra I, Geometry, and Algebra II

Peggy P. Chen, Gail Swingler and Brock Burkett

Abstract The benefits of self-regulated learning have been well documented in relation to various academic content areas. Students who are successful in their academic learning are likely to initiate learning processes and monitor their actions, thinking, and emotions until they complete tasks. Through planning, instruction, and classroom assessment, teachers can deepen students' mathematical conceptual understanding and fluency, and can provide opportunities to model and engage students in self-regulated learning behaviors and strategies. In this chapter, two high-school math teachers discuss their lessons in Algebra I, Geometry, and Algebra II, and how they afford students opportunities to practice self-regulated learning and develop mathematical understanding. The researcher then reflects on the processes and interactions delineated in these lessons. The chapter concludes with educational implications and suggestions for future research on self-regulation in the everyday learning of mathematics.

P. P. Chen (✉)
Hunter College, The City University of New York, New York City, USA
e-mail: ppchen@hunter.cuny.edu

G. Swingler
Transit Tech Career and Technical Education High School, New York City, NY, USA
e-mail: gswingler@gradcenter.cuny.edu

B. Burkett
Urban Assembly Maker Academy, New York City, NY, USA
e-mail: brock.burkett.nyc@gmail.com

M. K. DiBenedetto (ed.), *Connecting Self-regulated Learning and Performance with Instruction Across High School Content Areas*,
https://doi.org/10.1007/978-3-319-90928-8_8

Table 8.1 Asynchronous algebra study in functions lesson plan

Teacher: Brock Burkett BA Computer Science (Brandeis University) MA Adolescent Math Ed (Hunter College) Teaching License in Secondary Math Ed, Grades 7–12	**Grade Level(s)**: 9th Grade Math
School: Urban Assembly Maker Academy [District 2]	**Subject**: Algebra
City and State: New York, NY	
Instructional Plan Title: Asynchronous Algebra Study in Functions	
CCSS: HSF.IF.A.2: Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context HSF.IF.C.7(b): Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions and show key features of the graph, by hand in simple cases and using technology for more complicated cases	
Learning Objectives: 1. Students will successfully use the piecewise function for a given domain value 2. Given the rules for a piecewise function, students will successfully use a graph of the function to identify intervals for the rules	
Instructional and Learning Materials Needed: PowerPoint (displayed on SMARTBoard) that displays two separate, graphed linear functions and their rules; notebooks/pencils; laptops w/ Wi-Fi to access Khan Academy (www.khanacademy.org); mini dry-erase boards, markers and erasers; graphing calculators; unit checklist; and unit concepts and terms sheet (see Table 8.2 at the end of the lesson plan); student goal sheets/workplans (see Tables 8.3 and 8.4 at the end of the lesson plan); pacing calendar (see Table 8.5 at the end of the lesson plan)	
Lesson Duration: 40 min	
Teaching and Learning	

Min on this Activity	**Targeted Activity**	**Purpose of Activity**
5	**Orienting Students to Lesson**: This class is structured as a flipped classroom. Students are instructed to watch the Khan Academy videos (website) the night before • Before entering the classroom there is a Power Point display on the screen showing two separate linear functions (with given rules), each graphed over a small domain • Upon entering the classroom, students take out their notebooks and pencils, write down each function and to the right of each, determine and write the interval for the function	• The warm-up helps students get started immediately upon entering the room • The warm-up also activates prior knowledge and provides students with the opportunity to demonstrate competence • Stacking these rules together creates one piecewise function and removes confusion about how a piecewise function is created • Having students present their work on the board gives others the opportunity to check their work and provides the opportunity for the teacher to reinforce the use of function notation

(continued)

Table 8.1 (continued)

	• One or more students are then asked to present their work on the board • After the students have presented, the teacher stacks the rule/domain pairs together and labels them one function using function notation	
During Classwork	**Motivation**: • The teacher reinforces students who are sticking to their self-made goals and plans and for video studying and notetaking (see goal sheet at end) • The teacher displays a bizarre piecewise function (without calling it so) and tells students they will all be able to give intervals to it by the end of class	• Using class time to help students meet their self-made goals reinforces success and proper study strategies in class • Seeing an unusual example gives students a goal to work toward
0	**Whole Class Instruction**: • No whole class instruction. • Students work independently on Khan Academy lessons (reviewing videos as needed) or in small-group instruction led by teachers or peers to resolve misconceptions or struggles • Possible misconceptions may include conflation of domains and ranges on graphs and misuse of function rules to determine a range for a given domain	• Small-group or independent work allows students to move at their own pace; stronger learners may move through material more quickly and use their extra time as peer tutors, providing opportunities for more targeted small-group or one-on-one tutoring • Peer tutors are students who have moved into material ahead of the expected pace of class and who have previously demonstrated the ability to use questioning techniques to uncover and correct student misunderstanding
30	**Guided Practice/Providing Feedback**: • Students work independently with additional Khan Academy acceleration skills given as needed • Students use Khan Academy hints for assistance as needed • Students use mini-whiteboards for scratch work and may ask for peer/teacher assistance as needed **Independent Practice**: • Benchmark for classwork is successful completion of the assigned Khan Academy skills, for which students receive a grade • Students identify assigned Khan Academy skills using their Unit	• Having students lead themselves and others through the skills, in lieu of a whole-class discussion, gives students greater ownership for their mastery of the material • Khan Academy provides immediate right/wrong feedback in an environment where students can ask for assistance from their peers on locating their errors, teaching students better self-assessing and error investigation with ample practice

(continued)

Table 8.1 (continued)

	Task Checklist (see Table 8.4) and Calendar (see Table 8.5)	
	Evaluation of Learning and Assessments: • Mastery of the day's learning will be assessed in the closing activity, in an end-of-unit quiz, and in an end-of-unit benchmark task done on paper that extends this unit's activities in one larger, real-world exercise	• The closing class activity will help students gauge whether they have understood today's material through a novel problem • Student success on the closing activity will be used to direct their study prior to the quiz and paper task, helping them develop better study strategies
5	**Closing Activities**: • Students will complete the bizarre piecewise function displayed since the beginning of class in their notes • Teacher will call on two students who displayed some difficulty during practice (but who still correctly answered the problem) to present the answer from their seat • The teacher will give public praise to student presenters for their efforts • The teacher will ask students to mark their goal sheets with tonight's video exercises	• By the end of this lesson, most students will have the ability to define piecewise functions and tomorrow will extend this knowledge to describe the domains and ranges of piecewise functions • Helping students understand that one skill builds on the next enforces a minimum pace for proceeding through the course
Specific Strategies used to Address Exceptional Students and/or Students for whom English is a Second Language: • ELLs may watch videos with captions in their own language and work in groups in their preferred language. All class materials are provided in multiple languages • Students with special needs will be provided equivalent on-paper tasks, extra time or additional acceleration skills as needed • Exceptional students may use Khan Academy to boost their grade through mastery, or may tutor their peers as needed		

Table 8.2 A sample sheet of concepts and terms in Algebra I lesson

Common Core Algebra Unit 4: Concepts & Terms!	Name:	Date:

Instructions:

Reading the instructions is the most important part of doing your work! Always read instructions first!

Step 1: Please put your **name** and **today's date** on top of this paper!
Step 2: Always make sure you have this sheet, even until the end of the year! This (and future Concepts & Terms sheets) are excellent notes to help you understand each unit, and to study for your Regents exam.
Step 3: Make sure to use these terms whenever appropriate in answers that ask for an explanation!

Inequality Symbols: In the first three units, we largely worked with equations, which use the equals sign (=) to make comparisons. When we say "5 = x", we're saying that the variable x has **only one** value, and that value is 5.

Inequalities, like equations, also make comparisons, but indicate that variables may have many values. Inequalities use symbols such as <, >, ≤ and ≥ to make these comparisons.

- When we say "5 < x", we're saying that x is greater than 5, because the open side of our inequality symbol points toward the variable x. x could have the values 6, 6.8, 7, 211 and so on because all of these numbers are greater than 5. **x could not have the value 5** because x must be greater than 5, but x could have the value 5.00000000000001, because this is slightly greater than 5.

- When we say "5 > x", we're saying that x is less than 5, because the open side of our inequality symbol points toward the number 5. x could have the values 4, 3.63, 0, −1 and so on because all of these numbers are less than 5. **Here also, x could not have the value 5** because x must be less than 5, but x could have the value 4.99999999999998, because this is slightly less than 5.

- When we say "5 ≤ x", we're saying that x is greater than or equal to 5, because the open side of our inequality symbol points toward the variable x **and** there is an equals sign under it. x could have the values 6, 6.8, 7, 211 and so on because all of these numbers are greater than 5, but x may also equal 5.

- When we say "5 ≥ x", we're saying that x is less than or equal to 5, because the open side of our inequality symbol points toward the number 5 **and** there is an equals sign under it. x could have the values 4, 3.63, 0, −1 and so on because all of these numbers are less than 5, but x may also equal 5.

Interval Notation: Inequalities may also be written as intervals. You experienced interval notation while working with domains and ranges in Unit 3. By using interval notation, we can combine two inequalities neatly.

Parentheses in interval notation are the same as the < and > inequality symbols.
Square brackets in interval notation are the same as the ≤ and ≥ inequality symbols.

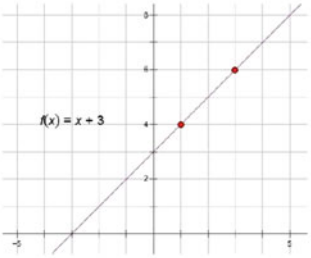
Below are several interval notation examples:

(3, 5) "3 < x < 5" … this has the same meaning as "3 < x AND x < 5"
[3, 5] "3 ≤ x ≤ 5" … this has the same meaning as "3 ≤ x AND x ≤ 5"
(3, 5] "3 < x ≤ 5" … this has the same meaning as "3 < x AND x ≤ 5"

(continued)

Table 8.2 (continued)

Average Rate of Change: Average rate of change is another way of saying **slope between two points**. Consider the two red points on the graph at below right:



In Unit 2, we calculated **slope** by finding two points and dividing the change in y by the change in x. To calculate the slope for the function f(x) = x + 3 at right using the two red points, we did the following:

(3, 6)
(1, 4)

$\frac{6-4}{3-1} = \frac{2}{2} = 1$, and so the slope of f(x) = x + 3 is 1

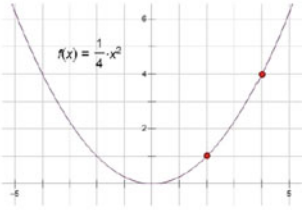
There is another way to think about slope that uses the definition of a function much more specifically:

The two red points above happen where x = 1 and x = 3, or the **domains** of 1 and 3.
Because f(1) = 1 + 3 = 4 and f(3) = 3 + 3 = 6, the **ranges** associated with these domains are y = 4 and y = 6.

We can think of slope as the change in our ranges divided by the change in our domains, or:

$\frac{f(3) - f(1)}{3-1} = \frac{6-4}{3-1} = \frac{2}{2} = 1$ ... this is our slope, but also the **average rate of change** over the interval [1, 3]

Once we understand how average rate of change works with a function that is a line, we can also find the average rate of change on a function that is not a line by finding the average change of the ranges over an change in domains.



Consider the two red points on the graph of the curve at right:

The two red points happen where x = 2 and x = 4, or the **domains** of 2 and 4.
Because f(2) = ¼(2²) = 1 and f(4) = ¼(4²) = 4, the **ranges** associated with these domains are y = 1 and y = 4.

Finding the **average rate of change** between these points is the same as finding the slope of a line that connects the two points:

$\frac{f(4) - f(2)}{4-2} = \frac{4-1}{4-2} = \frac{3}{2}$ ... this is the average rate of change of the curve over the interval [2, 4]

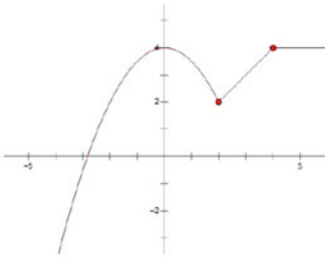
(continued)

Table 8.2 (continued)

Piecewise Functions: Piecewise functions are weird creatures. One easy way to think about them is that they are made up of more than one function, but each function happens only over certain intervals (certain **domains**).

The definition of a piecewise function contains both functions and intervals naming the domains these functions happen on. Consider this piecewise function and its graph:

$$f(x) = \begin{cases} -\frac{1}{2}(x^2 - 1) + 3, & (-\infty, 2] \\ x, & (2, 4] \\ 4, & (4, \infty) \end{cases}$$



This piecewise function has three parts, but others can have two parts or 50 parts. On the left side of the piecewise function definition are function rules. On the right side of the piecewise function are intervals which indicate the **domain restrictions** for the function rules.

To find a **range** of a piecewise function for a given **domain**, first use the right side of the piecewise function to find the interval that contains the domain. Then, use the left side of the piecewise function to find the function rule and evaluate the function. An example using our function above:

- To find f(1), we look over our intervals and decide 1 is in the interval $(-\infty, 2]$.
  We use the function rule $-\frac{1}{2}(x^2 - 1) + 3$ and solve:

  $-\frac{1}{2}(1^2 - 1) + 3 = -\frac{1}{2}(1 - 1) + 3 = -\frac{1}{2}(0) + 3 = 0 + 3 = 3$ ... f(1) = 3

- To find f(3), we look over our intervals and decide 3 is in the interval (2, 4].
  We use the function rule x and return 3 (because we substitute 3 for x)

  f(3) = 3

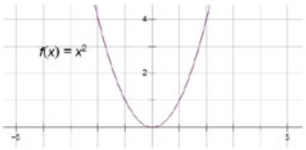
- To find f(7), we look over our intervals and decide 7 is in the interval $(4, \infty)$.
  We use the function rule 4 and return 4 (because this part of our piecewise function always returns 4)

  f(7) = 4

(continued)

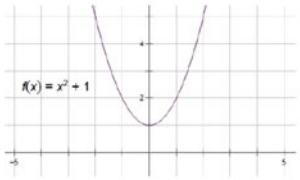
Table 8.2 (continued)

Graph Shifts: Adding and subtracting numbers from functions moves the graphs of these functions left and right (horizontal shifts) or up and down (vertical shifts). Consider how the graph of x^2 changes in these graphs:



At left is the graph of $f(x) = x^2$.

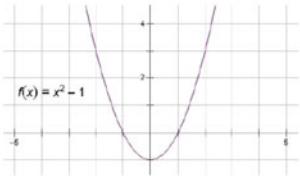
Note how the **vertex** of the graph (the bottom point of the curve) meets the origin ... the point (0, 0).



Vertical Shift Up

At left is the graph of $f(x) = x^2 + 1$. Adding one to the entire function shifts the function up one. See the vertex at (0, 1).

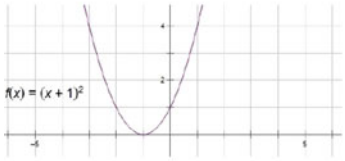
This makes sense when we evaluate our function:
For $f(x) = x^2$, $f(2) = 2^2 = 4$
For $f(x) = x^2 + 1$, $f(2) = 2^2 + 1 = 4 + 1 = 5$
By adding one to the function x^2, we added one to our **range** (and adding one pushes our range up!)



Vertical Shift Down

At left is the graph of $f(x) = x^2 - 1$. Subtracting one from the entire function shifts the function down one. See the vertex at (0, –1).

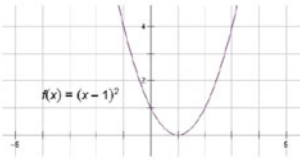
Like the graph above, by subtracting one from the function $x^2 - 1$, we subtracted one from our **range** (which pushes our range down!)



Horizontal Shift Left

At left is the graph of $f(x) = (x + 1)^2$. Adding one to only the domain of the function shifts the function left one. See the vertex at (-1, 0).

This makes sense when we evaluate our function:
For $f(x) = x^2$, $f(0) = 0^2 = 0$
For $f(x) = (x + 1)^2$, $f(-1) = (-1 + 1)^2 = 0^2 = 0$
By adding one to the domain of x^2, every x-value one to the left (one less) has the same answer that the x-value to the right used to have!



Horizontal Shift Right

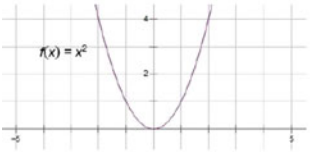
At left is the graph of $f(x) = (x - 1)^2$. Subtracting one from only the domain of the function shifts the function right one. See the vertex at (1, 0).

By subtracting one from the domain of x^2, every x-value one to the right (one more) has the same answer that the x-value to the left used to have!

(continued)

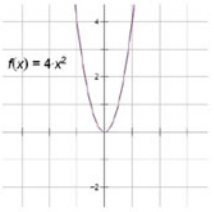
Table 8.2 (continued)

Graph Stretches/Shrinks: Multiplying functions by numbers stretches the graphs of functions or shrinks them down, and may turn them upside-down. Consider how the graph of x^2 changes in these graphs:



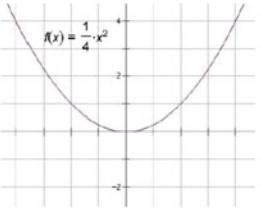
At left is the graph of $f(x) = x^2$.

Note how the **vertex** of the graph (the bottom point of the curve) meets the origin … the point (0, 0). When stretching or shrinking only, the vertex will never change!



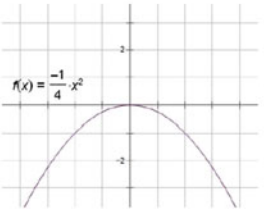
Vertical Stretch
At left is the graph of $f(x) = 4x^2$. Multiplying the entire function by four stretches the graph by four times.

This makes sense when we evaluate our function:
For $f(x) = x^2$, $f(1) = 1^2 = 1$
For $f(x) = 4x^2$, $f(1) = 4 \bullet 1^2 = 4 \bullet 1 = 4$
For the same domain, the range is now 4 times higher!



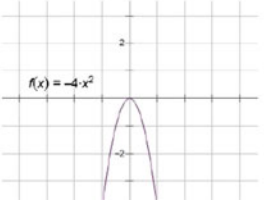
Vertical Shrink
At left is the graph of $f(x) = \frac{1}{4}x^2$. Multiplying the entire function by one-fourth shrinks the graph by four times.

Again, this makes sense when we evaluate our function:
For $f(x) = x^2$, $f(1) = 1^2 = 1$
For $f(x) = \frac{1}{4}x^2$, $f(1) = \frac{1}{4} \bullet 1^2 = \frac{1}{4} \bullet 1 = \frac{1}{4}$
For the same domain, the range is now one-fourth as high!



Vertical Shrink
At left is the graph of $f(x) = -\frac{1}{4}x^2$. Multiplying the entire function by one-fourth shrinks the graph as it did above, but multiplying by negative one-fourth also turns the graph upside-down.

Again, this makes sense when we evaluate our function:
For $f(x) = x^2$, $f(1) = 1^2 = 1$
For $f(x) = -\frac{1}{4}x^2$, $f(1) = -\frac{1}{4} \bullet 1^2 = -\frac{1}{4} \bullet 1 = -\frac{1}{4}$
Because the new ranges are negative, all points will be graphed below the x-axis, making the graph point down.



Vertical Shrink
At left is the graph of $f(x) = -4x^2$. Multiplying the entire function by four stretches the graph as it did above and also turns the graph upside-down.

Note: For functions that are normally graphed upside-down, multiplying a function by a negative number would turn its graph right-side-up.

(continued)

Table 8.2 (continued)

Sequences: Sequences are just lists of numbers. Each number is called a **term**, and these terms are ordered, so the first number in the list is the first term, the second number in the list is the second term, etc.

Sequences are given a letter name, usually **S**.
Terms are given a letter name, too, usually **n**. S(n) would be the n^{th} term of S.

So if S = 1, 3, 5, 7, 9, 11, 13, ... (the sequence of odd numbers), then:

S(1) = 1 because 1 is the first term
S(2) = 3 because 3 is the second term
S(3) = 5 because 5 is the third term
S(4) = 7 because 7 is the fourth term
and so on...

Sequences all have starting points (a first term) and a number that describes the change that makes the next term in the list. In our list of odd numbers above, the first term would be 1 and the change would be 2, because to get from every term in the list to the next term, we add 2.

The change from one term to the next term **must be a constant change**. If you create a new term by adding 2, you must also create the next term by adding 2!

Arithmetic Sequences: Arithmetic sequences are sequences where a new term is created by **adding** to the previous term. Our sequence of odd numbers is an arithmetic sequence because each new term is created by adding 2. Other examples of arithmetic sequences:

- 3, 9, 15, 21, 27, ... (first term is 3, the next term is created by adding 6)
- 0, −4, −8, −12, −16, ... (first term is 0, the next term is created by adding −4)

Geometric Sequences: Geometric sequences are sequences where a new term is created by **multiplying** the previous term by a number. Below are some examples of geometric sequences:

- 1, 2, 4, 8, 16, ... (first term is 1, the next term is created by multiplying by 2)
- 3, 1, $\frac{1}{3}$, $\frac{1}{9}$, $\frac{1}{27}$, ... (first term is 3, the next term is created by multiplying by $\frac{1}{3}$)
- 1, −1, 1, −1, 1, ... (first term is 1, the next term is created by multiplying by −1)

Explicit vs. Recursive Definitions: Sequences can be defined by explicit or recursive definitions.

- Explicit definitions of a sequence allow you calculate any term of a sequence without knowing the previous terms. This means you can calculate the 10^{th} term of a sequence from an explicit definition directly without knowing any other terms.
- Recursive definitions of a sequence allow you to calculate the next term of the sequence by knowing the previous term. This means if you have the 9^{th} term of a sequence, a recursive definition will enable you to find the 10^{th} term, and by knowing the 10^{th}, you can find the 11^{th}, and so on.

(continued)

Table 8.2 (continued)

Arithmetic Sequences: Examples of Explicit and Recursive Definitions:

Sequence: 1, 3, 5, 7, 9, … [first term is 1, 2 is added to create next term]
Explicit definition: $f(n) = 1 + 2(n - 1)$

Recursive definition:
$$f(n) = \begin{cases} 1, & \text{if } n = 1 \\ f(n-1) + 2, & \text{if } n > 1 \end{cases}$$

Sequence: 3, 9, 15, 21, 27, … [first term is 3, 6 is added to create next term]
Explicit definition: $f(n) = 3 + 6(n - 1)$

Recursive definition:
$$f(n) = \begin{cases} 3, & \text{if } n = 1 \\ f(n-1) + 6, & \text{if } n > 1 \end{cases}$$

Sequence: 0, −4, −8, −12, −16, … [first term is 0, −4 is added to create next term]
Explicit definition: $f(n) = 0 - 4(n - 1)$

Recursive definition:
$$f(n) = \begin{cases} 0, & \text{if } n = 1 \\ f(n-1) - 4, & \text{if } n > 1 \end{cases}$$

Geometric Sequences: Examples of Explicit and Recursive Definitions:

Sequence: 1, 2, 4, 8, 16, … [first term is 1, 2 is multiplied to create next term]
Explicit definition: $f(n) = 1 \bullet 2^{(n-1)}$

Recursive definition:
$$f(n) = \begin{cases} 1, & \text{if } n = 1 \\ f(n-1) \bullet 2, & \text{if } n > 1 \end{cases}$$

Sequence: $3, 1, \frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \ldots$ [first term is 3, $\frac{1}{3}$ is multiplied to create next term]
Explicit definition: $f(n) = 3 \bullet \frac{1}{3}^{(n-1)}$

Recursive definition:
$$f(n) = \begin{cases} 3, & \text{if } n = 1 \\ f(n-1) \bullet \frac{1}{3}, & \text{if } n > 1 \end{cases}$$

Sequence: 1, −1, 1, −1, 1, … [first term is 1, −1 is multiplied to create next term]
Explicit definition: $f(n) = 1 \bullet (-1)^{(n-1)}$

Recursive definition:
$$f(n) = \begin{cases} 1, & \text{if } n = 1 \\ f(n-1) \bullet -1, & \text{if } n > 1 \end{cases}$$

Table 8.3 Goal sheet

Goal Setting/Workplan Sheet

Name:_____ **Date:**_____

Please review which Khan Academy skills you need to complete and write down what you will accomplish in this period.

Exit Ticket: Did you meet your goals? Explain which goals you met or what you still need to do to meet them.

Table 8.4 Unit task checklist

Algebra Basics/Algebra 2Cr: Unit 4-Functions
Unit Task Checklist
DUE: 1/25/16

1) Complete the following sections of Khan Academy:

Algebra 2Cr Starts Here! Search: from search bar, look for "Algebra 1" → choose "Algebra I" → choose "Two-variable Linear Equations and Introduction to Functions" from the list on right → start with topic: Interpreting Linear Functions and Equations				
Interpreting Linear Tables Word Problems Example 1	Interpreting Linear Tables Word Problems Example 2	**Skill #1** Interpreting Linear Tables Word Problems	Interpreting Linear Graphs Word Problems Example 1	Interpreting Linear Graphs Word Problems Example 2
Skill #2 Interpreting Linear Graphs Word Problems	Interpreting Linear Formulas Example 1	Interpreting Linear Formulas Example 2	**Skill #3** Interpreting Linear Formulas Word Problems	

(continued)

Table 8.4 (continued)

Algebra 2Cr Continues Here! Search: from search bar, look for "Algebra 1" → choose "Algebra I" → choose "Two-variable Linear Equations and Introduction to Functions" from the list on right → start with topic: Comparing Linear Functions				
Comparing Linear Functions 1	Comparing Linear Functions 2	Comparing Linear Functions 3	**Skill #4** Comparing Linear Functions	Comparing Linear Functions Word Problems 1
Comparing Linear Functions Word Problems 2	Comparing Linear Functions Word Problems 3	**Skill #5** Comparing Linear Functions Word Problems		

Algebra 2Cr Continues Here! Search: from search bar, look for "Algebra 1" → choose "Algebra I" → choose " Two-variable Linear Equations and Introduction to Functions " from the list on right → start with topic: Modeling with Linear Functions and Equations				
Graphing Linear Functions Example 1	Graphing Linear Functions Example 2	**Skill #6** Graphing Linear Functions Word Problems	Constructing Linear Functions Example 1	Constructing Linear Functions Example 2
Skill #7 Constructing Linear Functions Word Problems	Linear Models Example 1	Linear Models Example 2	**Skill #8** Linear Models Word Problems	

(continued)

Table 8.4 (continued)

Algebra 2Cr Continues Here! Search: from search bar, look for "Algebra 1" → choose "Algebra I" → choose "Functions " from the list on right → start with topic: Piecewise Functions				
Introduction to Piecewise Functions	How to Evaluate a Piecewise Function (Example)	**Skill #9** Evaluating Piecewise Functions	How to Graph a Piecewise Function (Example)	**Skill #10** Graphs of Piecewise Linear Functions
How to Find the Domain and Range of a Piecewise Function (Example with a Step Function)		How to Find the Domain and Range of a Piecewise Function (Example with a Piecewise-Linear Function)		**Skill #11** Domain and Range of Piecewise Functions

Algebra 2Cr Continues Here! Search: from search bar, look for "Algebra 1" → choose "Algebra 1" → choose "Functions" from the list on right → start with topic: Average Rate of Change				
Introduction to Average Rate of Change	How to Find the Average Rate of Change from a Graph (Example)	How to Find the Average Rate of Change from a Table (Example)	How to Find the Average Rate of Change from a Formula (Example)	**Skill #12** Finding Average Rate of Change

Algebra 2Cr Continues Here! Search: from search bar, look for "Algebra 2" → choose "Algebra II" → choose "Manipulating Functions" from the list on right → start with topic: Combining Functions				
How to Combine Functions by Adding Them (Example)	How to Combine Functions by Subtracting Them (Example)	How to Combine Functions by Multiplying Them (Example)	How to Combine Functions by Dividing Them (Example)	

(continued)

Table 8.4 (continued)

Algebra 2Cr Continues Here! Search: from search bar, look for "Algebra 2" → choose "Algebra II" → choose "Manipulating Functions" from the list on right → start with topic: Composing Functions				
Introduction to Function Composition	How to Evaluate a Composite Function Given the Formulas of the Composed Functions (Example)	**Skill #13** Evaluate Composite Functions from Formulas	**Skill #14** Evaluate Composite Functions from Graphs and Tables	How to Find the Formula of a Composite Function Given the Formulas of the Composed Functions (Example)
Skill #15 Compose Functions				

Algebra 2Cr Continues Here! Search: from search bar, look for "Algebra 2" → choose "Algebra II" → choose "Manipulating Functions" from the list on right → start with topic: Shifting Functions				
Shifting and Reflecting Functions	Shifting and Stretching Functions	**Skill #16** Shift Functions		
Algebra 2Cr Continues Here! Search: from search bar, look for "Algebra 2" → choose "Algebra II" → choose "Manipulating Functions" from the list on right → start with topic: Stretching Functions				
Shifting and Reflecting Functions	Shifting and Stretching Functions	**Skill #17** Summary: Transforming Functions		

(continued)

Table 8.4 (continued)

Algebra 2Cr Continues Here! Search: from search bar, look for "Algebra 2" → choose "Algebra II" → choose "Polynomial Expressions, Equations and Functions" from the list on right → start with topic: Introduction to Symmetry of Functions				
Introduction to the Symmetry of Functions	How to Determine the Symmetry of a Function from Its Graph (Example)	**Skill #18** Determine if a Function is Even or Odd from Its Graph	The Connection between Even and Odd Numbers and Functions	

Algebra 2Cr Continues Here! Search: from search bar, look for "Algebra 2" → choose "Algebra II" → choose "Radical Equations and Functions" from the list on right → start with topic: Domain of Radical Functions				
How to Determine the Domain of a Radical Function (Example)				

Algebra 2Cr Continues Here! Search: from search bar, look for "Algebra 1" → choose "Algebra I" → choose "Sequences" from the list on right → start with topic: Introduction to Sequences				
Introduction to Sequences	How to Evaluate Recursive Formulas of Sequences (Example)	**Skill #19** Evaluate Sequences in Recursive Form		

(continued)

Table 8.4 (continued)

Algebra 2Cr Continues Here! Search: from search bar, look for "Algebra 1" → choose "Algebra I" → choose "Sequences" from the list on right → start with topic: Introduction to Arithmetic Sequences				
Introduction to Arithmetic Sequences	How to Find the 100th Term of a Sequence Give the First Four Terms (Example)	**Skill #20** Find the Next Term of an Arithmetic Sequence, Given the First Few Terms	**Skill #21** Find Any Term of an Arithmetic Sequence, Given the Formula of the Sequence	

Algebra 2Cr Continues Here! Search: from search bar, look for "Algebra 1" → choose "Algebra I" → choose "Sequences" from the list on right → start with topic: Constructing Arithmetic Sequences				
How to Find the Explicit Formula of an Arithmetic Sequence (Example)	**Skill #22** Find Explicit Formulas for Arithmetic Sequences	How to Convert between the Recursive Formula and the Explicit Formula of an Arithmetic Sequence (Example)	**Skill #23** Find Recursive Formulas for Arithmetic Sequences	

Algebra 2Cr Continues Here! Search: from search bar, look for "Algebra 1" → choose "Algebra I" → choose "Sequences" from the list on right → start with topic: Introduction to Geometric Sequences				
Introduction to Geometric Sequences	**Skill #24** Find the Next Term of a Geometric Sequence, Given the First Few Terms	**Skill #25** Find Any Term of a Geometric Sequence, Given the Formula of the Sequence		

(continued)

Table 8.4 (continued)

Algebra 2Cr Continues Here! Search: from search bar, look for "Algebra 1" → choose "Algebra I" → choose "Sequences" from the list on right → start with topic: Constructing Geometric Sequences				
How to Find the Explicit and the Recursive Formulas of a Geometry Sequence (Example)	**Skill #26** Find Explicit Formulas for Geometric Sequences	How to Convert an Explicit Formula of a Geometric Sequence to a Recursive Formula (Example)	**Skill #27** Find Recursive Formulas for Geometric Sequences	

Algebra 2Cr Continues Here! Search: from search bar, look for "Algebra 1" → choose "Algebra I" → choose "Sequences" from the list on right → start with topic: Modeling with Sequences		
How to Model Situations with Arithmetic and Geometric Sequences (Example)	**Skill #28** Model Real-world Situations with Arithmetic and Geometric Sequences	

2) Complete Castle Learning:

15Algebra2Cr, Khan Unit 4: Functions

3) Complete Benchmark Tasks:

"Evaluating Function Expressions" and "That's Radical Dude" **Located in Unit 4 folder: "Algebra Basics/15Algebra2Cr"**

Notes:

- Castle Learning quizzes must be completed individually and **cannot be retaken** … please take time to read each question carefully and look through your notes for assistance. Please look up any unfamiliar words online!
- Benchmark Tasks must be turned into the black homework box located at the front of the room!

Table 8.5 Pacing calendar

JANUARY 2016						
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
					1 New Year's Day	2
3	4	5 Skill 1	6 Skills 2-3	7 Skills 4-5	8 Skills 6-7	9
10	11 Skill 8	12 Skills 9-11	13 Skill 12	14 Skills 13-14	15 Skill 15	16
17	18 Skill 16 Rev. Dr. Martin Luther King, Jr.	19 Skills 17-18	20 Videos + Catch-Up	21 Skills 19-21	22 Skills 22 Whiteboard Exercises	23
24	25 Skills 23-25 Unit 4 Castle Quiz	26 Skill 26	27 Skill 27	28 Skill 28	29 Benchmark Regents Exams	30
31						

8.1 Narrative of the Asynchronous Algebra Study in Functions Lesson

I have been teaching high school mathematics for the past 3 years, and two of those years have been at Urban Assembly Maker Academy, a New York City public high school started in September 2014. I am currently teaching both Algebra I and Geometry. Students at Maker Academy come from all five boroughs of NYC; our student body includes students from extremely diverse socioeconomic, cultural, ethnic, and linguistic backgrounds. Maker Academy has Integrated Co-Teaching (ICT) classes for students with special needs, and has many English Language Learner (ELL) or Former English Language Learner (FELL) students. First-generation Hispanic students (primarily from the Dominican Republic and Central America) comprise the majority of our students, with black students comprising the second largest demographic group. As a primary goal of the school, students take CTE (Career and Technical Education or "Maker") classes as semester-long core courses; along with the more familiar diet of math, social studies, science, English, health, and gym. The CTE courses teach students prototype design, computer-aided drafting and 3D printing, graphic design, software development, microprocessor programming and more—each guiding students through a 5-step process model for planning, designing, testing, and presenting class projects. Students work alongside industry partners in tech and design, taking

planned trips to their offices for study or to host principals of these firms at our school, where students present the results of their projects. The goal of Maker Academy is to arm students with the skills necessary to succeed in an entrepreneurial, tech-based economy (Table 8.1).

Maker Academy implemented a standards-based mastery framework, giving students opportunities to rework previous assignments to demonstrate their growth against predetermined standards. These standards are based primarily on Common Core guidelines, but also on school-defined standards of personal and academic behaviors, in an effort to help students gain mastery in self-directed learning. Rather than giving individual letter grades on assignments, students are given a score of 1–5 against rubrics based on Common Core standards, where 5 represents full mastery of a standard and 1 represents initial attempts at a standard. Students are graded on progress toward (and eventual attainment) of mastery, and are taught to see that any initially low rubric scores are part of the process of learning … that mastery through repeated attempts to meet a standard is the goal. My school is in its second year of conception and currently has two grade levels: ninth and tenth, with approximately 220 students. The school is on track to grow to approximately 400–500 students in 2 years, as the current ninth- and tenth-graders progress to the eleventh and twelfth grades.

In my second year of teaching, Algebra class sizes varied heavily, from 18 students to 33, as required by scheduling concerns. Many of my classes are asynchronous, enabling students of all skill levels to work together while meeting their education goals at their own pace. Higher-performing students are given free rein to move through the material of a year-long course in half the time, if they so choose, provided they meet mastery benchmarks. These students are given opportunities to act as a peer tutor, and are often seen leading small-group lessons in class. To become a peer tutor, students are required to shadow me as I lead small-group discussions and must subsequently demonstrate the ability to use questioning techniques to uncover and correct the misunderstandings of other students. Lower-performing students are given an extra daily period of acceleration in reading, English, and math, as needed; and all students are assigned open school periods that provide in-school tutoring in a particular subject on a rotating basis. For my classes, I use multiple resources: traditional textbooks and online free-access videos such as Khan Academy (when I "flipped the classroom" in Algebra I).

Teaching Algebra I: My goal is to do the least amount of direct instruction possible, putting students in command of their own learning. At the beginning of each unit, I provide my students with a sheet of concepts and terms that I put together to introduce the main ideas of the unit (see Table 8.2 for an example). The language in these sheets is casual and references real-world examples of the ideas, wherever possible, using analogies to help students understand how these concepts connect to what they already know and why the new concepts are important. In addition, each sheet ends with detailed examples of more complicated problems, and includes a running commentary that explains the reasons for certain steps and notes possible alternative concepts to model and aid the thinking processes (Tables 8.3 and 8.4).

To support students' monitoring skills, I devised a checklist for them to use outside of the classroom when they view the lectures on Khan Academy videos and the corresponding mathematics concepts and skills. Further, I provide students with a calendar and a list of goals to accomplish (i.e., a work plan for when certain mathematical concepts and skills should be completed), to ready them for a day of small-group whiteboard exercises, a unit quiz, and an end-of-unit benchmark task that extends their use of the unit's mathematical concepts. Students may use a blank calendar to schedule their own unit work plan in consultation with me, provided they are able to finish the given material by the day of the unit quiz. The checklist and calendar create opportunities to develop students' self-guided learning strategies and monitor their mathematical understanding through a scaffolding process.

The Algebra I Lesson Plan presents the way I teach students how a piecewise function is created, and how the rules for the piecewise function relate to different domain intervals for the function on a graph. As students enter class, they will be armed with a notebook and pencil, laptop, and their calendar goal sheet (see Table 8.5). Students, who are following either my prescribed work plan or their own, will come to class having watched Khan Academy videos on the day's subject in the "flipped classroom." In preparation, I will have completed a review of students' work in Khan Academy the previous night and will come to class with full knowledge of who is and is not on track with their plans, or who is showing evidence of struggle or confusion with this or previous days' math concepts and skills. This enables me to plan ahead and have certain groups of students ready for in-class pull-outs for small-group instruction; I can also monitor who is and who is not following the prescribed work plan or their own plan.

Similar to a Do Now, I present students with an orienting activity designed to lead from the previous day's lesson into today's topic. At this point, students should have learned the domain of graphs of linear functions; specifying the domain of two such functions should be relatively straightforward for them. Especially after I combine the two functions into one, at the end of the orienting activity, I hope that students will start to understand that a piecewise function is the connection of two or more linear functions, each of which can only be mathematically valid for non-overlapping domains.

Once students have presented their solutions to the opening activity, I will direct them to their independent work with Khan Academy (following the skills indicated on their checklists and work plans); and provide them with graphing calculators, dry-erase boards, markers, and erasers. To monitor and encourage students' self-directed learning, each student will come to my desk so I can quickly determine if they are on track with my work plan or their own; most important, such individual attention allows me to provide differentiated instructions for students who need it the most, and move the ones along who are on track with their learning goals and their understanding of concepts and skills.

Following my check-ins with students, I call several students for small-group pull-outs, and form these groups based on students' shared confusion over a concept. If I observe from the previous night's data that there should be several such groups, I will ask students who are ahead of their plans, or ahead of the pace of the

class, to volunteer as peer tutors for the other groups. Afterward, the peer tutors and/or I ask various groups of students to attempt the next problem in the problem sets on the whiteboards; when finished, students in each group will pass these whiteboards to their group members to start a discussion. At this point, frequent errors center on forgotten negative signs, misreading of word problems, or other minor errors; but will occasionally result from wholesale confusion about the topic. If the former, students will assist each other with error corrections. If the latter, I work closely to review the key concepts of the skill in another mini-lesson, connect it to the previous day's material, and do one more problem from start to finish while asking students for explanations and engaging them in solving the problem. Mostly during small-group work, students ask each other questions and then complete another similar problem to demonstrate their better understanding of the mathematical concept. Once all students demonstrate competency, I ask them to remain in their small group until the end of class, to act as a team that helps each other through to the completion of their work—then I return to check on students' progress every few minutes, as needed. The goal of this style of teaching is to help students see themselves as owners of knowledge in math class, and "mitigate" their view of me as sole expert. Students are encouraged to use their notes and the concepts and terms sheets as resources; and are praised for assisting others, using notes, adhering to their work plan, and growing their understanding within the small groups, etc.

The ending activity enables all students to finish the class in a way that demonstrates competence in relation to a novel problem, and provides me with an opportunity to leave class knowing who may or may not be a candidate for small-group instruction the next day. As class ends, I remind students what they should (at a minimum) complete on their plan by the next day. This includes any Khan Academy work not completed in class, as well as videos.

By even the second month of classes, a few students fall behind, particularly those who have been absent excessively or who enrolled in my class in the middle of the school year. To be successful in "flipped classroom" teaching (and to intervene as quickly as possible for students who fall behind), I do a daily review of student data to know which students need small-group intervention, and this review can be time-intensive. The benefit of the extra time taken is that I have current, fine-grain performance data on all students and can feel certain that, when my students say they understand a concept, they actually understand the concept. As part of my daily data review, I color-code seating charts to determine students most closely grouped in course progress and understanding. In this way, I was able to best organize groups for mini-lessons and determine which students would be the best candidates for peer tutors, and which groups they could best assist. By displaying this seating chart publicly and daily, students were more likely to be on pace with the course, as earning the "on-track" color became a game for students to "win," allowed students to give each other praise for their hard work, and helped students identify others who they could ask for assistance.

Table 8.6 Asynchronous geometry study in polygons

Teacher: Brock Burkett BA Computer Science (Brandeis University) MA Adolescent Math Ed (Hunter College) Teaching License in Secondary Math Ed, Grades 7–12	**Grade Level(s)**: 10th Grade Math
School: Urban Assembly Maker Academy	**Subject**: Geometry
City and State: New York, NY	
Instructional Plan Title: Asynchronous Geometry Study in Polygons	
CCSS: HSG.CO.C.11: Prove theorems about parallelograms. *Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals*	
Learning Objectives: Students will connect prior units' concepts to novel problems about congruence in parallelograms	
Instructional and Learning Materials Needed: PowerPoint (displayed on SMARTBoard) that displays a quadrilateral with the markings described in the Targeted Activity below; Parallelogram Criteria sheet (see Table 8.7); whiteboard exercise sheets; dry-erase boards, markers and erasers; notebooks/pencils; when possible, extra teachers/adult visitors to listen to small-group presentations	
Lesson Duration: 40 min	
Teaching and Learning	

Min on this Activity	Targeted Activity	Purpose of Activity
5	**Orienting Students to Lesson**: • Before entering the classroom, there is a Power Point display on the screen showing a diagram of a quadrilateral with one pair of opposite sides marked parallel and one of the other pair of opposite sides given a length of 5 • Upon entering the classroom, students take out their notebooks and pencils, and are asked to list three separate ways extra marks may be given to the diagram to guarantee the remaining side is also length 5 • One or more students are then asked to present their work on the board and may debate on which answer is best as time permits	• The warm-up helps students get started immediately upon entering the room • The warm-up also activates prior knowledge and provides students with the opportunity to display misconceptions that involve not understanding the minimum requirements for a figure to be a parallelogram • Having students present their work on the board gives others the opportunity to check their work and provides the opportunity for students to get engaged as they debate their answers
During Classwork	**Motivation**: • The teacher circulates and checks students' responses to the opening activities	• Students see that the teacher values their efforts by checking their work

(continued)

Table 8.6 (continued)

	• Students are reinforced for coming up with similar answers to those presented and for other novel answers	• Reinforcing students' work encourages them to participate and helps motivate them to succeed • Reinforcing students' work habits (note taking, close reading, discussion techniques) reduces student belief in the importance of personal ability and instead on changeable behaviors
0	**Whole Class Instruction**: • No whole class instruction • Students work in small-groups on the exercises, and present to peers/me/other adults (see other teachers/adult visitors in the Materials section above) • Students will be placed in groups of 3–4 so that each group has one or more students on pace with the course in and one or more persons behind the pace of the class. Students on-pace will be asked to teach whenever possible, while students behind pace will receive teacher reinforcement to encourage them to give input in small-group	• Small-group work allows students to maximize discussion time, and helps students take ownership for their work processes
During Classwork	**Guided Practice/Providing Feedback**: • Peer feedback on content occurs throughout student work on the exercises through group discussion of open-ended questions and proofs, and again in the form of leading peer/adult questioning during presentations • The teacher will give specific feedback as necessary on ownership of roles by asking 'who is writing?', 'who is presenting?' and so on if students are having trouble making decisions or are falling into familiar roles (perhaps constantly presenting)	• Giving students the opportunity to provide feedback to one another in debate on the solutions helps students recreate the sort of environment where math is done in the real-world • Students are reminded that the nature of arriving at solutions of open-ended problems really is done in groups on whiteboards in tech companies all over the world, and that skill in participating in this environment is just as important as skill in knowing the math itself
15: Group Discussion 10: Presentation	**Independent Practice**: • The activity sheets contain 4 problems of increasing complexity, and all require the use of prior knowledge in their solutions	• Group-work is an extension of the unit's concepts and encourages deeper thinking about the content • Adults who are witness to the presentations are encouraged to ask

(continued)

Table 8.6 (continued)

	• The teacher and other adults will listen in on discussions and ask questions when necessary to keep students on track • Students are given grades for participation, use of the unit's terms in their discussions and openness to the ideas of others	questions to further thinking, especially from students less willing to speak out
5	**Evaluation of Learning and Assessments**: • At the end of the activity, students will independently write up the solution to their choice of one of the whiteboard exercises • Student knowledge of the solution and use of the unit's terms will be used to determine mastery	• Having students write up one of the solutions guarantees in-the-moment focus and attention to the activity (even from students unwilling to participate in the discussion), which is a study habit necessary for students to master
As students exit	**Closing Activities**: • Students are given an answer key to the exercises to study for tomorrow's quiz • Students are reminded that, as these were open-ended exercises, the answers given are only one set of possible solutions	• The expectation is that students leave the classroom having at least one correct way to approach each problem • Students also understand that their solutions (if they are different from those on the answer key) may be equally valid, and that most math problems have more than one solution path
Specific Strategies used to Address Exceptional Students and/or Students for whom English is a Second Language: • For ELLs, materials will be provided in multiple languages, and students will be given the opportunity to work in groups of students with similar language backgrounds if they so choose • Students with special needs will be provided extra time or additional acceleration skills as needed • Exceptional students will be expected to take on a leadership role in the formulation of solutions, but will also be encouraged to let others lead in the discussions		

Table 8.7 Parallelogram criteria

Common Core Geometry Unit 5: Parallelogram Criteria	Name:	Date:

Instructions:

Reading the instructions is the most important part of doing your work! Always read instructions first!

Step 1: Please put your **name** and **today's date** on top of this paper!
Step 2: For each diagram below, add the **minimum** number of marks necessary to prove that the figure in the diagram is a parallelogram.
Step 3: After adding marks to the diagram, write several sentences to explain how the marks in the diagram (the original marks provided, plus yours) are sufficient to prove that the figure in the diagram is a parallelogram.

Remember: While you must only find one answer, there may be more than one correct answer!

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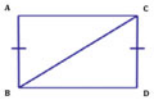
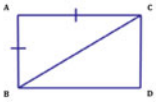
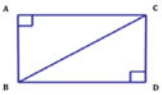
1. 

Explanation:

2. 

Explanation:

3. 

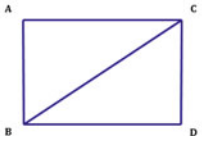
Explanation:

Instructions:

Reading the instructions is the most important part of doing your work! Always read instructions first!

Step 1: Using different marks than those in the problems above, add marks necessary to prove that the figure in the diagram below is a parallelogram.
Step 2: After adding marks to the diagram, write several sentences to explain how the marks in the diagram are sufficient to prove that the figure in the diagram is a parallelogram.

Remember: While you must only find one answer, there are many correct answers!



Explanation:

8.2 Narrative of the Asynchronous Geometry Study in Polygons Lesson

This geometry lesson is designed to give students the freedom to extend their understanding of *quadrilaterals and quadrilateral proofs*, which addresses Common Core Geometry Congruence standards relating to theorems about parallelograms. As students enter my classroom, they know to take out their notebooks and pencils and respond to the question on the Power Point at the front of the room. This is a warm-up activity that gets the students thinking about the day's lesson. After a few minutes of work-time, I ask for volunteers to write their solutions on the board. The lesson's opening question is sufficiently open-ended to have several correct answers, promote unexpected and novel solutions, and elicit answers that are likely to uncover misconceptions. Likely misconceptions will involve misunderstandings of the minimum requirements to declare a quadrilateral a parallelogram, with students either providing too little evidence or providing evidence well beyond the minimum sufficient parallelogram criteria. Using the volunteers' work, we discuss which of the several possible solutions to this problem is "best," and what criteria make for a "best" solution. Most important, students' discussion and negotiation about the "best" solution operates at a higher level of thinking, which requires students to first compare and contrast different types of situations so they can determine the "best" criteria that constitute the "best" solution. Such thinking and learning processes help make a presentation that is complete and understandable (Table 8.6).

After the open-ended orientation question and a whole-group instruction, I provide students with four progressively challenging open-ended problems related to proving parallelograms. These problems are designed to extend their knowledge of the current unit and activate the knowledge they have gained from previous units to complete the new problems. In my experience, fewer than four problems do not provide sufficient material to keep students engaged; and more than four problems lead to reduced discussion, less deep thinking, and rushing to complete the work. Students will be placed in groups of 3–4, with care to balance groups around prior knowledge. Each group will have one or more students that are on pace with the work of the class and one or more who are behind the pace of the class. Students who are on pace may act as peer tutors where necessary, and during my circulation, students who are behind will receive praise for participation and assistance. This pre-circulation gives me an opportunity to choose a group with whom to engage during presentations.

As I circulate among the groups, I provide feedback as appropriate, based on a group's needs (e.g., to ensure that someone is taking notes, designing a diagram, or doing other writing on the whiteboard; to ensure that someone is preparing to present, etc.), or to spur further discussion by asking students open-ended probing questions. I give positive feedback and encouragement to students whenever possible to ensure that my feedback relates to their use of various mathematical or learning strategies, and not to individual ability (e.g., "I see that you're taking your

time to read the question thoroughly," and "I notice that you called for only one person to speak at a time to make sure that others are listening to her solution"). The nature of this feedback is highly intentional, as the goal is to ensure that our students own the responsibility for their success (or lack thereof) in class, using academic strategies that they can change as needed, and not on their own abilities in math. Providing such feedback has paid off in increased student motivation and growth in the academic habits they will need to succeed.

During group presentations, which will be delivered in small groups to me and to additional adults who will be invited as observers (other teachers, admins, or parents), the other adults and I will ask follow-up questions to gauge student understanding and make note of students' use of the unit's terms in their explanations. During their presentations, students will use the diagrams and work that is written on their whiteboards. If the same group provides multiple solutions to the same problem, I facilitate the discussion to probe students for the criteria to judge a "best" solution. In addition, I try to engage students to articulate whether there are situations where one of these answers would be preferable, as opposed to other situations, where the other answers would be preferable. This reinforces the similar discussion structure at the beginning of class. The hope is that students will gain fluency in mathematical understandings that call for extensive explanations and use of mathematical language.

Once group presentations are completed, each group member chooses a different problem to finish from the exercises. Students have about 5 min to write an explanation of their chosen exercise solution; this gives me information to gauge individual student understanding and enables me to be sure that all students are accountable for their active listening and participation. As students hand in their explanations, they receive a sheet with correct answers to each of the exercises. As students leave the class, I remind them that the answers on my answer sheet are only one possible set of solutions for these exercises; other equally valid answers exist and are likely among the answers they have given in class. This is especially the case with geometry proofs; there are usually many ways to arrive at a correct answer. I remind students that incorrect proofs are only those that misuse a rule or theorem or are not backed up by sufficient evidence. The keys to a successful lesson are, as illustrated here, creating a culture of large- and small-group discussion; testing a variety of "best" answer criteria; modeling the thinking and listening processes through a number of problems; providing feedback that focuses on students' use of strategies; and holding each student accountable for their mathematical understanding.

As in the Algebra I lesson above, to be successful with this style of teaching, I found it helpful to do a quick, nightly review of student progress in which I color-coded seating charts to determine students most closely grouped in course progress and understanding. In this way, I was able to best organize groups for discussion and presentation, ensuring an appropriate mix of on- and off-pace students. Especially in geometry classes, I have found that the extra steps of drawing diagrams and organizing information sufficient to make proper proofs create additional room for student misconceptions. I therefore prepare a slide of potential

misconceptions for each day's lesson (that grows longer each year as my experience with teaching each lesson grows), and I print it out for myself to refer to during circulation and student questioning.

It is my experience that, while students have the ability to correctly discuss out loud the steps for proving that an object is a parallelogram (or to discuss any proof situation), students have a general difficulty in writing these proofs down. This difficulty persists regardless of whether they are asked to organize their proofs in traditional statements/reasons charts or in paragraphs and typically shows in both a lack of specific Geometry terminology (proof steps contain really vague wording) and a confusion in proof step order. As a work-in-progress, I am attempting the following interventions to address this:

1. Having students record themselves discussing proof steps. If students can say the words out loud, they should be able to write them down; by recording themselves speaking out loud and then replaying these recordings as they write my hope is that, with practice, what students say and what they write will more closely align.
2. Having students write proofs and then give them, one line at a time, to another student to analyze. The idea is that other students may catch proof steps that are unsupported by the statements/reasons or diagram marks and/or help address confusion in proof step order. When students are given a proof step that they feel is unsupported, they are supposed to stop the discussion and ask questions such as "You just said [x] was the next step. How do we know that? Where is that marked in our diagram?" Sometimes the students doing the analysis incorrectly call out what they feel is an unsupported next step, and the discussion that follows requires both students to justify their beliefs. In our efforts to date, this has been paying off twofold: (1) students whose work is being analyzed are better able to internalize what justifies next steps, and (2) students doing the work are better able to internalize when a correct step has sufficient evidence.

Table 8.8 How can we further investigate exponential functions? Lesson plan

Teacher: Gail Swingler	**Grade Level(s)**: 10th
School: Transit Tech Career and Technical Education High School	**Subject**: Honors Algebra II
City and State: Brooklyn, NY	
Instructional Plan Title: How can we further investigate Exponential Functions?	
Common Core State Standards: **CCSS.HSF.LE.B.5** Interpret the parameters in a linear or exponential function in terms of a context **CCSS. HSF.LE.A.1.c** Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another **CCSS.F.LE.2** Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table)	

(continued)

Table 8.8 (continued)

Learning Objectives: 1. By the end of the lesson, students will create exponential functions given two points 2. Students will demonstrate understanding by determining exponential equations given coordinate pairs		
Instructional and Learning Materials Needed: Whiteboard, markers, pencils, pens, paper, calculator		
Lesson Duration: 46 min		
Teaching and Learning		
Min on this Activity	**Targeted Activity**	**Purpose**
5	**Orienting Students to Lesson** • Upon entering the classroom, students take out their supplies and previous day's homework • Students know to copy down the "Aim" and "Do Now" from the board The Do Now is: Find an equation for (0,3), (2,12) in the form f(x) = a * b^x	• Writing the Aim and working on the Do Now help students get started immediately upon entering the room • They also activate prior knowledge in preparation for the current lesson
5	**Motivation** • Students share their responses to the Do Now to review yesterday's x = 0. Different solutions are welcomed as talking points for math discussion • We discuss the general form of f (x) = a * b^x along with shapes of graphs • We discuss how the rapid growth indicated in an exponential function relates to finance—a rapidly growing bank account is good, a rapidly decaying (financially) asset like a car is not so good! We may talk about sports cars to further tie the exponential functions to something they see every day. The discussion of appreciation and depreciation of money in terms of bank accounts and cars is an easily understood and useful (for the present as well as the future!) introduction to exponential functions • Our long-term motivation is to do well on the Algebra II June Regents, which has been traditionally difficult to pass	• The students need to practice questions that will be found on their state-wide end of year exams to build confidence, comfort, and mastery with similar questions • Most students are very interested in driving at this age, the analogy of today's lesson to savings accounts and car depreciation excites them about the day's topic

(continued)

Table 8.8 (continued)

10	**Whole Class Instruction** • We will work some problems on the board together as a class that start with simple problems using linear functions • Then we will transition into exponential functions—working on situations in which x does not equal 0 • Discuss with the students and compare and contrast the features that result in an exponential function with the features that result in a linear function • Example problem: (2, 2) (3, 4). Sketch graph first to determine if growth or decay. Substitute values into formula for x and y. Write equation twice and discuss similarities to solving by elimination in systems of equations. Use division to cancel. Use b value by substitution and solve for a. Write out final equation in function notation	• Students will have yesterday's linear functions tied to today's exponential functions as a method of motivation • We will also follow the idea of a bank account increasing or a car decaying and use this is as a framework for interpreting the graphs, as well as a tool for encouraging engagement
5	**Guided Practice/Providing Feedback** • Before the students move into the independent practice, they will have 5 min to try and solve some problems all on their own • Students will work in pairs to solve these few problems and will discuss amongst themselves • They will sketch, discuss what they believe the equation will "look" like, and solve for a and b • Examples: (2, 4) (3, 16) and (−1, 4) (2, 0.5) • After they have had a few minutes to work, we will come back together and discuss possible solutions and differences between the two problems • While the students work, the teacher will check in with students	• Giving students a chance to discuss the new problems before independent practice helps them to clear up misconceptions before work time • Working with a partner helps students to "bounce" ideas off of each other • The discussion after the Guided Practice is a low-stakes way to make errors and learn from them
15	**Independent Practice** • Students practice independently both through the classwork problem set and from homework from the textbook • The homework is checked daily at the beginning of class	• Having time to practice in class helps students to feel successful in a low stake environment • Working with partners helps students to share ideas and work through multiple solutions and perspectives

(continued)

Table 8.8 (continued)

	• Students will work in pairs here on a mixed examples problem set, they will also be expected to find a cube root, and be able to perform a summation of former tasks • Students are encouraged to work through each problem thoroughly as a pair and use moments of disagreement as opportunities to learn from each other	• Homework gives students additional independent practice • Homework being checked daily holds students accountable
	Evaluation of Learning and Assessments • Students are evaluated daily as the teacher walks around the room and conferences with students • End of class discussion is another opportunity to assess students' learning for the day • Tests are offered frequently and homework nightly as a means of assessment • The lesson structure is sequential, and all knowledge is built on prior knowledge	• Walking around the room helps the teacher to correct misconceptions in the moment • Reiterating confusing points may clear up student misconceptions • Homework is also another indication of where student strengths and weaknesses lie • Individual progress is monitored by class participation, daily homework, and frequent in-class tests
5	**Closing Activities** • End of class discussion about the problem set and common misconceptions noticed by the teacher/offered by the students • During work-time check-ins help teacher to know by the closing that each student has demonstrated the ability to determine exponential equations as directed—those who have not demonstrated can use discussion as a chance to show knowledge • Nightly homework is assigned for further practice • Test dates are reiterated	• Helping students to have a whole discussion on method, the preliminary sketches of the graphs, the difference when the x coordinate is 0 versus when it is not, the division methods, and formatting of final equations needs to be discussed and reviewed to help students finalize their knowledge • Making sure each student demonstrates competence in the skill by the end of the lesson is crucial for understanding
Specific Strategies Used to Address Exceptional Students and or/Students for whom English is a Second Language • Extension activities are made available to students who need more challenges • ELLs are supported by teacher and classmate "check-in" and are discretely addressed continuously to ensure understanding • The main goal of the class is to create a motivated, inclusive, warm atmosphere where success, effort, and accomplishment are rewarded • All students are recognized and addressed, all must participate		

8.3 Narrative of the How Can We Further Investigate Exponential Functions? Lesson

I have been teaching high-school mathematics for the past 14 years in Transit Tech Career and Technical Education High School, which is a public high school in New York City. I currently teach Geometry, Algebra and Algebra II, although less frequently in the school. Transit Tech CTE High School is a large urban school, where a majority of the student population qualifies for free lunch. As a primary goal of the school, students in CTE High School are enrolled in "standards-based" educational and technical programs that are structured to provide them with the skills needed for pursuing post-secondary education and opportunities for employment, particularly within the New York City transit system and for engaging in lifelong learning. It is in Transit Tech CTE's mission statement to promote the belief that "all students can learn (Table 8.8)."

The class that I teach and have used to illustrate my instruction in this chapter is an Honors Algebra II class with 30 students. All of the students in this class have already passed the Algebra 1 New York Regents' exam and are motivated to acquire Advanced Regents Diplomas, which necessitate passing both Geometry and Algebra II Regents Exams. In New York State, all high-school students must pass five subject exams to graduate, and may take more exams if they wish to receive the Advanced Diploma. My Algebra II students are in the tenth grade and will be the first group to take the Common Core Algebra 2 exam when it is offered; they will also take the Algebra II/Trigonometry exam. I will provide narratives of my lesson on *exponential equations* (Algebra II) next, with the corresponding lesson plan. My classes reflects the school demographics where approximately 60% of the students are African American, 31% are Hispanic, 4% are Asian, 1% are American Indian, and 2% are White. For my classes, I was using multiple resources available to me at the time (we have since acquired additional online resources and a new curriculum): traditional textbooks and free online sources such as Kirk Weiler's EmathInstruction (Weiler, 2015).

The structure of my class is similar to many classes in U.S. high schools, which gives students an anticipated routine. Each day's class begins with students entering the room and immediately copying the aim and completing the Do Now off of the board. The "Aim" of the lesson is to inform students of the major learning outcome of the lesson. For this lesson, the Aim is "How can we determine the exponential function, given two points on the coordinate plane?" Then students write down the "Do Now," a problem based on the previous day's materials that is designed to strengthen what students learned in prior lessons. While students are working on the Do Now task, I walk around the classroom to check their previous days' homework assignment. The process of checking students' previous day's homework permits me to address student questions individually if they have particular concerns or clarification that they want to discuss with me. In addition, this process can involve student-prompted questioning or my instruction based on seeing difficulties in the homework. Once the majority of students have completed the Do Now, we go over

the task as a class. The whole-group discussion serves as a general review of the mathematical concepts to help students who need further clarification to catch up from the previous lesson, and to consolidate the understanding of those who are on track.

In many of my classes, students' questions about the Do Now provide appropriate segues. In this lesson, a student asked "what happens if the x value is NOT zero?" which we used to move directly into the focus of the day's lesson—the examination of exactly that situation—to find exponential equations for coordinate pairs without zero for the x value. I start with a straightforward example, usually presented in the prior day's lesson to re-activate students' prior knowledge and give them a sense of mastery, accomplishment, and motivation; and to provide conceptual connections to move forward with the current day's lesson material. We typically solve the Do Now problem on the board together after the students have a chance to work with it. Frequently, students are confused, but we use their questions to approach that day's topic.

The next part of the lesson involves guided instruction to show the students the more complicated procedure, without the x coordinate of zero. First, I provide an example on the whiteboard. I ask the students if they understand what the problem is asking of them to do and if they know how to proceed to solve it; a number of students verbalize what we should do to find the exponential equation. We then work together to solve the problem: I will think aloud, occasionally stopping and asking the class for their suggestions on how to proceed. Then I suggest that we quickly make a sketch of the graph. I ask the students which it is, and when they state that it is growth, I ask them what that tells us about the equation we are looking to find. The students know from the previous day and the introduction to the topic that growth indicates that the b term or exponential base will be greater than one. Through their answers, we review what it means if b is one, or if b is a value less than one (but greater than zero).

At this point, our class is engaged, we have a small graph, and we know that our b value is greater than one. We have learned a new method, where we will write the general (y = a * b^x) equation down twice, and substitute the x and y values into both, respectively. We then discuss what they learned in Algebra I about systems of equations and solving by elimination. Once we have both variables, we can write out the actual exponential function we were solving for. Then we would test this by graphing on our calculators, and determining that our values matched those given in the table and on the graph.

Once the students seem confident with this problem-solving process, I give them another problem to try in pairs. There are a few steps and a few places for errors, so I walk around to listen to students' conversations and see how they progress. Once most students have finished, I ask them to share how they solved it, which gives students a chance to learn various ways of solving a problem. I ask them to give one or two steps at a time, in their own words; and I try to give as many of them as possible the opportunity to share. The students can also come to the board and model their thinking for each other. Using student work and showing different

methods of solving the same problem increases my students' engagement, and I want to maintain their enthusiasm throughout the lesson.

Once they have completed this part, I put three more problems on the board, of graduated difficulty, to solidify students' understanding and fluency. For example: "Determine the exponential equations of the following coordinate pairs: (a) (0, 5) (2, 45), (b) (4, 162), (2, 18) and (c) (1, 147), (2, 110.25)"—pairing (a) with zero as the first term, pairing (b) as we just did in class, and pairing (c) with a fractional/decimal component to make a greater challenge for those who seek it. I give students time to complete those problems individually, but they know they can speak to their classmates and ask for clarification and/or assistance. We also verify the answers using graphing calculators, and again go over the problems and multiple solutions as a group, discussing any particularly challenging points and lingering questions. This gives students a chance to work on the problems with no direct instruction, and encourages them to learn from each other and use their peers as another resource of learning.

I always conclude the class by having a final summary conversation, via student contributions and directed questioning, about what we learned that day, how it fits in with what we learned the day before, what they anticipate that we will do the following day, and other final questions and clarifications. I reiterate their homework assignment and usually ensure that students have recorded it. When we finish our discussion, I announce the next test or assignment due date if one is approaching and dismiss the class in time for the bell and our school's schedule.

This lesson built on students' prior knowledge. The challenges in the lesson occur due to the fact that many students are arriving with differing levels of background knowledge. Algebra II is much more in depth in terms of content that Algebra I, and many students find the leap in complexity to be substantial. It is also imperative to have student engagement. By having hands-on activities and real life examples, we try to activate the students' interests on a personal as well as academic level.

Students have learned exponential growth and decay from their other classes (either from math classes in earlier years or from their science classes). The additional real-life application of exponential growth and decay, particularly with respect to compound interest as it relates to financial accumulation and the depreciation of assets such as cars, and the easy visual aids and hands on aspect with the graphs (particularly with the use of TI-83 calculators) made this lesson meaningful to students. Through graphing, students were able to easily see that the *b* term is what indicates where there will be growth or decay. If it is decay, they know to expect a fraction, so they are able to build confidence that they are heading in the right direction, rather than asking the teacher "Is this right?" My goal is to build student confidence in math, which encourages students to take ownership of their learning.

As the lesson builds, students are able to see that there are easy parallels to solving systems of equations. Traditionally, they added and subtracted one variable via elimination. But we are now able to do the same thing with dividing and using our exponent laws. This lesson is straightforward and allows students to quickly

and easily see the results of their understanding of the math concepts. It also builds on their knowledge of exponential functions, leading the way to further studies in this area, and then on to logarithms. By creating a class flow that is linear and sequential, students are best set up for success, because everything is logical and supports their understanding.

8.4 Scholar's Analysis of Self-regulated Learning in the Secondary Mathematics Classroom

Considerable attention has been devoted to improving students' mathematics performance in the U.S. This attention is not without justification. According to the 2015 Nation's Report Card results, the mathematics performance of American fourth- and eighth-grade students has continued to be a concern because only a modest number of students perform at or above proficiency levels in mathematics. The 2015 National Assessment of Educational Progress (NAEP) data show that about 40% of fourth graders and 33% of eighth graders perform at or above proficiency levels in mathematics, and these percentages were a couple of points below the 2013 data. According to the pilot data gathered from 11 volunteering states (the Nation's Report Card, 2013), the mathematics performance of twelfth graders was even lower, with only 26% performing at or above proficiency level. In short, the evidence provided by NAEP shows that there is room for improving students' math performance in the U.S.

Research on students' self-regulated learning (SRL) has shown a strong and positive link with academic success (Cleary & Chen, 2009; Zimmerman & Schunk, 2011). A synergy has therefore emerged within education to improve students' mathematics performance through teachers' instruction and formative assessment (Wiliam, 2007), while introjecting support into mathematics lessons for self-regulated learning (SRL) skills such as planning, monitoring, and self-reflection (Chen & Rossi, 2013). Based on the social-cognitive framework, theorists have described *self-regulated learning* (SRL) as processes through which learners strategically and purposively manage and direct their behaviors, cognition, emotions, and environment to successfully attain personal goals (Zimmerman, 2000). Importantly, sophisticated learners exhibit heightened motivation and metacognitive awareness, and engage in iterative modifications of their learning and actions by using self-feedback and information from external feedback. This dynamic and continuous feedback mechanism is vital to any successful SRL process, as it signals to learners the potentially useful information acquired from one phase that they can use to adjust their plans and behavior during the next phases of the learning sequence (Zimmerman, 2013) (for more information on Zimmerman and Schunk's SRL model, see DiBenedetto, 2018/this volume).

Wiliam (2007) posited that mathematics teachers can engage in daily formative assessment as an ongoing way to instruct their students in mathematical concepts

and regulate students' learning processes. Effective mathematical instruction can assume various forms; however, it focuses on deepening students' understanding of mathematical content, on capturing students' knowledge gaps and ways of thinking about mathematics, and on encouraging students to take ownership of their own learning (i.e., SRL). Highly competent mathematical teachers have extensive content and curriculum knowledge of mathematics, and pedagogical content knowledge. They continuously keep track of students' learning progress and gaps in knowledge and skills; in other words, quality mathematical instruction entails effective assessment practices for student learning (Hill, Rowan, & Ball, 2005; Kilpatrick, Swafford, & Findell, 2001; Wiliam, 2007).

This chapter focuses on three class lessons that are tied to typical mathematical topics taught in most of the high schools in the U.S. According to the NAEP (2013) assessment framework, the focus of mathematics content in the twelfth grade is fourfold: (1) number properties and operations; (2) measurement and geometry; (3) data analysis, statistics, and probability; and (4) algebra. These four areas of mathematics contents are mostly tied to the typical 3-year course of study (the equivalent of 1 year of geometry and 2 years of algebra) taught in many high schools in the U.S. Particularly, we provide detailed lesson plans and teacher narratives of how their mathematics instruction and use of formative assessment practices not only elicit a conceptual change in their students' understanding of mathematics, but also infuse opportunities for students to practice their *self-regulated learning* (SRL) skills. Based on the courses typically taught in American high schools, we focus on three mathematics lessons: each in Algebra I, Algebra II, and Geometry. The analysis of these lessons will be following Zimmerman's three-phase SRL framework (*forethought, performance control, and self-reflection*). The last section of the chapter concludes with educational implications for mathematical instructions and future research on ways to promote students' mathematical understanding through embedding SRL in the classroom.

8.4.1 Analysis of Mathematical Instruction and Lessons

Forethought and Planning Phase: In both teachers' three lessons, there is plenty of evidence that they not only model SRL as teachers—they also provide opportunities for students to exhibit forethought and planning. According to prominent SRL researchers, examining the task at hand, planning what strategies to use, and setting goals are what highly self-regulated learners do before performing target tasks (Pintrich, 2000; Winnie, 2001; Zimmerman, 2000). The three math lessons demonstrate various qualities of teachers' forethought processes, and provide opportunities for their students to engage in forethought processes. For example, Mr. Burkett constructed a mathematical concept sheet for his Algebra I students before each unit, and modeled his forethought and planning behaviors and strategies. In addition, Mr. Burkett provided an orientation problem in his geometry class to elicit students' attention and prompt their thinking about the mathematical

concepts and strategies of the lesson. Likewise, Ms. Swingler provided her Algebra II students with a similar activity (i.e., Do Now) to focus their attention on the topic at hand and use it as a discussion point; this was a strategic move on her part. Similarly, Ms. Swingler used the "Aim" to show her students that the lesson was goal-directed and attainable in one lesson, which is an important component of the forethought phase of SRL.

One particular and unique opportunity afforded students to practice forethought is seen in the way that Mr. Burkett had his students make plans using a calendar to develop their own learning goals with a goal sheet, and decide which online learning module to view, and which mathematical concepts and skills to target. This activity provided students with self-regulation opportunities to set specific, realistic, and immediate goals (Zimmerman, Schunk, & DiBenedetto, 2015). In this Algebra I class, which was a "flipped classroom," students independently engaged in pre-learning through viewing free online lectures—an arrangement that afforded them greater autonomy and individual accountability for their learning. By giving the learning rein to students and having them experience high autonomy in classroom, these opportunities are essential to sustain student motivation and promote student self-regulation (Reeve, Ryan, Deci, & Jang, 2008). Both teachers' lessons showed good planning, with incremental complexity and opportunities to scaffold students' math and SRL learning. The lessons were goal-directed and included specific, discernible sub-goals throughout. For example, Ms. Swingler began her class with a task that engages students to review the materials or homework from the previous lesson, not only to check for their understanding and completion of homework assignment, but to ensure that they solidify their learning. Such mastery learning experiences may sustain or improve learners' self-efficacy beliefs, which impact positively on students' later performance (Schunk & DiBenedetto, 2014).

The contents of both teachers' lesson plans (e.g., learning objectives, aims, guides, materials, pre-lesson learnings, guided practices, and motivation), and their descriptions of their instructions, show great *forethought* in their preparations. Both Mr. Burkett and Ms. Swingler are self-regulated teachers who modeled self-regulated behaviors to their classes. Importantly, the teachers demonstrated, through their instructions, ways to build students' mathematical understanding and develop students' self-regulation. Both teachers demonstrated: (1) preparation for themselves and their students prior to the class meeting, (2) how to critically analyze math tasks and set goals, (3) how to think about the connections between current and prior learned materials, and (4) how to assess self-efficacy beliefs.

Performance Control/Implementation of Leaning Tasks Phase: In this phase of the self-regulated learning cycle, the math lessons prominently showed how both teachers modeled the use of mathematical language and ways to solve math problems. Further, the teachers clearly implemented mathematical problems of various difficulty levels and with different problem types. Both teachers notably linked their lesson to students' knowledge from prior lessons. The contiguity of developing students' mathematical understanding was evident in the descriptions of the lessons. During the *performance control* phase, Ms. Swingler prompted her class to "suggest ways to find the exponential equation." Following students'

suggestions, she made a sketch of the graph and asked students to identify its elements. When students shared their solutions to solving a problem in a group, the discussion provided them with opportunities to hear and learn alternative strategies from each other. Similar instructional practices were evident in Mr. Burkett's geometry lesson. He used math questions that have multiple correct solutions to elicit students' complex thinking and uses of strategies. Students' sharing of the methods they used to solve the problem makes the multiple solutions and methods explicit to the whole class and allows Mr. Burkett to monitor any misconceptions that need to be addressed.

Throughout Ms. Swingler's lesson on exponential equations, she used graphs and new methods of writing equations—then linked the lesson with what students had learned in eighth-grade algebra about systems of equations and solving by elimination. Using the method that was discussed in class to solve problems step by step, she had students test out the solution by graphing on calculators. In addition, Ms. Swinger demonstrated the scaffolding of learning processes in her lesson through the visual aid of the graphs on exponential growth and decay, which made provided a way to make cognitive process explicit to her students, refer to their prior knowledge, and provide them with additional examples to work through on their own. Her instruction was particularly purposeful, and conveyed strategies at each step—through modeling and scaffolding—that can promote student performance and learning.

To improve student performance and learning and self-regulation, Zimmerman and Labuhn (2012) indicated that strategy training should be provided for both content-specific and self-regulatory strategies. Mr. Burkett's class instruction showed his attempt to model math problem-solving strategies as well as self-regulation strategies for his students. First, Mr. Burkett (in his Algebra I class) provided a concepts sheet, with examples for each unit, to provide an organization of mathematical sub-concepts in the unit and unify these sub-concepts. He also provided an accompanying commentary to reinforce the connections among sub-concepts and to signal possible errors. He instituted independent work time, followed by a period of checking in with the teacher. During this *performance control* phase, his students used a calendar to help monitor their progress. This permits the teacher to check whether students need to be broken into smaller groups for additional instruction. Some students need less monitoring assistance from the teacher, so Mr. Burkett provided them with opportunities to derive self-direct learning goals for the unit. After students had had a chance to engage in solving tasks, Mr. Burkett did a quick check to monitor their progress and answer any questions they had. Mr. Burkett could then make further instructional decisions to break students into small groups and attend to the needs of each group, according to students' shared misconceptions. Throughout this instructional process, students self-recorded the subtopics that they had accomplished or a video clip of instruction that they had viewed. Active self-recording provides explicit evidence of students' performance outcome and learning progress, and enhances students' self-efficacy beliefs (Zimmerman & Kitsantas, 1999).

Mr. Burkett also utilized student peers to assist those who needed corrections of explanations of concepts. The instructional processes and differentiating feedback provided by Mr. Burkett align with the interactive nature of formative assessment principles (or assessment for student learning) that are particularly evident in current assessment literature, both in terms of promoting student self-assessment and peer assessment (Black, 2013). As Brown and Harris (2013) posited, student self-assessment in educational situations involves self-monitoring of learning processes and performance outcomes. In addition, student self-assessment involves learners in classroom assessment and promotes their achievement and self-regulation. Although self-assessment and peer-assessment processes seemed to occur during the self-reflection phase of SRL, Mr. Burkett's students were monitoring and assessing their learning processes and progresses. Thus, the intertwining nature of Zimmerman's SRL phases was evident in the lessons.

Self-reflection Phase: In this phase of the self-regulated learning cycle, learners engage in post-performance evaluation of the outcome. After Ms. Swingler's students had had individual time to solve a number of problems in her lesson on exponential equations, she gave them a way to self-evaluate their solutions by using graphing calculators to verify their answers. This step of verifying and self-evaluating solutions using other forms (i.e., a graphing calculator) is critical to promoting self-regulation and self-checking the accuracy of learning and uses of effective strategies. Any inconsistency of solutions that was observed might trigger students to modify their strategies or retrace steps of their problem solving and adjust their subsequent learning cycle. Ms. Swingler's lesson ended with a group discussion on what had been learned and the challenges presented in the lesson. She then provided a preview of the next lesson and how the topics her students had covered would be building blocks for the next lesson. This closing activity afforded students a way to verbally summarize their learning and thinking, and to ask for further clarification on the topics of the lesson—a process that provided them with opportunities to self-reflect on their learning and anticipate what the next class would bring.

Mr. Burkett also planned ending activities that promoted his students' self-reflection of their learning. In his Algebra I class, Mr. Burkett ended with a final and novel question to ensure that all students could demonstrate competence. Using such an activity provided both teacher and students with some evidence that learning and understanding the topic had been achieved, or the extent to which further instruction would be needed for some students the next day. A unique aspect of Mr. Burkett's lesson and overall practice is his daily review of student data to help him adapt his instructions to various groups of students for the next class. These reviews allowed him a closer look at students' performance and greater insight into students who may be struggling, so that timely additional instruction and learning could be afforded to the students who need it. In Mr. Burkett's geometry lesson, he also implemented a closing activity. Earlier in the lesson, students had worked in groups and presented various solutions to multiple problems. To reinforce student learning, each student wrote an explanation, in their own words, of their chosen solution to the problem. This process encourages students to

"pull together" their understanding and learning of the topics by reflecting on the various methods learned during the lessons and justifying which strategies were "best" in solving the problem. Mr. Burkett could then review each student's explanations to plan for the next class.

Even though both teachers' lessons included closing activities to evaluate student learning and teacher instruction, the purposes of these activities were primarily to plan further instruction. To encourage student self-reflection, the lessons included short self-evaluation tasks throughout the lessons and made the self-assessment process explicit.

8.5 Implications for Mathematical Instruction and Future Research

This chapter presents two high school mathematics teachers who have been teaching in urban schools for a number of years. Ms. Swingler and Mr. Burkett selected three topics from the content areas (Algebra I, Geometry, and Algebra II) to show how they devised lesson plans and supplemental materials, and provided a detailed narrative of each lesson. Although the three lessons are only snapshots of the teachers' instructional practices, one of the instructional implications is that both of them were able to provide opportunities to model mathematical thinking, strategy use, and self-regulation. As Kilpatrick, Swafford, & Findell, (2001) indicated, teaching for mathematics proficiency requires teachers to have the ability to analyze the task and its possibilities so that they can afford various learning opportunities to specific groups of students. They further pointed out that teachers' familiarity with students' learning trajectories and the complexity of mathematical ideas is a critical element in their promotion of students' movement along their learning progressions. This view of mathematical instruction is akin to what many assessment experts have been recommending as one of the main purposes of formative assessment (or assessment for learning) in the classroom, which is to close the learning gap of learners and move them along their learning paths (Heritage, 2010). Although Ms. Swingler and Mr. Burkett may have been preparing their lessons and exhibiting sound mathematical instructions, their narratives further showed that their lessons included opportunities for students to practice mathematical thinking and problem solving, and develop self-regulation. Importantly, both teachers use problem-based approach in their instruction which provides meaningful learning to students. In addition, both teachers provided effective mathematical instruction with focuses on formative assessment, which equals ample opportunities for students to develop self-regulation and close learning gaps.

From the narratives of the three lessons, it was evident that Mr. Burkett's and Ms. Swingler's instructional practices are different. Ms. Swingler's lesson has a certain structure, with much time focused on group instruction and activities, followed by individual work time. Mr. Burkett, on the other hand, provided more

individual work and instructional time than group instruction and discussion. I would consider Ms. Swingler's lesson as having a more "teacher-centered" framework, while Mr. Burkett's lessons have a more "student-centered" framework. However, both teachers' lessons were well planned, organized, thoughtful, and well executed. In addition, their lesson plans show that both teachers consider the design of their lessons in accordance with the Common Core State Standards, specifically for their topics and grade levels. Most important, as was evident from their instructional planning and practices, both Ms. Swingler and Mr. Burkett are self-regulated teachers and are knowledgeable about mathematical contents. Another implication derived from the two teachers' math lessons is that opportunities to model self-regulation and demonstrate SRL strategies can be interwoven with any math lesson, despite teachers' preferred instructional practices. At various points in both teachers' lessons, students were engaged in monitoring their learning, making connections to prior knowledge, carrying out mathematical strategies to solve the target problems, and reflecting on their own and their peers' methods and strategies of problem solving. In alignment with this theme, it would be important for future research on developing SRL in math lessons to study the quality of teacher feedback to learners with different achievement levels, and how learners use this information to guide their learning. Even though Mr. Burkett was explicit in including in his narratives the feedback that he provided to students, he focused on providing feedback at the task level (Hattie & Timperley, 2007), which is often the focus of teacher feedback. Effective feedback is critical to enhancing student self-regulation (Zimmerman, 2002) and narrowing student learning gaps (Heritage, 2010). Therefore, research on levels and complexity of teacher feedback should be conducted while instruction is ongoing. Importantly, research on feedback should examine the extent to which learners utilize teacher feedback, and how they use the feedback they receive.

This chapter presented two teachers' planning and practices of mathematical instruction in three lessons (Algebra I, Geometry, and Algebra II). They had a different instructional presence, but were equally knowledgeable in their contents. The lessons were designed to scaffold students in building their complexity of mathematical understandings, and to provide opportunities to promote their self-regulation. Most important, both teachers exhibited self-regulation and explicitly modeled their cognitive processes and behaviors in their instructions. Both teachers also utilized small-group and whole-class instructional activities to further their students' learning by discussing mathematics and their thinking behind mathematical understanding. It was evident that both the teachers and their students were not only working toward mathematical proficiency, but toward being self-regulated math learners.

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Part V
Foreign Language: Spanish (Two Lessons)

Chapter 9
Studying and Learning a New Language

Marie C. White, Miriam R. Vélez and Marie Angelica Jean-Pierre

Abstract Teaching and learning occur within a socio-cultural context of values, traditions, and relationships. World language teachers focus on the development of language learners as culturally proactive and self-regulated participants in the process of learning a new language. Modeling respect for the culture in which the language is embedded, encourages both novice and advanced learners to go beyond the learning of a dialect and enter into the global community of world language learners. The lesson plans and narrative are evidence of how acquiring a new language can be an interactive, engaging, and enjoyable high school learning experience.

Table 9.1 Why study and learn to communicate in a language other than english? Lesson

Teacher: Angelica Jean-Pierre, B.S ACSI Certified (Association of Christian Schools International)	**Grade Level(s)**: Beginner Level Grades 9/10
School: Valley Stream Christian Academy K-12	**Subject**: World Language/Spanish
City and State: Valley Stream, NY	
Instructional Plan Title: Why study and learn to communicate in a language other than English?	
World Language Learning Standards **1. Communication**: Communicate effectively in more than one language in order to function in a variety of situations and for multiple purposes **2. Cultures**: Interact with cultural competence and understanding	

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M. C. White (✉) · M. R. Vélez
Nyack College, Nyack, NY, USA
e-mail: Marie.White@nyack.edu

M. R. Vélez
e-mail: Miriam.Velez@nyack.edu

M. A. Jean-Pierre
Valley Stream Christian Academy, Valley Stream, NY, USA
e-mail: atimetowrite@gmail.com

M. K. DiBenedetto (ed.), *Connecting Self-regulated Learning and Performance with Instruction Across High School Content Areas*,
https://doi.org/10.1007/978-3-319-90928-8_9

Table 9.1 (continued)

Common Core State Standards: **ELA Common Core Anchor Standards** CCSS.ELA-LITERACY.SL.9-10.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively CCSS.ELA-LITERACY.SL.9-10.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest		
Learning Objectives: 1. Students' will benefit from learning a new language in a culturally appropriate manner through an increased emphasis on the value of context 2. Students will communicate their understanding of the value of context by creating an art form that depicts the characteristics of the cultural community in which the language is spoken		
Instructional and Learning Materials Needed: Group Design for Beginning Language Learners (see Table 9.2 at the end of the lesson plan), Model(s) of Language/Cultural Experience Map (see Fig. 9.1 at the end of the lesson plan), paper and pencils, art supplies for Learning Experience Map, Learning Experience Map Rubric (see Table 9.3 at the end of the lesson plan) drawing materials, computers and software, magazines, Self-Monitoring Plan (see Table 9.4 at the end of the lesson plan), Merit Award System (see Table 9.5 at the end of the lesson plan)		
Lesson Duration: One 45 min class period		
Teaching and Learning		
Min on this Activity	**Targeted activity**	**Purpose of activity**
5	**Orienting Students to Lesson**: • Upon entering the classroom, students are grouped according to the Group Design for Beginning Language Learners (see Table 9.2 at the end of the lesson plan) • *Stop! Think! Write!* Students are asked to write the response to the following question in their individual notebooks: Why learn Spanish?	• The purpose of the activity is to provide each student with time to transition into the learning environment and engage them in the lesson • The activity sets the framework for helping students examine their thoughts and feelings about learning a new language
5	**Motivation**: • Teacher models by sharing personal and professional reasons along with personal experiences for learning other languages and studying other cultures, then asks students to share their response in pair sharing. The following specific questions are posed by the teacher to generate class discussion: – Why is learning a new language important?	• The initial discussion questions promote participation and empower each student to state his or her opinion prior to beginning the course. The teacher chooses open-ended questions and models the significance of sharing strengths and weaknesses regarding language learning • Responses are used to evaluate initial thinking about the course and build community

(continued)

Table 9.1 (continued)

	– How did you get here? Why do you think you are here? – Do you want to learn Spanish? Why? Why not?	
10	**Whole Class Instruction**: • Several models of the Language/Cultural Experience Map are displayed (see Fig. 9.1 at the end of the lesson plan) • Guidelines are distributed to help students track progress along with an assessment rubric (see Table 9.3 at the end of the lesson plan) • Students are given the choice to use one of three mediums (Drawing, Collage, and Computer Drawing Tools) • The teacher asks students to use their responses and gather more information from their experiences and set short-term goals to create a personal map on how they arrived at this point in their language-learning journey. • Materials are in a place where they can be easily accessed once the students are ready to begin	Students are given choices regarding how they want to share their responses and as a result, begin to take ownership of the task. Choices regarding who to work with encourage selective help-seeking, environmental structuring, and time management. Students set goals for the task and share their plan with the teacher for the project
10	**Guided Practice/Providing Feedback**: • Students choose a venue and create an outline for their personal Language/Cultural Experience Maps while the teacher remains available to explain the process to learners who might not have understood the directions during whole class instruction • Students begin to work on their projects sorting through the information in their outlines and from their written statements • The teacher reminds students to monitor their performance by checking their current performance with their goals using the self-monitoring plan (see Table 9.4 at the end of the lesson plan). The teacher asks students to rate their self-efficacy now that they are engaged in the task	• Feedback from teacher to student and student to self is the focus of guided practice. The outline serves as a self-initiated guide for the project from which the students can set and monitor goal progress. As students work on their projects this time can be used to direct them to seek help from peers, the instructor, or other resources

(continued)

Table 9.1 (continued)

10	**Independent Practice**: • Students work independently or with a peer constructing the Language/Cultural Experience Map	• Although the teacher is available, students are encouraged to work independently or with a peer to complete the Language/Cultural Experience Map
Occurs throughout class period	**Evaluation of Learning and Assessments**: • Formative assessments include Stop! Think! Write! and The Merit Award System (MAS) (see Table 9.5 at the end of the lesson plan) • Students will assess self-efficacy to learn a new language at the beginning and ending of the task and in future class sessions	• Formative assessments and self-evaluations provide students with consistent feedback that leads to reflection and revision of goal choices and performance methods
5	**Closing Activities**: • Students choose how to share their Cultural/Language Learning Map with the teacher and peers	• Students are given an opportunity to share with peers their individual experiences

Specific Strategies used to Address Exceptional Students and/or Students for whom English is a Second Language:

- Classroom instruction is paced to accommodate leveled learning and group work. The Language/Cultural Experience Map task provides the opportunity to choose the method with which they are most comfortable, in the case of ELL's, visual representation is the best choice
- This task sets the tone for language learning through the three benchmarks of developing skills in a foreign language: novice, intermediate, and advanced, according to the World-Readiness Standards
- Personal copies of their Language Experience Maps are displayed and used to log progress for the duration of the course

Table 9.2 Group design for beginning language learners

Levels of language experience	Learner description
Novice (Level 1)	• 0% of the target language spoken at home • Surrounded by family members who were never exposed to the language by means of a Spanish environment or traveling abroad • From homogeneous cultural environment and are at an advantage in that they are learning a new language, rather than re-learning the language • Motivation and self-efficacy are key factors in learning the new language

(continued)

Table 9.2 (continued)

Levels of language experience	Learner description
Novice (Level 2)	• Has heard the language spoken briefly, in passing, on television or on radio, but was never intentionally exposed to it • Not intrigued by the language, and though student may be familiar with its form, may not see the need for acquiring the new language • Motivation and self-efficacy are key factors in learning the new language
Intermediate (Level 3)	• Spanish heritage and strong Spanish cultural background, grandparents of Spanish descent • Receptive to learning due to their belief that communication is important with family members and other contacts
Level 4	• Have acquired Spanish comprehension, but are limited by the spoken form of the language
Level 5	• Native-speaking and have received advanced instruction in the target language • Leaders within their groups and equipped with the cultural background that would enhance our cultural connections • Challenged to collaborate with peers, reinforcing their control of personal goals and language learning

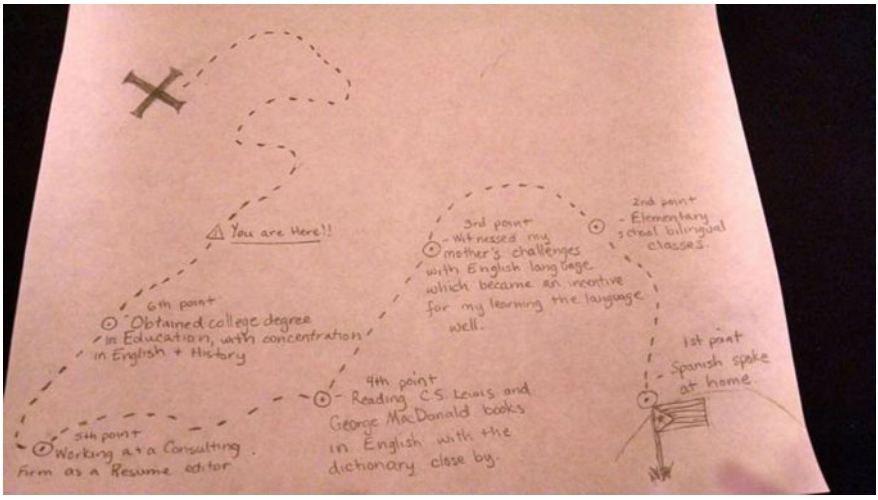

Fig. 9.1 Model of language/cultural experience map

Table 9.3 Language/cultural experience map rubric

Criteria	Excellent (4)	Good (3)	Fair (2)	Needs improvement (1)	Points/ Comments
Task completion	Superior completion of the task, content appropriate, visual map is well developed and well-organized	Completion of the task, content appropriate, map adequately developed	Partial completion of the task, content mostly appropriate, ideas are undeveloped	Minimal completion of the task, and/or content frequently inappropriate	
Comprehensibility	Map readily comprehensible, requiring no interpretation on the part of the reader	Map comprehensible, requiring minimal interpretation on the part of the reader	Text mostly comprehensible, requiring interpretation on the part of the reader	Map barely comprehensible	
Vocabulary	Rich use of vocabulary out-lined in map	Adequate and accurate use of vocabulary outlined in map	Somewhat inadequate and/or inaccurate use of vocabulary outlined in map	Inadequate and/or inaccurate use of vocabulary outlined in map	
Layout	Creatively enhances information, which supports readability	Balanced, uncluttered, and adequate white space	Somewhat balanced, uncluttered, and slightly detracts from readability	Not balanced, cluttered, insufficient white space, and detracts from readability	
Mechanics	Few or no errors in spelling, use of diacritical marks, punctuation and/or capitalization	Mostly accurate spelling, use of diacritical marks, punctuation and/or capitalization	Somewhat inaccurate spelling, use of diacritical marks, punctuation and/or capitalization	Inaccurate spelling, use of diacritical marks, punctuation and/or capitalization	
Points					
Grading scale		20–16	A	Total points	
		15–11	B	Possible points	
		10–6	C		
		5–	D	Grade	

Table 9.4 Self-monitoring plan

Student Name: _____ Date:_____

1. Stop! Think! Write!	Indicate your confidence level by circling a number between 1 (not confident at all) to 10 (very confident). 1 2 3 4 5 6 7 8 9 10
2. My plan for completing this task is…	What learning strategy will you use in completing today's task?
3. My confidence level for this task now that I am working on it is…	Indicate your confidence level by circling a number between 1 (not confident at all) to 10 (very confident). 1 2 3 4 5 6 7 8 9 10
4. I am working with a partner.	How are you monitoring your learning?
5. My confidence level now for the next time a task like this one is assigned…	Indicate your confidence level, at this time, by circling a number between 1 (not confident at all) to 10 (very confident). 1 2 3 4 5 6 7 8 9 10

Table 9.5 Merit award system

The Merit Award System is a system created to provide students with an incentive to participate in their language learning and serve as a formative assessment Students are awarded incentive points for, but not limited to, the following tasks: • Responding to a question in Spanish • Reading in Spanish • Translating vocabulary to Spanish • Participating and demonstrating effort to understand or respond in Spanish • Assisting peers to understand and communicate in the target language

9.1 Narrative of Why Study and Learn to Communicate in a Language Other Than English

The high school setting for this lesson is an urban, private school that offers beginning level Spanish courses to ninth grade students. Three years of Spanish are required for students who want to graduate with an Advanced Regents diploma. There are usually 25 students enrolled in this class per semester with one teacher. The classroom population reflects the school's diversity with approximately 45% Hispanic, 25% African-American, 20% Asian descent including international

students from China, and 10% Caucasian. Out of a class of 25 students, five students have individualized education plans, and three native Spanish-speaking students receive English Language Learning (ELL) instruction twice a week. In addition, three international students for whom Chinese is their first language receive ELL instruction three times a week (Table 9.1).

The Beginner Spanish classroom is strategically adorned with cultural artifacts and stimulating language learning resources. On display are authentic Guatemalan textiles, stem-changing verb posters, and a visual vocabulary wall. There are empty places for student work to be displayed such as the Language/Cultural Experience Map which is the first, and the most important, project of the school year. Through this task, beginning language learners establish individuality by mapping their experiences with new languages. Leveled groups have proven beneficial in creating an effective learning environment within my classrooms. For Beginner Spanish, the groups are leveled based on the criteria in Table 9.2. Due to class size and the diversity of the members, the groups are arranged according to exposure, motivation, and ability to communicate in Spanish.

The most important days of the school year for all students are the first days of school (Wong & Wong, 1991). In language learning, the initial experiences within a classroom are indicators of future success or failures. Self confidence is considered a significant factor in new language learning, and I consistently recite a "you can do it" mantra, knowing that once a strong sense of efficacy is developed (Oxford & Shearin, 1994), my students will become risk takers and enjoy the challenge of learning a new language. This lesson was developed knowing that students are individual learners who enter a learning environment from varying cultural backgrounds, perspectives, goals, desires, and values and long to share their language experiences. We are all at the same starting point in our initial exposure to the time, setting, course materials, and personal attributes of our classmates.

Students enter Beginner Spanish with prior experiences that might inspire or deter them from devoting the necessary time and energy to acquiring a new language. As students enter the classroom, their attention is immediately directed to the Smartboard with the daily routine of "¡Para! ¡Piensa! ¡Escribe!" (Stop! Think! Write!). The "Stop, Think, Write" is the equivalent to most teacher's Do Now question which either introduces the day's lesson or is used as a review of a lesson previously learned. In this case, it is the beginning of a well-planned sequence of tasks directed towards learning a new language. I account for the percentage of students with low self-efficacy who may have had past experiences that will negatively impact motivation by making the first task an opportunity to self-reflect and set new goals.

The overarching question of "Why Learn Spanish?" is expanded with sub questions during the motivation portion of the lesson. I give students choices for completing the written and timed task. They may either work on the task with a partner or work independently. Student collaboration provides an opportunity for peer mentoring and learning within and across the leveled groups. I encourage students to engage in sharing their written opinions about why anyone should learn Spanish or any foreign language during a time of "pair and share."

After students share their opinions with their elbow partners, we begin the whole class discussion with the following question: "Why is learning a new language important?" During the few minutes that follow, I model how to construct a verbal response by sharing my personal language experience with learning English. Students are reminded to jot down notes as I describe the circumstances that led to setting short-term goals, making a plan, and monitoring my progress as I carry out my plan; in other words, the strategies that resulted in my acquiring a refined articulation of a new and difficult language. I now ask students to focus on their language experiences that brought them to this time and place and why they are registered to take Spanish. Follow-up questions, such as "How did you get here?" and "Why do you think you are here?" are written on the board to prepare students to think about the elements required to create a Language/Cultural Experience Map (Fig. 9.1) that tracks the events that have exposed them to other languages and cultures. Experiences can be positive or negative helping students identify past experiences and self-evaluate their motivation to learn a new language. The objective is to have each student identify from within their own cultural and life experiences as a transition to having now embarked on a new and exciting language experience that is challenging but manageable. When viewed in the context of past language and cultural experiences, the present Spanish class becomes part of a journey rather than an isolated learning event. Students are asked to make note of their responses to be used in the map project.

Models of the project, including mine, are shared with the students. Guidelines with checkpoints and a rubric (Table 9.3) are distributed to help students design a plan from which they can set goals, self-monitor, and check their progress. I explain the Language/Cultural Experience Map is likened to a treasure map to activate prior knowledge of a visual image. Students are at the starting point and are asked to conceptualize how they arrived at this point using their prior language experiences.

By conceptualizing a visual representation, or a map, students indicate prior language experiences and include their self-confidence ratings for learning and acquiring the new language (Table 9.4). At this time, students are given a choice on how they would like to share their responses which may be in the form of drawing, collage, or virtual art programs. Technology to complete the assignment may be used by students who are interested in completing their map using Microsoft Office Visio or PowerPoint. Once the students are informed of the assignment, and the guidelines are made clear, I encourage students to make a plan and set short-term goals to complete the project. I remind them of the resources that are available to them to begin the project and remain close-by if help is needed. Students are also encouraged to seek assistance from each other if they want to discuss their ideas for the map and gather the materials or equipment needed to begin the project.

Students are given a time frame of 15 min to plan their maps and begin the project. Checking for understanding of directions, I move about the classroom to make sure that each student is using the guidelines, the template for the map, and understands the rubric. I remind them that the map should include reflection on specific experiences or thinking, clear writing with captions, neatness if drawn, as well as be creative and thoughtful. As they begin the task, I remain available to

respond to questions, clarify ideas, and provide guidance when requested. They are reminded to check their performance with their goals and again rate their self-confidence for learning a new language now that they are engaged in the task. A challenge the teacher will face with this lesson will be time management for both the teacher and students. The students are given three choices, drawing, making a collage and computer drawing and can become distracted by the availability of choices. Students are given a self-monitoring plan and the teacher assists them with constructing a plan within specific time constraints and outcome expectations to meet their self-set goals.

The opportunity to work independently or with a peer constructing the map allows me to withdraw support, but remain available if needed. The creative and personal nature of the project allows students to take charge of their learning experience and become proactive language learners for this and future tasks. The lesson is aligned with the selected the common core standards (see Table 9.1), Standard SL 9-10.1 is addressed by the Stop Think and Write activity and the whole class discussion that follows, and Standard SL 9-10.5 is addressed through the construction of the Cultural Experience Map task.

The map will be handed in the following class period and will be assessed using a measurement tool that pays close attention to details and the requirement to create a visually appealing display that is clear to anyone who reads it. This lesson is unlike any other lesson that I teach, since the primary objective for this lesson is to enable students to draw from their prior knowledge and motivate them towards the goal of learning a new language. When completed, the maps serve as motivational reminders displayed on the large bulletin board towards the front of the classroom. Throughout the year, students are able to add new language learning experiences to the map. Making note of their progress by keeping track of accomplished goals and met challenges often helps them acquire the motivation needed to form the foundation for learning a new language. During lessons on conjugating verbs, identifying cultural similarities/differences between Spanish countries and communities with our own, tackling grammar forms, and on the English language as the basis for learning Spanish, we refer to these motivational incentives from past accomplishments. Over the semester, the map provides information regarding goal progress and serves as a formative assessment.

During the closing portion of the lesson, I collect the maps. Students are provided with resources and apps to download to use outside of the classroom which assist them in becoming more familiar with their new language. Students are also encouraged to label items in their environment. They are introduced to The Merit Award System (Table 9.5) that is in place to encourage verbal expression in the target language. With each response, pronunciation, and effort shown, students will be given a point. These points are added-up and tallied at the end of each month for the earning of extra credit and culturally relevant prizes such as maraca pens, soccer balls, hacky-sack kick balls, and Guatemalan textiles among other small prizes (Table 9.6).

Students are also encouraged to use the language outside of the classroom by downloading the free language learning system, Duolingo (www.duolingo.com),

which enables me, as their teacher, to track students virtually and allows students to compete with each other and share one another's progress. Critical to learning a world language is the motivation for students to work independently to practice speaking and using the language outside the classroom. Similarly, students' efforts to make the connection to the cultural context are one area that requires consistent teacher intervention and encouragement.

Table 9.6 Classic to conversational vocabulary building lesson plan

Teacher: Mrs. Angelica Jean-Pierre, B.S ACSI Certified (Association of Christian Schools International)	**Grade Level(s)**: Advanced Level Grades 11/12 (Spanish Language and Literature)
School: Valley Stream Christian Academy K-12	**Subject**: World Language/Spanish
City and State: Valley Stream, NY	
Instructional Plan Title: Classic to Conversational Vocabulary Building	
World Language Standards (Interpretive Reading, Listening, Viewing) Connections: Reinforce Other Disciplines 3.1 Make cross-curricular connections Communities: Beyond School Setting 5.1 Analyze the features of target culture communities (e.g. geographical, historical, artistic, social, and/or political	
Common Core State Standards: **ELA Common Core Anchor Standards** CCSS.ELA-LITERACY.SL.11-12.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11-12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively CCSS.ELA-LITERACY.L.11-12.1 Demonstrate command of the conventions of standard grammar and usage when writing or speaking CCSS.ELA-LITERACY.W.11-12.9 Draw evidence from literary or informational texts to support analysis, reflection, and research	
Learning Objectives: 1. Students will provide evidence of a working knowledge of newly acquired vocabulary gathered from classical Spanish literature in a present written conversation about a specific topic 2. Students will effectively engage in class discussions about controversial cultural practices (such as arranged marriages) comparing and contrasting current events with historical literature	
Instructional and Learning Materials Needed: (Notebook for Writing Activities, *Classic Spanish stories and plays: The great works of Spanish literature for intermediate students* (Andrade, 2001), Display Board, Self-Monitoring Plan (see Table 9.4 at end of Lesson 9.1) Group Design for Advanced Language Learners (see Table 9.7 at the end of this lesson plan), Writing Assessment Rubric (see Table 9.8 at the end of this lesson plan) Merit Award System (see Table 9.5 at the end of Lesson 9.1)	
Lesson Duration: One 45 min period	
Teaching and Learning	

Min on this Activity	**Targeted Activity**	**Purpose of Activity**
5	**Orienting Students to Lesson**: • *Stop! Think! Write!* Upon entering the classroom students are given the choice to	• The activity serves as a catalyst to interest the students in today's lesson by engaging them in topic,

(continued)

Table 9.6 (continued)

	form pairs or work individually to respond to the following questions in English – "What is an arranged marriage?" – "Would you want to be part of such an arrangement?" • Students are asked to complete the Self-Monitoring Plan by rating self-efficacy (see Table 9.4)	which is relevant to teenagers in other cultures and will provoke their interest in reading the novel • It sets the framework for helping students examine their thoughts and feelings on learning about cultures, which are different from their own
10	**Motivation**: • Students are asked the following question to generate class discussion: "What are the advantages and disadvantages to an arranged marriage?"	• The question serves multiple purposes: – It generates interest in the plot of the reading material since it is directly related to the assigned reading of Scene II of El Cid Campeador (Andrade, 2001) – It allows the teacher to make connections to assigned readings and to assess how prepared each student is for class
15	**Whole Class Instruction**: • Students will be given key vocabulary words: *litigio, atrajo, odiar, celos, lisonjear*, to locate and extract during the read aloud of "Las Bodas" • Teacher will pronounce the Spanish vocabulary words aloud and use them in sentences • Students will take turns reading aloud "Las Bodas" from the novel • After the completion of the reading, teacher will pronounce each word again in Spanish • Students will be asked to prepare to write sentences using new vocabulary by setting goals to write simple and complex sentences during Guided Practice	• The teacher models self-monitoring for learning new vocabulary and then asks students to identify the new vocabulary word in text • Student collaboration is encouraged for planning, goal setting, and self-monitoring to serve as a catalyst for writing sentences during guided practice
10	**Guided Practice/Providing Feedback**: • Group Work: Three students per group according to assigned level (see Table 9.7 at the end of the lesson plan) • Students are asked to write sentences using new vocabulary words extracted from the reading paying close attention to the goals set during whole class instruction • Intermediate students will write simple-structured sentences consisting of subject, verbs in the present tense previously studied and practiced, and noun • Advanced students will form a complex sentence including conjugated form of verbs, and correct context cues	• The task provides students with the opportunity to self-monitor while using classical language in everyday expressions • This practice provides students with an opportunity to work with peers, increase self-efficacy for the task, and attempt a challenging task with self-set goals • By grouping students into levels the teacher recognizes that not all of the students are at the same level of proficiency with the new language and working together can provide assistance for novice learners

(continued)

Table 9.6 (continued)

Homework	**Independent Practice**: • Students incorporate newly acquired vocabulary in an opinion on Arranged Marriages, written in Spanish. On a scale of 1–10 students are asked to rate their self-efficacy to write the response in Spanish	• Provides students a specific task for utilizing and expanding on their knowledge of vocabulary in the target language with self-efficacy ratings
Occurs throughout class period	**Evaluation of Learning and Assessments**: • Assessment is a result of student's self-evaluation from teacher feedback. Students are assessed on whether they are able to extract new vocabulary and use it effectively verbally and in writing through formative assessments using rubrics specific to the task	• Formative assessments are acquired through responses to specific questions related to the reading. Rather than ask: "what is … attraction?" questions such as "what *attracts* El Cid and why? • Questions are designed to guide students to form their opinions while using new vocabulary in their responses. Self-evaluation is a form of self-assessment towards becoming an advanced language learner
5	**Closing Activity** • Students will be given explicit directions and guidance on how to research current practices on arranged marriages and other cultural norms presented in the literature	• Students work independently using learning strategies practiced in the classroom in other settings
Specific Strategies used to Address Exceptional Students non-native speakers of Spanish. • The Merit Award System is used for positive reinforcement of target language use inside the classroom • Duolingo.com Language Learning system is a competitive tracking system for language learners to increase proficiency in the target language • Leveled Learning Systems: Grouping is appropriate to partner novices with more advanced language learners		

Table 9.7 Group design for advanced language learners

Level	Learner description	Other factors
Novice (Level 1)	• Minimal exposure to the target language outside of the classroom and home setting • Adequate comprehension • Non-native (other first language) • In-school instruction only	Background Interest Motivation Learning style Prior knowledge
Intermediate (Level 2)	• Frequent exposure to the oral form of the target language within their home or community • Motivated to use the language at home and in community • Minimal verbal communication, with good comprehension	
Advanced (Level 3)	• Native language speaker • Goals include language refinement through peer-coaching groups	

Table 9.8 Writing assignment rubric

Criteria	Excellent (4)	Good (3)	Fair (2)	Needs improvement (1)	Points/ Comments
Task completion	Superior completion of the task, content appropriate, ideas well developed and well-organized	Completion of the task, content appropriate, ideas adequately developed	Partial completion of the task, content mostly appropriate, ideas are undeveloped	Minimal completion of the task, and/or content frequently inappropriate	
Comprehensibility	Text readily comprehensible, requiring no interpretation on the part of the reader	Text comprehensible, requiring minimal interpretation on the part of the reader	Text mostly comprehensible, requiring interpretation on the part of the reader	Text barely comprehensible	
Vocabulary	Rich use of vocabulary	Adequate and accurate use of vocabulary	Somewhat inadequate and/ or inaccurate use of vocabulary	Inadequate and/or inaccurate use of vocabulary	
Grammar	Control of basic language structures	Emerging control of basic language structures	Emerging use of basic language structures	Inadequate and/or inaccurate use of basic language structures	
Mechanics	Few or no errors in spelling, use of diacritical marks, punctuation and/or capitalization	Mostly accurate spelling, use of diacritical marks, punctuation and/or capitalization	Somewhat inaccurate spelling, use of diacritical marks, punctuation and/or capitalization	Inaccurate spelling, use of diacritical marks, punctuation and/or capitalization	
Points					
Grading scale		20–16	A	Total points	
		15–11	B	Possible points	20
		10–6	C		
		5–	D	Grade	%

9.2 Narrative of the Classic to Conversational Vocabulary Building Lesson

The high school setting for this lesson is an urban, private school offering advanced level courses to 11th and 12th grade students. The course incorporates Spanish literature which is required for students at the intermediate level of study who want to graduate with an Advanced Regents diploma. There are usually 12 students enrolled in this class per semester. The class population reflects the school's diversity which includes more than 50% Hispanic, 25% African-American, 10% Asian international students, and 15% Caucasian. Two students have individual education plans, and one native-speaking student is concurrently enrolled in English language learning classes.

Critical to their success in becoming proficient in a new language is that the students themselves read the works in their original form. In my experience, I have found that language learners find reading Spanish literature to be motivating if the text is interesting and relevant to their lives. When the text "speaks" into the lives of young people, you will find them eager to participate and independently continue reading on their own outside the classroom in the target language. They have found that the texts can speak to young people with a truly universal human voice (Bowen, 2016).

The Poema de Mio Cid, or Cantar de Mio Cid, is the oldest example of epic poetry in the Spanish Castilian vernacular, and it offers a glimpse of the culture of medieval Spain unlike other texts (Chaney, 2013). The language is medieval in nature and can be compared to what Old English would be for today's common English language. Spanish vocabulary relating to the classic literature is often unfamiliar to many students. Taking into account that my 11th grade students are embarking on their first ever school experience of reading classic literature for vocabulary acquisition, I chose the adapted version of the epic poem, El Cid (Andrade, 2001) written for intermediate Spanish students. In class, I refer to the epic poem as a "novella" to make a connection to a more familiar form of literature that tells a story. Each chapter introduces stages of El Cid Campeador's life that include both human and contemporary dilemmas, such as battles between good and evil, acts of chivalry, domestic violence, and arranged marriages. Throughout the reading of the novella, students are encouraged to extract the vocabulary from within the context of the novel and use the new vocabulary to form oral and written sentences, and eventually opinions, in conversational Spanish.

In all of my lessons, the learning objectives align with the standards and are discussed with the students prior to beginning the units. Connections to outcomes, including how they are specifically aligned with tasks, are reviewed prior to beginning each lesson. Students enter Advanced Spanish at different levels of language proficiency that require leveled learning and differentiated instruction. The upper level (native speaking) students are required to set more challenging goals than the intermediate and beginner level students. For the initial task, students are encouraged to work with a more competent peer; however, for the most part, students are seated

in a leveled-group setting consisting of three students as described above in Table 9.7. Levels are assigned from observations, formative assessments, and taking into consideration students' background/experiences, prior knowledge, learning styles, incentives/motivators, interests and aptitude for learning language.

As students enter the classroom, their attention is immediately directed to the Smartboard with the daily routine of "¡Para! ¡Piensa! ¡Escribe!" (Stop! Think! Write!). I give students a choice, either work on the task with a partner or work independently on a timed task. Student collaboration provides an opportunity for peer mentoring and learning within and across the leveled groups.

The Stop! Think! Write! task is aligned with the chapter reading assigned for homework. I pose questions that invite opinions rather than factual responses in order to engage all learners in the first activity. Students collaborate and write their responses in English in order to facilitate their thinking about the topic and reflect on their comprehension of the chapter not yet discussed. For this lesson, the questions link students' contemporary thinking to the cultural practice of arranged marriages which is the overarching theme of the chapter. The students write their responses in English and are then asked to rate their self-efficacy to write their responses in Spanish. Students rate themselves on a scale of 1–10 (Table 9.4) while I check their written responses before beginning the discussion part of the lesson.

A follow-up question "what are the advantages and disadvantages of an arranged marriage" is used as a motivator to engage students deeper into learning the vocabulary to understand the reading passages and to address and engage students struggling to translate the complex Spanish language. Though the questions have the potential of creating a debate, I frequently focus the students on the literature and the vocabulary that are related to the arranged marriages of El Cid's daughters. The discussion activates prior knowledge, provokes interest in the topic, and serves as a formative assessment of students' participation and preparation.

During whole class instruction, Students pay close attention while I pronounce and write five key vocabulary words: *litigio, atrajo, odiar, celos,* and *lisonjear* and use each one in a sentence. During this time, students are asked to echo the pronunciation and become familiar with the keywords that will later be extracted from the chapter. This is done to make sure students are paying attention.

As a class, we take turns reading aloud "Las Bodas" a chapter from the novella which describes the arranged marriages of El Cid's daughters. This reading strategy reduces stress as I read along with each one providing prompts and helpful hints. It is also a formative assessment; while they are reading aloud, I am noting their pronunciations and fluency. Prior to the reading, I strategically select the key vocabulary words making sure they are spaced throughout the chapter, and not clustered together. As students take turns reading short sections of the passage, I call attention to and again pronounce the key words and discuss the meaning of each one in context. This becomes an exciting practice as students begin to anticipate the citing of a keyword and volunteer to call attention to the word. During the read aloud, I show students how I maintain a record of new vocabulary with notations in my book to monitor my vocabulary development. I encourage students to monitor themselves using the same strategy and provide them with models.

Modeling continues as I demonstrate how to set goals and make a plan before beginning to write sentences using the newly acquired vocabulary words. Suggested goals for novices, intermediate, and advanced Spanish language learners are displayed on the board. As we transition to guided practice, students are asked to set goals to complete the writing task of constructing sentences using the new vocabulary words extracted from the reading.

During guided practice and when providing feedback, one of my objectives for the lesson is to encourage students to take control of their learning and use resources to acquire new vocabulary by using context cues within the reading. Assigning students to write conversational sentences about a cultural practice using classic Spanish vocabulary is a standards driven task related to analyzing the features of target cultural communities, demonstrating the conventions of standard grammar when writing, and drawing evidence from the texts to support reflection (WLS 5.1; CCSS:ELA-Literacy.L.11-12.8 & 9). In addition, students are directed to set goals according to their self-confidence to complete the sentence at the novice, intermediate, or advanced level.

This activity is used as a formative assessment and students are encouraged to use as much vocabulary and grammar as they have acquired throughout their years in Spanish. I make note of those who use the resources made available for use such as electronic Spanish/English dictionaries. In addition, I closely monitor student interactions specifically for exchanges between peers that include questions on the readings and sentence formation. Merit points can be earned for effort and help-seeking while constructing sentences. Effective group work requires a positive classroom community to be successful. The level learning system described in the lesson addresses this challenge. Completed sentences are the summative assessment with the criteria being the vocabulary is used in the correct context.

Our Spanish Literature course grades are earned through formative assessment of practices of reading and writing. Assessments are graded using a rubric. Spelling, diacritical marks, vocabulary within correct context, verb forms, and grammatical rules found in the target language are noted on the rubric (see Table 9.8).

After sentences are evaluated, students are asked to rate their self-efficacy for doing a homework assignment that requires them to create an opinion piece on arranged marriage using each of the vocabulary words from today's lesson. In addition, I set aside a time of self- reflection to allow learners to focus on their self-set goals and compare their performance noting areas of success and failure. I pose questions that require them to think about what they would do differently the next time the task is assigned and what changes they could make in the approach to the task. Students are assigned an expansion of the activity as homework that requires them to write an opinion piece in Spanish on arranged marriages.

Students are encouraged to verbally demonstrate comprehension through pronunciation and accurate responses in the target language (Spanish) in and out of the classroom. They are encouraged to research cultural norms of the target language and independently write a report that can be presented orally to the class. Assigning homework is important however, it is a challenge that requires motivation on the

part of the learner to independently complete further research into a topic in which students might not be interested.

9.3 Analysis of Self-regulated Learning in a World Language Classroom

Self-regulation of learning has become a topic of increasing interest to language educators (Collett, 2014). Helping language learners (L2) develop the strategies and capabilities to become self-regulated learners has been an integral part of the successful teaching practices of our teacher, Mrs. Maria Angelica Jean-Pierre. The Zimmerman, Bonner, and Kovach (1996) self-regulated learning academy model provides a description of the teacher's characteristics from which we can examine the attributes of the teacher's role in language learning. White and Bembenutty's (2014) self-regulated culturally proactive pedagogy encourages teachers to pay close attention to the interactive triadic reciprocality between the person (the teacher and students), the environment (classroom), and the behavior (actions of both the teacher and the student). In this model both the teacher and students share responsibility for engaging in a culturally proactive educational experiences where the teacher becomes an agent of change and provides the pedagogical framework from which both content and academic achievement can be realized in diverse settings.

Zimmerman's (2000, 2013) model of the cyclical phases of self-regulation helps to explain a dual process of culturally proactive pedagogy as demonstrated by our teacher, Mrs. Jean-Pierre (for more information on Zimmerman's model see DiBenedetto, 2018/this volume). Teachers can provide opportunities for their students to regulate their behaviors and beliefs using the three cyclical phases of forethought (i.e., processes that precede any effort to act), performance control (i.e., processes that occur during the learning efforts), and self-reflection (i.e., processes occurring after learning or performance). A cycle is complete when the self-reflection processes impact the forethought phase processes during future learning attempts (Zimmerman, 2000). An essential feature is a recursive feedback loop used to inform future planning.

Zimmerman's model includes a component of reflective practice (self-reflection) and a feedback loop (Zimmerman, 2013). Reflective practice has been related to the teacher's ability to engage in active, persistent analysis of her own beliefs and knowledge with the realization that the outcome can help shape those beliefs. Mrs. Jean-Pierre relies on information gained from students' self-efficacy ratings as they learn a new language. The feedback loop gives her the opportunity to use what has been learned through reflective practice to inform and improve future lesson planning and performance. Mrs. Jean Pierre's attitudes, attributes, and understanding influence how she interprets and diagnoses difficulties encountered by students in her classroom. Additionally, evaluations that come from her own

language learning experiences guide her towards solutions that can best be used to deal with individual learning differences in language learning. As a teacher of Spanish for the past six years, she recognizes that the challenges in maintaining the momentum of Spanish learning beyond high school to college (Pratt, 2010) can be resolved when the teacher and students engage in close interaction guided by the cyclical phases of Zimmerman's self-regulation model.

9.3.1 Teacher's Role in Self-regulated Learning

Agent of Change. Learning is shaped by factors within the academic environment through the personal agency (Bandura, 1986) of the teacher who introduces and reinforces what others experience. At the same time, learning is affected by students' own thoughts and self-beliefs in addition to their interpretation of the classroom context. The language teacher becomes agent of change by first examining the lens through which individual students assess their self-efficacy and motivation for learning a new language. Mrs. Jean-Pierre immediately engages students in the lesson by using a Stop! Think! Write! task in which she poses thought provoking open-ended questions that can be responded to in English. The responses to the questions provide her with insights into students' efficacy and motivation for the planned lesson.

Motivational. The role of the teacher is both social and academic, conveying the value of becoming academically self-regulative and the commitment required to achieve competency. This is especially relevant to language learning where many L2 students are extrinsically motivated to learn a world language to meet a graduation requirement rather than intrinsically motivated to communicate with their peers, community, and the larger social environment (Noels, Pelletier, Clement, & Vallerand, 2000; Noels, 2001). Mrs. Jean-Pierre's motivation to engage her students comes from her own journey in learning English as her second language to help her family gain social acceptance in the English speaking community. She shares her strategic approach to learning a new language while tapping into their interests, reviewing their self-efficacy ratings for each task, and letting them make some choices regarding task completion. The value Mrs. Jean-Pierre placed on prior exposure to language and culture is indicated by the first assignment. The Language/Cultural Experience Map encourages them to track prior learning and cultural experiences and recognizes the experiences as important to the language learning process.

Intentional. World language teachers, such as Mrs. Jean-Pierre, are intentional in guiding their students to view learning a new language through a global lens of culture and community. They also emphasize the metacognitive benefits of comprehensive self-regulatory training needed to succeed beyond the high school years. These instructors desire to assist their students to self-observe and self-evaluate their effectiveness, set goals and use learning strategies, self-monitor changes, and adjust their strategic methods. As a result, in addition to the enhancement of

student's learning, the design of the self-regulatory process heightens perceptions of self-efficacy and their control over the learning process (Zimmerman, Bonner, & Kovach, 1996). In this way, the world language teacher recognizes the human need for L2 students to feel agentic, not pressured by external forces, but equipped with a feeling of competence which motivates them to seek challenges and monitor the learning process (Noels, 2001). The teacher models self-regulated learning strategies as a means towards independent learning that can be sustained through management of one's personal, behavioral, and environmental influences (Bandura, 1986).

Reciprocity. From Bandura's social cognitive theory, we know that within a social context, there is a reciprocity of influences in which the person influences the behavior and the environment while the environment and the behavior influence each other and the person. In this context, the behavior of the teacher, the instructional context, and the curriculum can facilitate learning in which individual accomplishments are monitored and assessed formatively (Bandura & Schunk, 1981). A Merit Award System created by Mrs. Jean-Pierre helps to raise individual student's awareness regarding how his or her own behavior and personal and environmental factors impact his or her achievement. The awarding of merit points is an incentive for students to stay on task, practice the language, assist a peer with the language and improve their own performance.

9.3.2 A Dual Process Teaching Model: Culturally Proactive

Dual Process. Based on Zimmerman's (2000, 2013) self-regulation model, White and Bembenutty (2014) construe learning and teaching as a cyclical process of three phases in which both teachers and learners begin planning, implementing, assessing, and reflecting on outcomes of instruction and learning. In White and Bembenutty (2014, 2016), all instruction and learning encompasses a triadic reciprocality between the person (the teacher and students), the environment (classroom), and the behavior (actions of both the teacher and the student) (Bandura, 1997). Both the teacher and the students are responsible in a dual process of engaging in a culturally proactive learning experience in a language-based classroom setting. In White and Bembenutty's culturally proactive pedagogy the students and the teachers consider the interactions of personal, environmental, and behavioral factors on their perceptions of cultural and communication differences. As demonstrated through Mrs. Jean-Pierre's both teachers and students individually and together construct their thoughts and actions specific to tasks that facilitate the engagement of all learners in and beyond the boundaries of the classroom setting. Table 9.9 depicts how culturally proactive teachers and students engage in language learning in a standards-based learning environment.

Table 9.9 Phases of self-regulated learning: role of teacher and student

Lesson plan example	Teacher	Student
Phase 1: forethought (*planning*)		
• Stop! Think! Write! Students are given the choice to work individually or with a partner. Self-efficacy ratings are how the teacher evaluates motivation	• Guides goal setting to encourage students to identify appropriate strategies, examine self-efficacy beliefs, and take charge of their learning for a specific task	• Prior to strategy choice, examines self-efficacy beliefs and then choose a strategy that it the best fits with cultural experiences
• Stop! Think! Write! If the task is too challenging the student can work with a peer and use resources to complete the task successfully	• Provides opportunities for learners to exercise personal agency through beliefs in efficacy for engaging in the task successfully	• Attributes task performance to specific aspects of personal agency and self-efficacy beliefs
• Whole Class Instruction: Propose a plan to write sentences (Intermediate)	• Plans specific activities giving learner control over the process	• Proposes a plan to complete a specific task taking control over the topic and strategy choice, asking for help when needed
• Motivation: Open-ended questions lead to discussions about the upcoming task and level of difficulty	• Shows enthusiasm with the process and expected outcomes	• Shares positive and negative feelings about the process and predicted outcomes
• Teacher's Story and Language/Cultural Learning Map	• Draws from prior experiences to inform planning	• Draws from prior experience to inform task choice and planning
• Motivation: Ed Cid discussion on arranged marriages (Intermediate)	• Relates task to socially relevant topics, issues, and experiences	• Comments on the relevance of proposed topics, issues, and experiences from own perspective
• Motivation: Work with peer or alone to complete task	• Pays close attention-giving choices to increase and sustain motivation	• Pays close attention to choices offered and provide addition information that can increase and sustain motivation from own perspective
• Stop! Think! Now! & Motivation; Makes connections to reading or life experiences (Beginner and Intermediate)	• Models strategies, how teacher makes choices, and sustains motivation	• Peers model how choices are made from own perspective and motivation to work on task
Phase 2: Performance (*Doing*)		
• Guided Practice and Independent Practice	• Engages students in completing the task independently, asking for help (in the form of a hint)	• Works independently or with peers asking for help when needed from

(continued)

Table 9.9 (continued)

Lesson plan example	Teacher	Student
	when needed to move forward to complete the task successfully	appropriate and well-chosen sources
• Guided Practice: Reminds students to check performance using guidelines (Beginner)	• Follows the plan, using goals to move the process along	• Focuses on the plan, use goals as checkpoints to remain on task
• Whole Class Instruction: Map and Sentences require real-life experiences as a resource (Beginner and Intermediate)	• Reminds students to use real life experiences	• Integrates real life experiences into task-related research and discussion
• Whole Class Instruction: Arranged Marriage Sentences (Intermediate)	• Includes specific information to connect to current socially relevant topic	• Knows credible sources that can be used to support more than one perspective on the topic
• Checklist for Language/ Cultural Learning Map (Beginner)	• Finds evidence of progress monitoring by using a checklist for attaining goals	• Self-monitors by checking off goal progress using a checklist
• Guided Practice: Beginner and Intermediate.	• Provides feedback and seeks help from a more able peer or appropriate resource	• Uses feedback and assistance to enhance learning outcomes while completing the task
• Guided Practice: Beginner and Intermediate	• Makes adjustments if plan is not working	• Stops and evaluates progress, checking for satisfaction with the plan and the outcomes before completing the task
• Guided Practice: Beginner and Intermediate	• Displays sensitivity to challenges and obstacles to task completion	• Increases self-awareness while addressing specific topics, when challenged seek help from an appropriate resource
• ALL	• Encourages challenge and praise	• Encourages and challenges peers, and teacher, to maintain a culturally proactive perspective
Phase 3: Self-Reflection (*Self-evaluation and Self-satisfaction*)		
• Independent Practice for both lessons includes time to reflect on the task and chosen strategies	• Incorporates feedback into self-reflections attributing success and failure to choices made in planning and performance	• Attributes successes and failures to choices made, check with peers to share self-evaluations
• Independent Practice for both lessons includes less oversight from teacher. Intermediate students write	• Guides learners to carefully self-evaluate for future tasks and what can be done to improve future task	• Looks forward, using information gained from the completed task to improve

(continued)

Table 9.9 (continued)

Lesson plan example	Teacher	Student
sentences using available resources. Beginners will add future language experience to their map	performance while letting responses be learner initiated and teacher guided	performance on the next task
• Beginner and Intermediate learners are asked to draw from life experiences to make tasks relevant. Map and Arranged Marriage sentences are life experience based	• Helps learner to evaluate the role of real life experiences and prior knowledge in successful completion of the task	• Draws from real life experiences to have vignettes readily available for specific tasks
• Closing is the time for both Beginner and Intermediate level students to reflect on their performance and discuss what would be done differently going forward	• Resets goals, begins again with a new task, a new opportunity to self-regulate	• Remains focused on what worked, and what did not work, deciding what will be done in future tasks, similarly or differently

White and Bembenutty (2014)

The dual process requires both learners and teachers to acknowledge their individual differences in how they learn. Advancements in the educational research examine not only what students learn, but also how individual students use strategies, monitor emerging understanding, and make plans during learning (Moos & Ringdal, 2012). Mrs. Jean-Pierre models how to use self-monitoring strategies to evaluate growth and development while learning a new language while sharing her own language learning experience. She describes how she would underline, highlight, and create lists of unfamiliar words from challenging literary texts by well-known English authors such as C. S. Lewis or George MacDonald. For feedback and self-evaluation, she would ask her friends to correct mispronunciations of newly acquired words when used in conversation. As a teacher, Mrs. Jean-Pierre knows that she can best support her student's self-regulated learning (SRL) by acquiring self-regulatory skills in her own learning and being able to model and teach these skills in her classrooms (Dembo, 2001).

Mentoring. The framework for a culturally proactive pedagogy is consistent with a mentorship model designed to engage the teacher and learner in self-regulation (White, 2011). Our teacher sees herself as more of a mentor than a language instructor. In a mentoring relationship, the mentor fosters a reciprocal learning relationship that is characterized by trust, respect, and commitment. In addition, as a mentor she promotes self-regulated learning and performance by enabling the language learner to become independent and self-directed during the process. The learner is not a passive observer but rather an active participant whose prior learning experiences, other significant relationships, expectations, and values influence what is learned and not learned. Most learning and behavioral changes

can be expected to occur from observing the mentor's example (DiBenedetto & White, 2013). Mrs. Jean-Pierre recognizes how critical identifying with the mentor/model is to adopting the model's behaviors (Bandura, 1997). For this reason, she engages on a personal and professional level with her students by sharing personal stories of learning achievements and failures, her interest in their success, and her strong commitment to providing a safe place for them to learn a new language.

9.3.3 *Learning in a Socio-cultural Context*

A self-regulated culturally proactive approach emphasizes the role of the teacher as intentionally modeling and training all students in the class to evaluate their self-efficacy for L2 learning through reciprocal determinism. Mrs. Jean-Pierre models language learning behaviors that encourage her students to become proactive participants in reshaping the classroom learning experience and self-direct their development as successful learners. Schunk (1999) depicted social influences of cultural awareness, achievement outcomes, and self-influences in reciprocal interaction with each other. The actions of the teacher fall into the area of social influences through modeling, instruction, and feedback.

White and Bembenutty's (2014) culturally proactive pedagogy places responsibility on both teacher and student to interpret the way their personal, environmental, and behavioral variables influence their cultural lens and motivation to acquire the necessary skills to communicate in a new language. In this approach, the teacher and the student are both empowered with self-regulatory skills that they use cyclically until learning goals and objectives are reached. This proactive approach involves both students and teachers in self-regulation as a method by which they control their thoughts and actions specific to embracing the challenges that accompany learning a new language.

9.3.4 *Implications for Instructional Practice and Future Research*

Implications for instructional practice and future research are an important part of this chapter since self-regulation remains a relative newcomer to the field of learning a new language (Chamot, 2014; Collett, 2014). Studying a new language has moved beyond meeting graduation requirements to preparing future generations to live and work in a complex society. In order for young adults to become literate or educated citizens, they will be required to be proficient in a language other than English and have a working knowledge of its cultural context (Klee & Barnes-Karol, 2006; Spinelli & Dolce, 2007; Spinelli, 1985). Most students who have studied language in high school enter college qualifying only for the novice

level of a language already studied. The current assessment of being language-ready to compete in a global economy calls for new approaches to the teaching and learning of world languages; specifically, the recognition of self-regulation learning strategies as significant factors in obtaining proficiency (Chamot, 2014).

Importance of Self-Regulation in Learning New Languages. Teachers who are self-regulated will find themselves sharing their self-regulated learning strategies vicariously. Effective models, instructional strategies, and feedback are environmental factors that can influence a student's personal factors such as goals and sense of self-efficacy for a specific task. All of these elements encourage the behaviors that can lead to achievement, sustained motivation, and learning which in turn reciprocally impact personal factors. The expertise of the world language teacher presents differently than in other subjects. She is usually the only one in the classroom who actually speaks the language fluently. She has the depth of knowledge and efficacy to switch between two or more languages, and for that reason, there is the potential of a great divide between the expert and the novice. However, self-regulated learning strategies can level the playing field. Allowing students to work with a partner removes the feelings of anxiety that often accompanies new language learning (Pratt, 2010). Helping students set goals and self-monitor provides opportunities for the teacher to maintain a connection with the student and use formative assessment as a means towards increasing self-efficacy for novice language learners.

Importance of Formative Feedback and Self-Efficacy. Feedback aligned with proximal goals can provide information from which students can track their goal attainment and increase self-efficacy. It also allows for the teacher to help students reflect on their performance, determine strengths and weaknesses, and discuss changes that can be made to improve performance. Principles of good feedback can be incorporated into lesson planning and can strengthen students' capacity to self-regulate their performance. Included in good feedback practices are formative assessments that (1) help to clarify goals and expected outcomes, (2) facilitate self-assessment, (3) inform students about their learning clearly and with specific recommendations, (4) encourage teacher and peer dialogue around learning, (5) provide motivational incentives and self-efficacy evaluations, (6) connect with opportunities to close the gap between current and desired outcomes, and (7) are useful to teachers to shape lesson planning and instruction. Further research on formative assessment strategies as applied to new language learning should be conducted to provide assessment tools that measure the important role of the feedback loop in cyclical learning segments (Nicol & Macfarlane-Dick, 2006).

Importance of a Culturally Proactive Pedagogy. Being culturally proactive requires both the teacher and the learner to engage in self-regulation. Culturally proactive teachers look for opportunities to create situations in which both the teacher and the learner share in a dual process of teaching and learning. They track and account for the interactive relationship between environmental, personal, and behavioral factors during the learning process. Teacher beliefs and modeling of

self-regulatory strategies can significantly improve how both students and teachers self-regulate as a means towards creating culturally proactive L2 learning experiences. In the context of new language learning, teacher and students are required to be proactive agents of cultural awareness engaged in constructing a learning environment where the individual is validated and cultures are celebrated.

Future Research. There is a need for researchers to focus on investigating the connection between learning new languages in the academic setting and self-regulated learning. We are experiencing a wake-up call in regards to the need for our students to actively engage in learning a new language other than English. Students often enroll in high school world language courses with low levels of self-efficacy to actually learn how to speak and write the new language. In addition, as the language learning becomes more complex, motivation lessens, and students often give up on learning the language and focus only on passing the course. Our teacher turned her classroom into a language-rich cultural center where students are also trained in specific strategies to learn the new language. Studies that investigate how cyclical phases of academic self-regulation influence new language learning at the high school level could align specific strategies with language learning success.

9.4 Conclusion

In order for all students to be prepared to succeed in a 21st century global economy and society, all students must be proficient in multiple languages. Other growing economic areas such as Latin America, Asia, and the Middle East have made it very clear that although English is considered to be an important language, it is not the only world language (Heining-Boynton & Redmond, 2013). National statistics report that eight out of 10 Americans speak only English which places them in a severe disadvantage in terms of being prepared to become serious contenders in a global economy and society (Pratt, 2010). Therefore, the importance of finding ways for our students to acquire a minimum of one second language prior to leaving high school should be the highest priority of all educators not just world language teachers.

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Part VI
The Arts: Art and Music (Four Lessons)

Chapter 10
The Art of Self-regulated Learning: Teaching the Visual Arts

Maria K. DiBenedetto and Martha A. Garrett

Abstract Secondary visual arts students are faced with many challenges in learning how to be creative and innovative while being self-directed, self-reflective, and genuine. While there is extensive research on how self-regulation skills can promote independent learning in various academic content areas, there is little on how self-regulated learning can promote creativity in the visual arts. The current chapter presents two visual arts lessons (photography and a collaborative drawing exercise) and discusses the nature of creativity and how students engage in the three cyclical phases and the psychological dimensions of self-regulated learning. The analysis presented describes how Rhodes's theory of creativity and Bandura's social cognitive theory lay the foundation for art instruction using a self-regulated learning framework, and concludes with recommendations for future research.

Table 10.1 Fictional self-portrait: photography and digital imagery lesson plan

Teacher: Martha A. Garrett, BSA, MFA (License Area: Art K-12)	**Grade Level(s)**: 11–12
School: Bishop McGuinness Catholic High School	**Subject**: Photography
City and State: Kernersville, NC	
Instructional Plan Title: Fictional Self Portrait: Photography and Digital Imagery	
National Core Arts Standards: Anchor Standard 1. Generate and conceptualize artistic ideas and work Anchor Standard 8. Interpret intent and meaning in artistic work Anchor Standard 10. Synthesize and relate knowledge and personal experiences to make art Anchor Standard 11. Relate artistic ideas and works with societal, cultural and historical context to deepen understanding	

(continued)

M. K. DiBenedetto (✉) · M. A. Garrett
Bishop McGuinness Catholic High School, 1725 NC Highway 66 S, Kernersville, NC 27284, USA
e-mail: mkdibenedetto@gmail.com

M. A. Garrett
e-mail: mgarrett@bmhs.us

M. K. DiBenedetto (ed.), *Connecting Self-regulated Learning and Performance with Instruction Across High School Content Areas*,
https://doi.org/10.1007/978-3-319-90928-8_10

Table 10.1 (continued)

Learning Objectives:
1. Students will differentiate between the aesthetics of the "selfie" and that of self-portraiture in art
2. Students will consider alternative representations of themselves in a written proposal and final photograph

Instructional and Learning Materials Needed: Cell phone for opening exercise (can be shared if not all students have a cell phone). Reference material for self-portraiture in art history including the work of Rembrandt and Cindy Sherman. A sample of a poorly done fictional self-portrait, the "homeless girl" (see Fig. 10.1 at end of the lesson plan.) This class is held in the graphics lab: a room consisting of a large conference table surrounded by computers and desks around the perimeter of the room

Unit Duration: 2–3 weeks **Introductory lesson**: 46 min

Teaching and Learning

Min on this Activity	Targeted Activity	Purpose of Activity
5	**Orienting Students to Lesson**: • When students arrive, they are told to take out their cell phones and take 2–3 "selfies"	• This activity helps set the stage for learning about the difference between the typical teenage "selfie" and the tradition of self-portraiture
10	**Motivation**: • Students share their selfies with each other and the class • Once seated at the conference table the topic of self-portraiture is introduced first with the "selfie" exercise and followed up with examples of other types of self-portraits • Teenagers are often unaware of the long tradition of self-portraiture and the diversity found within the genre	• By appealing to the young artist's natural "vanity" and desire for self-expression the fictional self-portrait project always generates a lot of interest—both from those creating the work and those viewing it later • The initial exercise and subsequent examples from art history help the students clarify their thinking around what type of message they wish to convey in their own work
10	**Whole Class Instruction**: • The teacher elaborates on the self-portrait by providing examples of artists' work, in particular Cindy Sherman's self-portraits • Students break away from the table to do quick research online from a list provided of artists who create inventive and evocative self-portraits • Examples of past students' work are shared and teacher asks students to analyze the pictures; she then shows them a picture taken by a student in a previous year of a homeless girl who looks clean, is wearing eye makeup, and has manicured nails. Students are challenged to identify what is wrong with this picture (The girl	• The class discusses how self-portraits may be used to convey many different messages. Cindy Sherman's work is not ego driven as the typical selfies are; rather they convey psychological depth • Research into self-portraiture creates an understanding of the place of the genre in history • Students learn to identify the feelings and meanings a self-portrait is conveying; through class discussion they realize that looking beyond the subject is critical when creating a self-portrait of their own

(continued)

Table 10.1 (continued)

	does not match the appearance of a homeless girl.)	
20	**Guided Practice/Providing Feedback**: • After the "selfie" and research of examples of professional and student artists, students work in pairs to create quick expressive portraits within the school walls to capture something unique about their subject • Students try to convey an emotional quality (mood, attitude, personality) in their photographs and take pictures of themselves as well as each other • Teacher and students provide feedback using the examples from online and book resources which are available in the classroom	• Looking at and discussing the work of other artists and students helps the students focus their attention on ideas. By having confidence in the technical part of the assignment the student is afforded more freedom to focus on the creative part of the project • This project is primarily an individual assignment although practice with a classmate is important for some aspects of the project as it progresses • Self-portraiture is done by the artist of the artist. Some practice with classmates helps students bounce ideas off of peers
(Ongoing until completion of project)	**Independent Practice**: • This lesson requires that the student ask a lot of questions of themselves to figure out what message they wish to convey in their portraits • Students are asked to begin a draft of a written proposal of what they hope to convey in their portrait • Independent work is monitored by circulating through the classroom	• The purpose of asking questions of themselves is to move beyond their first response to the assignment which is usually somewhat cliché • All independent work needs supervision to make sure the students are on track and understand the assignment
(Ongoing until completion of project)	**Evaluation of Learning and Assessments**: • All work is evaluated by peers and the teacher on an ongoing basis until the completion of the self-portrait • By the time the Fictional Self Portrait assignment is introduced the photography students should be familiar with the technical and aesthetic problems unique to photography. They demonstrate mastery through lighting, setting, composition and creative thinking • Learning is monitored through discussion and questions asked. The whole lesson spans a few weeks and some of the photography must be done at home or in a setting outside school	• Grading of the smaller preliminary assignments gives concrete feedback to the student and students respond well to peer feedback • Assessment is progressive to guide the students through the many steps of the project • Preliminary work like research, critique and eventual thumbnails are included in the grade for the finished project
1 min wrap-up	**Closing Activities**:	• The follow up assignment is one that uses a different skill set but

(continued)

Table 10.1 (continued)

	• Students who are unable to complete their proposal by the end of the class period are assigned to complete it for homework • As previously indicated, this is an ongoing project that spans over several weeks. The teacher encourages students to consider three ideas for their portraits as part of the self-exploration process • The Fictional Self Portraits are hung in the halls in the spring quarter. It is one of the displays by art students that attracts the most attention and discussion amongst the student body (See Fig. 10.2 at the end of the lesson plan for samples of finished self-portraits.)	encourages a similar type of self-expression • The Fictional Self Portraits often receive a lot of positive feedback from students and faculty outside the art department

Specific Strategies used to Address Exceptional Students and/or Students for whom English is a Second Language:

- This lesson can be extended for the exceptional learner with a second self-portrait project where the student researches and chooses a famous work of art to put themselves into using Photoshop
- Should students need help with focusing their time in class, a daily work plan is implemented with a short written log turned in every class period
- Each student approaches the art assignment with unique skills, technical ability and creative thought processes
- Exceptional students and those whose second language is English are encouraged to approach the lesson on the same ground as the rest of the class
- Visual learning is emphasized as it communicates best with diverse groups

Fig. 10.1 Self-portrait of a homeless girl

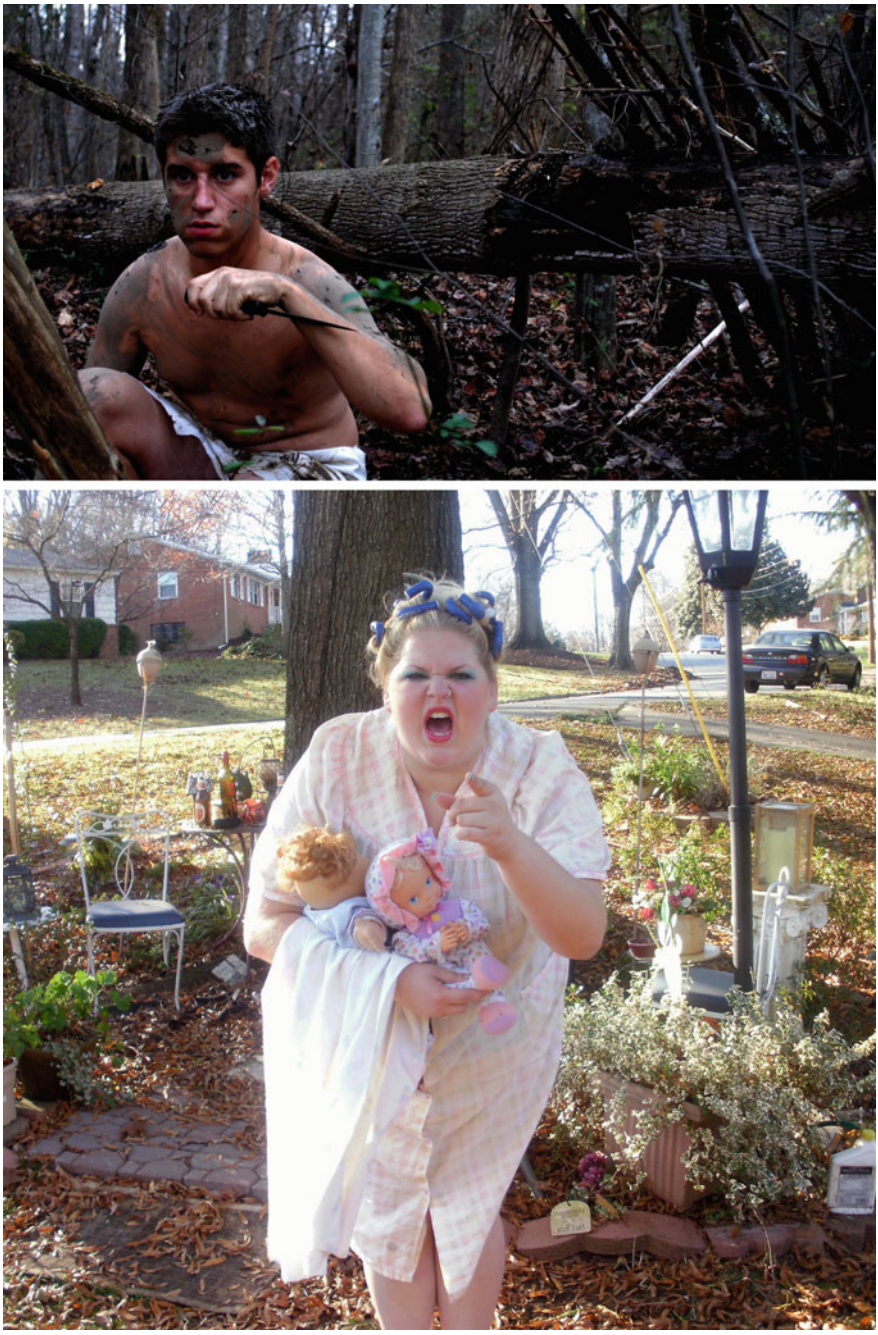

Fig. 10.2 Two examples of students' final fictional self-portraits

10.1 Narrative of the Fictional Self-portrait: Photography and Digital Imagery Lesson

Bishop McGuinness is a small Catholic school with a population that hovers around 500 students. The students at Bishop are highly motivated and many are academically gifted. The school is not particularly diverse and has a small population of minority students—primarily Chinese, Hispanic and African American. For the most part, the student body as a whole creates a supportive community and the culture of the school is one of caring that fosters Christian values.

The art program at Bishop McGuinness serves somewhere between 95 and 140 students each year. The offerings include: Art I, Art II, Honors Art III, Honors Art IV, Photography, Pottery, AP Studio Art and AP Art History. Graphic Design and painting are offered when there is enough faculty to teach them. Students in art are required to read and research art history and current trends in art in all studio classes although these classes are primarily focused on art production.

Photography is one of the more popular art classes at Bishop because the medium is familiar to a large number of students and many of them wish to improve their skills. For this reason, there are no prerequisites for the class for juniors and seniors although students who have had prior art classes get placed into the class first. The class focuses on being an artist who composes through a lens. Emphasis on composition, conveying an evocative message, and photo editing are the crux of the class. Students often come to photography thinking that a good photo is one that is in focus and captures a moment they wish to remember. The charge of the instructor is to push them into seeing like an artist and caring about framing, lighting, exposure, color balance, emphasis, leading lines, use of the "rule of thirds" and providing the viewer with an image that will make them think or feel.

The Fictional Self Portrait assignment is one of the more challenging and rewarding assignments given in Photography and Digital Imagery at Bishop McGuinness. The assignment gives the student a unique way to express an alternate image of themselves which addresses the anchor standard of synthesizing and relating knowledge and personal experiences to make art (National Core Arts Standards, 2014). Often the assignment becomes one where the student is able to explore a part of their personality that is just below the surface or sometimes the complete opposite of what they convey to the world. One of the successes of the assignment is the fun and sense of freedom the students experience in creating a new version of themselves. The challenge of the assignment for the instructor is helping students realize what is cliché and guiding them toward making unique portrayals of themselves. The students are often challenged with the time allotted for the assignment even though the assignment spans as much as five weeks including the Christmas break (see Fig. 10.2 for two examples of the final product). What follows is a summary of the first class where the Fictional Self Portrait is introduced.

We use the graphics classroom for the photography class. It has a large conference table with chairs around it and desks with computers around the perimeter of the room. In this class, I have between 12 and 15 students. I orient the students to

the topic of self-portraiture with the cell phone "selfie" by telling them to take a few quick selfies. This helps them begin to generate and conceptualize artistic ideas and work (National Core Arts Standards, 2014, Anchor Standard 1). This is a quick ice breaker that gets the students up and moving around, laughing and talking about their photos. The advent of cell phone cameras seems to have created a population of young people (although not exclusively young) who feel compelled to document every major or minor event to share on social media including the ubiquitous "selfie".

I have the students share their "selfies" and I introduce the topic of self-portraitures, explaining to students that there is a long tradition and extensive diversity found within this genre. I provide them with a brief presentation of the works of Rembrandt, Michelangelo, Judith Leyster, Velásquez, Van Gogh, Chuck Close, Frida Kahlo, Vivian Maier and finally Cindy Sherman using books I have in the graphics classroom (National Core Arts Standards, 2014, Anchor Standard 11).

During the whole class discussion presentation, I ask students questions about the portraits and what they say about the person. The focus turns to Cindy Sherman, as her body of work which is a lifetime of fictional self-portraits ranging from glamourous shots that look like frame grabs from a 1940s black and white Hollywood film, to color compositions portraying her as an older and disturbed looking woman with poorly applied make-up. The discussion often turns to vanity and the lack of it in most of Cindy Sherman's work. Here students are learning to interpret intent and meaning in artistic work (National Core Arts Standards, 2014, Anchor Standard 8). The stark contrast between Sherman's work and the cell phone selfie helps the students understand the range of possibilities for the assignment. Cindy Sherman's self-portraits are often emotional, not ego driven with the goal of elevating herself. They are a huge contrast from a typical teenager's selfie. Students are then instructed to break away from the table and do quick research online from a list of artists that I provide. These artists create inventive and provocative self-portraits. Research on the artists helps create an understanding of the place of the genre in history and students learn to identify the feelings and different meanings a self-portrait is conveying.

Examples of fictional self-portraits from previous classes are shared with the students along with discussion of what makes an approach to the assignment successful and what does not work as well. I usually show the class the photo of the "homeless girl" who is obviously well fed, very clean, with manicured nails and makeup that was obviously smudged over her face as an example of what not to do (see Fig. 10.1). I remind them that they must place themselves within a convincing environment for the character they create and that they must move out of their comfort zone when considering who they will become. After looking at other self-portraits and the work from past photography students, the students begin to consider how they will portray themselves in the final part of the assignment. At this point, they realize that looking beyond the subject in the photograph is critical when creating a self-portrait of their own (Fig. 10.2).

The class then works in pairs to create quick expressive portraits. Students take pictures of themselves and of each other trying to capture an emotional quality in

the pictures. The goal of the self-portraits is to convey a psychological depth beyond what is typically done in a selfie (National Core Arts Standards, 2014, both Anchor Standards 1 and 10 are addressed here.). Examples from books that illustrate unique lighting, setting and different poses help the students understand that there are many elements required to make a portrait that is more than a snapshot that records a likeness. The point is for them to capture something about their subject's mood, attitude or personality. During this time peers and I provide feedback to students to help them focus their attention on the messages they are trying to convey. This exercise will sometimes take the whole class period and it often becomes necessary to extend the lesson another day.

After discussion and the two exercises (the selfie and the expressive portrait done with a partner) they begin to narrow down their ideas. Students understand that they need to ask a lot of questions of themselves to figure out what message they want to convey and to move beyond their first response which is usually somewhat cliché. I ask them to write a proposal of what they hope their portrait will express and if there is not enough time in class, they are to complete the proposal as a homework assignment. Sometimes they are unable to come up with just one thing they want to do, so I allow them to explore up to three ideas for the assignment. The goal of the proposal is to articulate a message of what the students want to convey and this message may be an idea of who they are, who they wish they were, or even the polar opposite of how they and others see them.

As far as evaluation of learning and assessment goes, this is done throughout the lesson and on an ongoing basis until the completion of the self-portrait. Students demonstrate mastery through lighting, setting, composition and creative thinking and receive scaffolding from me, use the work of professional artists as models of what good self-portraits express, and provide and receive feedback from their peers which are greatly valued.

The creation of a self-portraiture continues over the Christmas break with the actual shooting of the photos. This affords more time for location choices. Students who travel over break have to make sure they are prepared to shoot their portrait within the setting of their vacation. The fictional self-portrait assignment has yielded some really fun and adventurous results over the years. Once completed, I hang the students' photos in the school corridors where the entire school community can view them. The students and I often receive positive feedback from the school community on their work.

A few of the challenges in teaching this lesson involve having students think deeply and creatively about themselves and understanding that there is a huge contrast between a typical selfie and the self-portrait. In addition, students often struggle with how lighting, clothing, and the setting come into play. They need to understand that they must first "set the scene" before they take their photos. This involves looking deeply within oneself to reflect on the message that the student feels is most important to communicate. I try to address these issues by using the professional artists' examples, brainstorming with students on what is striking about the pictures and on what works well and what does not work well, and highlighting the striking contrasts between selfies and works of art.

Table 10.2 Free writing and collaborative drawing lesson plan

Teacher: Martha A. Garrett, BSA, MFA (License Area: Art K-12)	**Grade Level(s)**: 11–12
School: Bishop McGuinness Catholic High School	**Subject**: Honors art
City and State: Kernersville, NC	
Instructional Plan Title: Free Writing and Collaborative Drawing	
National Core Arts Standards: Anchor Standard 1. Generate and conceptualize artistic ideas and work Anchor Standard 8. Interpret intent and meaning in artistic work Anchor Standard 10. Synthesize and relate knowledge and personal experiences to make art	
Learning Objectives: 1. Students will learn to use writing as inspiration to inform their artwork 2. Students will work collaboratively to create a work of art	
Instructional and Learning Materials Needed: Lined paper for the writing exercise. Materials for art making vary but can include drawing paper and technical pens, ink, charcoal, ebony pencil and other black and white two-dimensional media	
Lesson Duration: 2–3 weeks. This lesson guides the student toward a larger independent study project and takes place in the art room where there are tables and chairs for students to work on. **Introductory lesson**: 46 min	
Teaching and Learning	

Min on this Activity	**Targeted Activity**	**Purpose of Activity**
5	**Orienting Students to Lesson**: • Upon entering the room, students are handed a piece of loose leaf and a large envelope with a clasp • They are asked to spend the first 5 min on a free-writing activity—writing about whatever comes to mind • Students are told not to focus on grammar or editing and that only they will read what they wrote	• To clear the mind of clutter. To focus on what may or may not bubble up from the sub-conscious
1	**Motivation**: • After the free-writing is completed a student usually asks: What will we do with the writing? Students are told that the writing exercise is simply to help them get in touch with their own thought processes • Students are told to get into groups of six students	• Students are interested in what will happen after the free-writing session • Allowing time for experimentation and curiosity in the creative process is imperative

(continued)

Table 10.2 (continued)

5	**Whole Class Instruction**: • From the free writing exercise the students are instructed to take out one piece of paper per group and to fold it six times —accordion like style. (One paper per group, one fold per member of the group; see Fig. 10.3 at the end of this lesson plan.) • The teacher then explains that students are to pull out words or phrases as a prompt for a drawing to be done on the folded piece of paper. Each student will draw a picture on the same paper resulting in a collaborative drawing using the Exquisite Corpse project format (described below)	• The writing exercise and collaborative drawing assignment are used to free up ideas for the independent study and the group activity • Whole class instruction is limited in this introductory lesson. It is necessary, however, to explain why the class is undertaking the exercises as a way to open them up to new ideas • The students may need monitoring to ensure they understand how to begin the assignment. It is sometimes necessary to continue this into a second class period or show examples of other works created using this technique
10	**Guided Practice/Providing Feedback**: • Students may choose any black and white media that appeal to them • After the first student draws a picture, the student folds the paper so that only a part of his/her drawing is revealed. This begins the collaborative drawing process • The instructor is always available but does not tell the students exactly what to do thereby giving them confidence in their own process • The instructor circulates frequently through the room helping individuals with problems as they arise or as they are observed by the instructor	• Using familiar drawing media overcomes the problem of learning a new technique, the process of passing the drawing, however, creates a challenging collaborative and creative problem to solve • Students at the honors level are expected to be proficient in several media processes. The paper is pre-folded by the instructor or the person who does the first drawing. A small portion of the first drawing must extend past one of the folds so the next person has something to work from • The process for creating artwork is broken down into steps that build on one another. E.g. free writing leads to each drawing, the first drawing is continued by the person doing the second drawing and it continues until the whole class is involved in creating a single work or several works by small groups
15	**Independent Practice**: • The student then passes the paper to another member of their group after completing his or her drawing	• Working through the process of free writing and collaborative art making helps the students know their own

(continued)

Table 10.2 (continued)

	• The second person then does a drawing connected to the first person's drawing • Once this is completed, the student passes the paper to the next person and it continues from there • Students continue passing the folded paper. Each student works from the lines that cross into over the fold from the previous student's work • Progress is monitored by regular circulation through the groups by the instructor who ultimately works only as a facilitator and guide	mind and clarify what they wish to communicate • The art classroom works well as a collaborative environment. Students often gain insight during critique and less formal conversations with their classmates • The instructor is there to help the student when there is a creative block or technical problem
5	**Evaluation of Learning and Assessments**: • Students are asked to unfold their papers and share their finished group-drawings (See Fig. 10.4 for a sample at the end of this lesson plan.) • Formative assessment is in the form of short discussion of the creative process the students went through from the writing to the drawing exercise • Mastery is judged by how well the student communicated through the assignment and collaborated with the group. The drawing and writing in-and-of-themselves may or may not be what the student would consider fine art	• This lesson is one that uses scaffolding to give the students an opportunity to share their work with the larger group • Students at the honors level are expected to be able to discuss their work both informally and in critique which provides them with the opportunity to understand others' creative processes • Finished work is displayed within the art room for a few weeks as the students continue to use it as a touchstone for their creative process. It is important for students to understand that the process and the product are equally important • Guidance from the instructor is necessary to help the student stay on track. The grade for this assignment is addressed later on when they have completed their final projects under the category of "initial exercises and research"
5	**Closing Activities**: • Briefly explain to the students how this class sets the parameters for the final independent study project	• It is necessary to give the students opportunity to experiment with their ideas before undertaking an independent study. The

(continued)

Table 10.2 (continued)

	• The free writing and collaborative drawing are the introductory part of a larger unit that will take up to three weeks to complete. Sketchbook assignments, proposals and rough drafts are often done for homework in subsequent lessons • Students summarize lessons in their portfolios during later class periods in the form of written reflection	assignments that follow such as using the sketchbook and writing a proposal are more standard in art classes in an academic setting • Written reflection is often done much later giving the student the opportunity to look back and consider what they learned from the process
Specific Strategies used to Address Exceptional Students and/or Students for whom English is a Second Language: • Students who need more attention or motivation are worked with individually. Students who excel and work with ease are often used as peer mentors for others in the class • All art instruction is differentiated at some level. Art students rarely interpret an open-ended assignment like the one described above the same way • Students who are not native English speakers are frequently monitored for understanding of the instruction/problem to be solved • On the rare occasion that an Honors Art student needs additional motivation, the teacher must be there to push them along. The teacher should sit at the different tables with students and talk about their ideas with them, toss out new ways of working or allow them to start over • The instructor is key to helping non-native English speakers understand the nuances of working in a group		

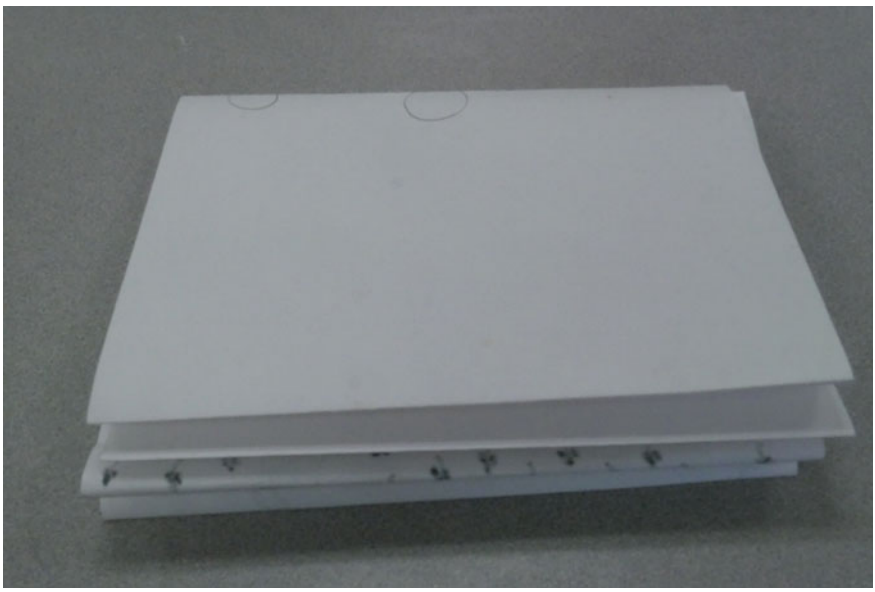

Fig. 10.3 Paper folded like an accordion used for the Exquisite Corpse drawing technique

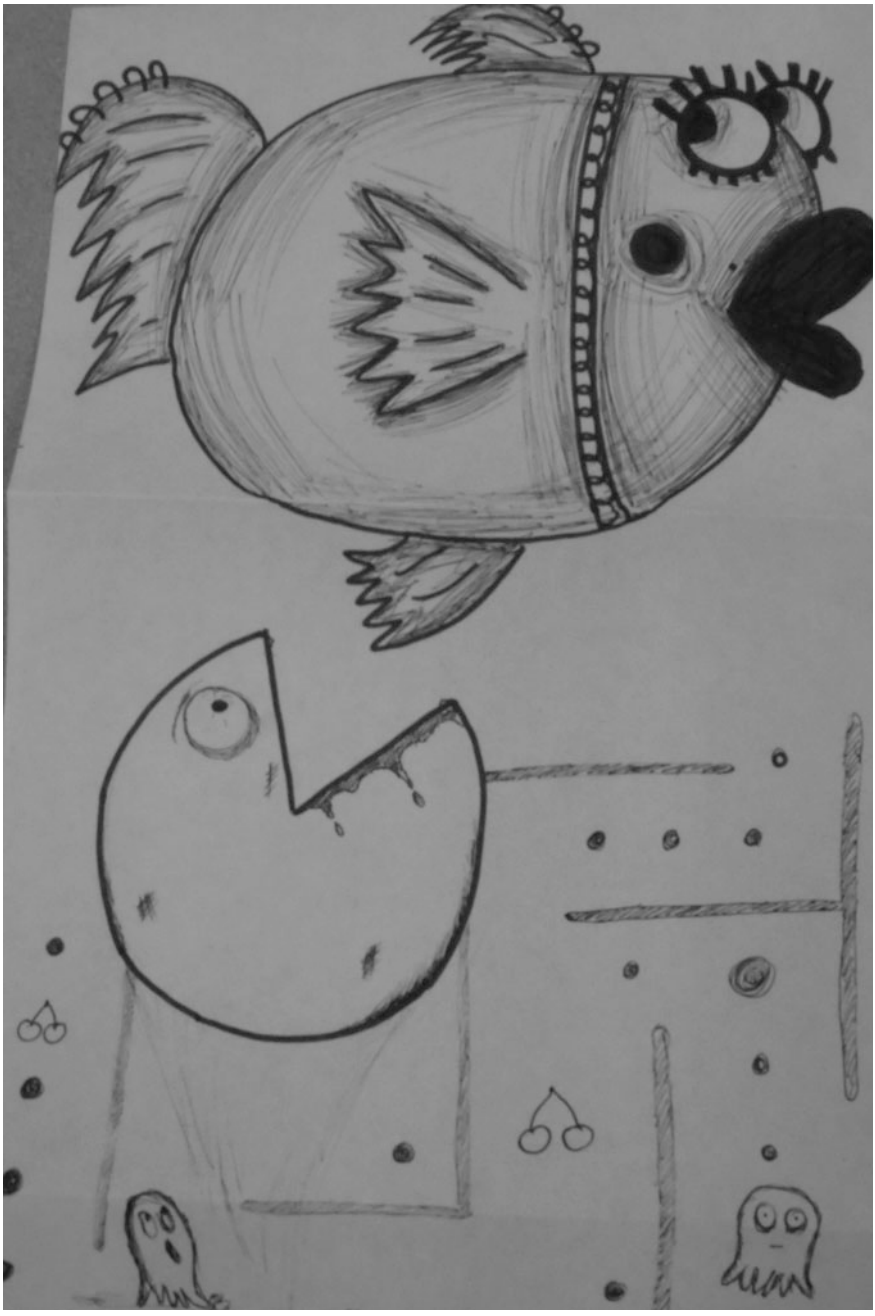

Fig. 10.4 Sample of students' collage using the Exquisite Corpse technique

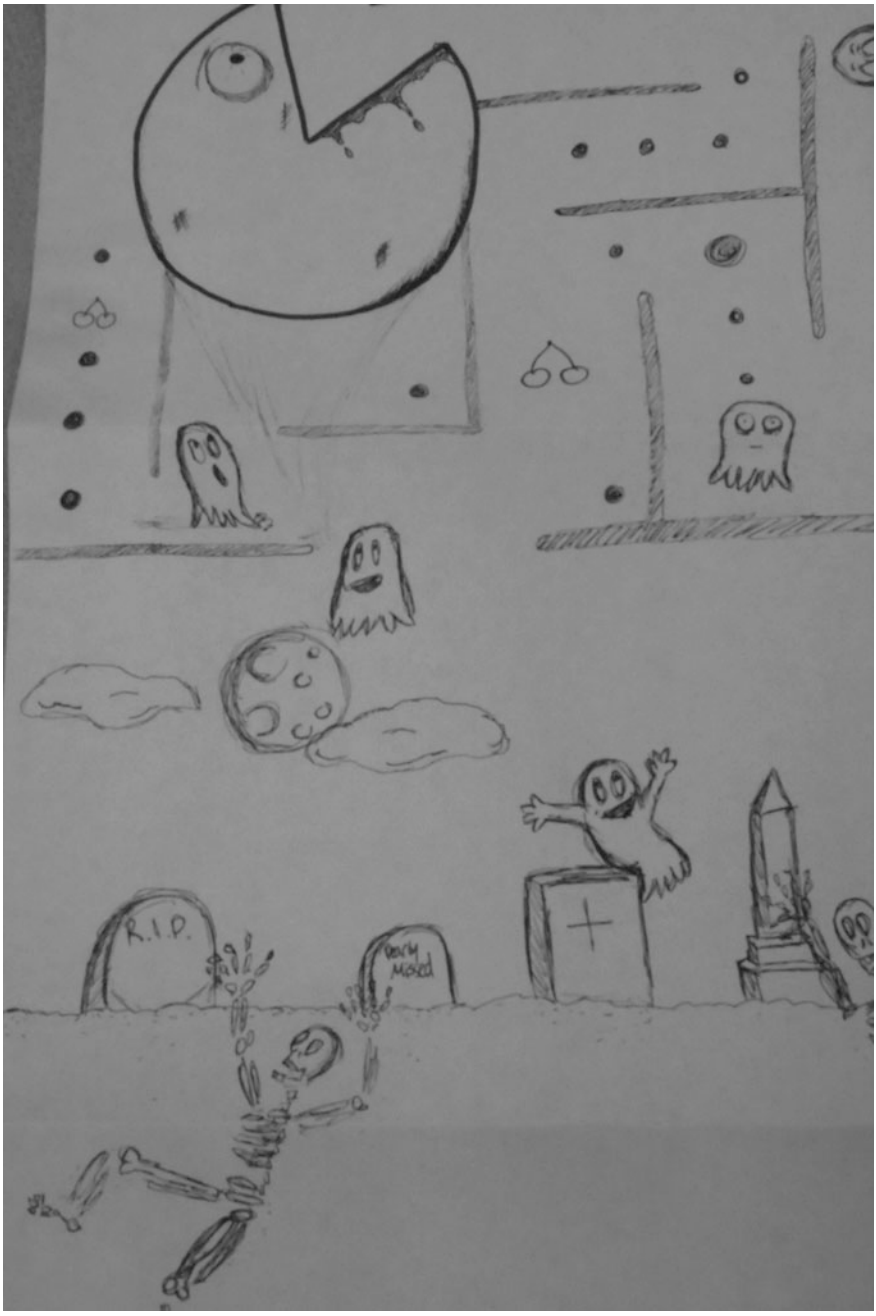

Fig. 10.4 (continued)

10.2 Narrative of the Free Writing and Collaborative Drawing Lesson[1]

Students in the Honors Art classes are those who are proficient in a variety of art skills, can solve problems independently, and have an outstanding work ethic. The prerequisites for Honors Art III are Art I and Art II. The prerequisite for Honors Art IV is Honors Art III. Both classes require recommendation of the instructor in the level below in addition to the prerequisite. Students who are not recommended (and transfer students) can submit a portfolio for consideration by the Honors Art instructor if they wish to be in an Honors Art class. The two levels often meet during the same class period as staffing and schedule constraints at the school dictate. This is not necessarily a disadvantage as the Honors IV students inspire and motivate the Honors III students and vice versa.

The scope of the Honors Art classes is broad and includes exploration of a variety of media and approaches to projects including drawing, painting, installation art, sculpture, photography, videography, printmaking, animation, assemblage, digital art and conceptual art. While the students are exposed to many media and assignments in Art I and II, the Honors classes require students to explore working with new media and challenges their own ideas about art and art making. The cultivation of curiosity and self-reflection is a large part of what makes a successful Honors Art student. As the instructor I am required to coach and encourage students to take risks in their art making. This can be a large hurdle if a student is very skilled in one particular medium or has developed a style that he or she is reluctant to stray from. I believe teenagers (and most humans) prefer what is familiar and easy. Often the students in Honors Art have not considered what messages they want their artwork to convey because concept has been underplayed due to emphasis on technique. Similarly, they are still in the process of understanding what constitutes a good composition and how to choose media that will give them the results they desire. The independent study challenges the student in Honors Art to explore his or her own ideas and to delve deeper into how these ideas are best communicated visually which targets Anchor Standard 1 (National Core Arts Standards, 2014). This art class is held in the large art room which consists of tables, chairs, desks and a variety of art materials. I typically have about 12–15 students in the art room at one time.

The first exercise given for the independent study is a free-writing activity. The students are not told about this in advance. When they come into the room they are handed a piece of loose leaf and a large envelope with a clasp. They are then asked to write for 5–10 min about whatever comes to mind. The emphasis is on writing without editing or even trying to be coherent. While the students are usually a little apprehensive about this exercise, all of their fears are calmed when I tell them I will not be grading or even reading what they write. The goal of the activity is to help

[1]See the previous narrative for a description of school and class characteristics.

clear the students' minds of clutter and to encourage what is in the subconscious to bubble up to the surface. It is very important that the students understand that no one will read what they write. I emphasize this so that the students will write freely without fear of being judged. This process can be done as a single event or repeated over several days. If the writing is done for more than one day, the students keep their writing in the envelope provided with a clasp.

Immediately following the writing exercise students are curious about how the writing will be related to the current art class. I share with the students the purpose is to help them to become aware of their inner thoughts and feelings and then I ask them to get into groups of about six. This gets them curious and helps sustain interest and motivation. We begin the whole class instruction by my explaining to them that we will be using what they have written as a prompt for a collaborative drawing exercise which helps them interpret intent and meaning in artistic work (National Core Arts Standards, 2014, Anchor Standard 8). From the free writing, they are to pull out words or phrases to use as a prompt to begin drawing. I explain to them that they will be using the "Exquisite Corpse" format which involves a collaborative drawing process invented by the Surrealists somewhere between 1918 and 1925. Each person adds to a work of art or writing in a sequence following particular rules so that the end result is a unique whole created through many, consisting of often discordant, pieces (see https://www.moma.org/ for additional information on this technique). I explain how the drawing or writing takes place using this Exquisite Corpse method.

The method can be initially confusing to students and I want to be sure each student understands what to do. The class is told that each group will get one piece of paper and fold it into six parts (one per student) in an accordion-like way (see Fig. 10.3). In folding the paper this way, when they do the collaborative drawing only part of what the previous student drew is revealed to the next student. One by one each student in the group gets the paper passed to him or her until it returns to the first person. Each student is instructed to draw something related to what they wrote in the opening class activity and to fold the paper back so that only a part of the drawing is bleeding onto the next fold of the paper. The second student then uses what he or she sees of the first person's drawing and adds a drawing of his or her own. While whole class instruction is limited in this introductory lesson, it is necessary to explain why the class is undertaking the exercises as a way to open students up to new ideas. They may also need monitoring to ensure they understand how to begin the assignment. It is sometimes necessary to continue this into a second class period or to show examples of other works created using this technique to help promote clarity of the process.

After reviewing the method for the collaborative drawing, students are ready to begin. Students are able to choose any black or white media that appeal to them and students at the honors level are expected to be proficient in several media processes. Using familiar drawing media overcomes the problem of learning a new technique, while the process of passing the drawing however, creates a challenging collaborative and creative problem to solve.

The paper is pre-folded by the instructor or the person who does the first drawing. After the first student draws a picture, the student folds the paper so that only a part of his or her drawing is revealed. During this guided practice portion of the lesson, I circulate around the room and make observations, providing feedback to students who are stuck. I do not tell the students exactly what to do at any time because I want to give them confidence in their own creative process.

During the independent practice portion of the lesson, students are working in their groups; each one is doing a drawing related to his or her earlier writing, and then folding the paper and passing it to the second student so that the second student can only see a portion of the first drawing. From the free writing exercise the students pull out words or phrases as a prompt for his or her drawing in the collaborative drawing process. While re-reading what they had written may not yield an exact idea for the drawing exercise, there is often a "tone" within the pages that is personal and insightful. This help students learn how to synthesize and relate knowledge and personal experiences to make art which is Anchor Standard 10 of the National Core Arts Standards (2014).

Again, only a small part of the student's drawing is extended past the fold so the next person has something to work from. I circulate throughout the room; I see my role only as a facilitator and guide. Working through the process of free writing and collaborative art making helps the students know their own mind and clarify what they wish to communicate. Feedback comes regularly throughout the creation of these initial exercises and the creative process of the larger project that follows in subsequent lessons.

After each student has had a turn, the paper is unfolded and the drawings are put on display (usually amongst a lot of laughter and loud talking; see Fig. 10.4 for a sample). Formative assessment is in the form of a short discussion of the creative processes the students went through—from the writing—to the drawing exercise. This provides me with information as to whether they have learned the National Core Arts' Anchor Standard 8 (2014) to interpret intent and meaning in artistic work. Mastery is judged by how well the student communicated through the assignment and collaborated with the group. The drawing and writing in-and-of-themselves may or may not be what the student would consider fine art but it sparks further interest and excitement among students as they share and discuss their drawings. This lesson is one that uses scaffolding to give the student an opportunity to share his or her work with the larger group. Students at the honors level are expected to be able to discuss their work both informally and in critique and these discussions provide them with the opportunity to understand what others' are thinking and feeling and how they display these feelings and thoughts creatively. The finished work is displayed within the art room for a few weeks as the students continue to use it as a touchstone in their creative processes. The students are continually encouraged to identify new ways to be creative and to communicate artistically their feelings in an endproduct. It is critical for young artists to explore alternative ways of expression as most of what they are taught in school is that art has to look a certain way and that the product is more important than the process. I try to help the students understand that the process *and* the product are equally

important. Students receive a formal grade for this assignment after they have completed their final projects under the category of "initial exercises and research".

These initial exercises are important to the ideation of concepts for the independent study because without them, students are likely to choose the safest and most common topics of interest to teenagers. As their instructor, I feel it is essential to help my students with this part of art making so that they come to understand that art communicates something beyond the skills of the artist. My greatest challenge is to push the students to think deeply. This lesson involves both cognition and affect and I want them to think beyond what is obvious, to notice their thoughts and to learn how something one thinks or feels can be transformed within a group into a work of art, targeting the National Core Arts' Anchor Standard 10 of synthesizing and relating knowledge and personal experiences to make art (2014).

I close the lesson by explaining to students that the parameters are now set for the final independent study project: a two-dimensional black and white media that conveys a message about something important to the student/artist. Over the next few class periods follow-up assignments in their sketchbooks and written proposals come from class discussions. Topics often includes social justice issues, the environment, climate change, alcohol and drug abuse, gun control, bullying, mental health, love and happiness—to name a few (National Core Arts Standards, 2014, Anchor Standard 1). As the instructor, I do my best to remain neutral to topics that are politically charged and guide the class as they narrow their topic choices. Students will also be asked to summarize lessons in their portfolios during later class periods in the form of written reflections. We also spend a lot of time discussing what is cliché' after the first pass of ideas has been looked over. I usually ask questions to get the students to name the most cliché' images for any given idea: "What is the most overused image for …?". The honors students always know what has been "done to death" and saying it out loud in class prevents them from using the most common images in their artwork.

The beauty of the independent study is in seeing the students' ideas transform and mature. The initial exercises are explicitly designed to be freeing and non-threatening. The students move from a process that purposely uses non-sequitur and the subconscious mind to later create a project with a specific message of importance to them.

10.3 Teaching the Visual Arts: A Palette of Self-regulated Learning

Art instruction has received little attention in the context of explaining the psychological dynamics of how learning takes place in the secondary classroom. Research on *art instruction* is often focused on pedagogy (specific lessons and their artistic outcomes) while one of the objectives of art instruction is to foster students' creativity (Seidel, Tishman, Winner, Hetland, & Palmer, 2009). *Creativity* research,

on the other hand, has been studied extensively (how it is defined, measured, and needed for a final product) in an attempt to distinguish it from other constructs (Abdulla & Cramond, 2017; Ma, 2009). Much of the research and findings have resulted in a fragmentation of the definition, assessment, and a lack of consensus in explaining the nature of creativity (Hennessey & Amabile, 2010). In addition, there is little research on how social cognitive theory and self-regulated learning can help teachers promote creativity in the high school visual arts classroom. Yet the topic of art instruction is often in the media as more businesses, policy makers, and educators suggest it holds a more prominent place in education (Kaufman & Beghetto, 2014). In fact, some indicate it should be a mandatory part of the school curriculum and refer to the four C's: creativity, communication, collaboration, and critical thinking, as important skills for students to learn (Trilling & Fadel, 2009). Sternberg (2017, p. 10) suggests that creative thinking skills such as inventing, discovering, imagining, and hypothesizing are essentially the "first step" in moving cognition into action.

On the surface, creativity and art instruction may not seem linked to social cognitive theory and self-regulated learning, but in actuality, Bandura's (1986) social cognitive theory is closely aligned with current theories on creativity and offers a framework for understanding the mechanisms for learning. Good art instruction involves the use of specific processes critical for learning art within Zimmerman and Schunk's (2001) model of self-regulated learning.

Bandura's (1986) social cognitive learning theory describes triadic reciprocity, three determinants of actions that are interrelated: personal factors (e.g. cognition, affect, talent); environmental (i.e. classroom, peers, home); and behavioral (e.g. drawing, painting, studying; see DiBenedetto, 2018/this volume). Bandura suggests that "creativity is one of the highest forms of expression" (Bandura, 1986, p. 104) and yet there is little research on art instruction in secondary classrooms or on the link between teaching the visual arts and social cognitive theory. One of the purposes of the current chapter is to highlight how theories on creativity map against Bandura's triadic model of reciprocity and how this mapping leads the way to understanding how self-regulated learning processes are used in learning the visual arts.

Self-regulated learning is defined as self-generated feelings, thoughts, and behaviors directed towards goal attainment (Zimmerman & Schunk, 2001). In this chapter we discuss two models of self-regulated learning: the three phases of self-regulated learning and processes, and the dimensions of self-regulated learning (see DiBenedetto, 2018/this volume), and their prevalence in the two art lessons presented. Lastly, recommendations for future research on visual arts instruction and self-regulated learning are made.

10.3.1 Creativity

There is a lack of agreement on the definition of creativity (Abdulla & Cramond, 2017). Traditional definitions include divergent thinking and problem-solving skills (Guilford, 1959; Runco, 2014). Divergent thinking refers to the ability to produce a variety of different responses to an open-ended problem and includes processes such as flexibility, fluency, and elaboration. Problem-solving involves being able to develop solutions to problems in a novel way and also requires the ability to be flexible and adaptive (Runco, 1996). One advantage of this definition is that these two skills can be taught in school.

Abdulla and Cramond (2017) identified several characteristics that distinguish creative individuals such as being active, adaptive, alert, autonomous, capable, enthusiastic, flexible, independent, industrious, intrinsic, motivated, resourceful, and self-confident. These characteristics are also found in students who are self-regulated (Zimmerman, 2002a). A meta-analysis showed the effect sizes from 111 studies examining several of these variables to be strongly related to creativity (Ma, 2009). In addition, divergent thinking and problem-solving skills had significantly higher effect sizes than variables such as emotional creativity and non-verbal creativity.

Rhodes (1961) has described creativity in terms of the creative *personality, process, press,* and *product*. The *creative personality* denotes many of the characteristics described above. The creative person is motivated, independent, open-minded, flexible, self-confident and has a generally positive affect (Abdulla & Cramond, 2017; Hennessey & Amabile, 2010; Ma, 2009). The creative individual is a divergent thinker, meaning able to think unconventionally, to come up with something new and different (Kaufman & Beghetto, 2014). The *creative process* addresses the behavior one engages in to problem-solve. It often requires a reorganization of knowledge and strategic planning to develop a novel solution appropriate to the task at-hand (Ma, 2009; Wheatley, Anthony, & Maddox, 1991). The *creative press* refers to the relationship between the individual and his or her environment such as a classroom that supports creativity, innovation and effort. Teachers can create a psychological environment that encourages intrinsic motivation and provides opportunities for self-reflection and stimulation to foster creative behavior (Cramond, 2005). In a meta-analysis it was found that the classroom climate has an effect on students' creativity (Ma, 2009). Teachers who encouraged flexibility in thinking and allowed students to engage in open discourse and self-directed learning had students with higher creativity scores. This suggests that environments that are supportive and conducive to creativity will foster creativity in students and in their behavior and final products. The *creative product* may include "ideas, solutions, performances, or products generated by the creative process" (Ma, 2009, p. 32). The creative product is original, appropriate to the task, useful, and often a surprise (Acar & Runco, 2015; Kaufman & Beghetto, 2014; Simonton, 2012). It represents a novel solution to a problem which could not be solved in a conventional way. These four elements of creativity can be mapped against the

personal, behavioral, and environmental determinants in the triadic model of social cognitive theory to help explain how students become active agents in their learning in a visual arts classroom.

10.3.2 Linking Social Cognitive Theory's Triadic Reciprocity with Creativity

Social cognitive theory posits that students are active agents of their own learning. Art instruction is different from most other subjects taught in school because students are not expected to learn specific content such as facts or formulas and then demonstrate learning on an achievement performance measure. Art instruction involves teaching students the skills needed to develop a novel product or solution (Hennessey & Amabile, 2010). According to Bandura (1986), learning occurs within the framework of triadic reciprocity involving personal, behavioral, and environmental factors, which are interdependent on one another and lead to achieving a goal or intended outcome. These three factors along with the outcome are similar to Rhodes's (1961) four "Ps" personality, process, press and the product. Figure 10.5 demonstrates a framework of how the two theories overlap to help explain the psychology of creativity in classroom instruction.

Adolescence represents a challenging time for most students (Yeager, Lee, & Dahl, 2017). Explaining how social cognitive theory and creativity theory overlap is useful for understanding the dynamics between the learner, behavior, classroom and final outcomes in a context other than those typically found in research studies on high school learning; i.e. research on mathematics, reading, science, and physical education (see other chapters in this volume). While Rhodes's model describes how creativity operates, social cognitive theory offers a theoretical foundation for how students may learn to be creative in a visual arts classroom.

According to Bandura (1986), learners have personal characteristics such as cognition, affect, self-efficacy (belief in one's capability to accomplish one's goals), skills, and talent which influence and are influenced by one's behavior and environment. This is similar to Rhodes's description of the creative personality which takes the individual's personal characteristics into account. The learners, such as those in the two art lessons described earlier in this chapter, are motivated, interested, and encouraged by the teacher to think "divergently" about how to create a message that they want to convey (personal factors/creative personality). The students need to problem-solve how to do the assignment, engage in activities that are strategic, and actively participate in the lesson (behavioral factors/creative process). These behaviors are impacted by the personal characteristics of the student, as well as by the environment. They use the resources available to them in their classrooms (or homes depending on the lesson) and rely on their peers and teachers for modeling and feedback (environmental factors/creative press). The final artwork (achievement outcome/creative product) is to be original, appropriate to the task,

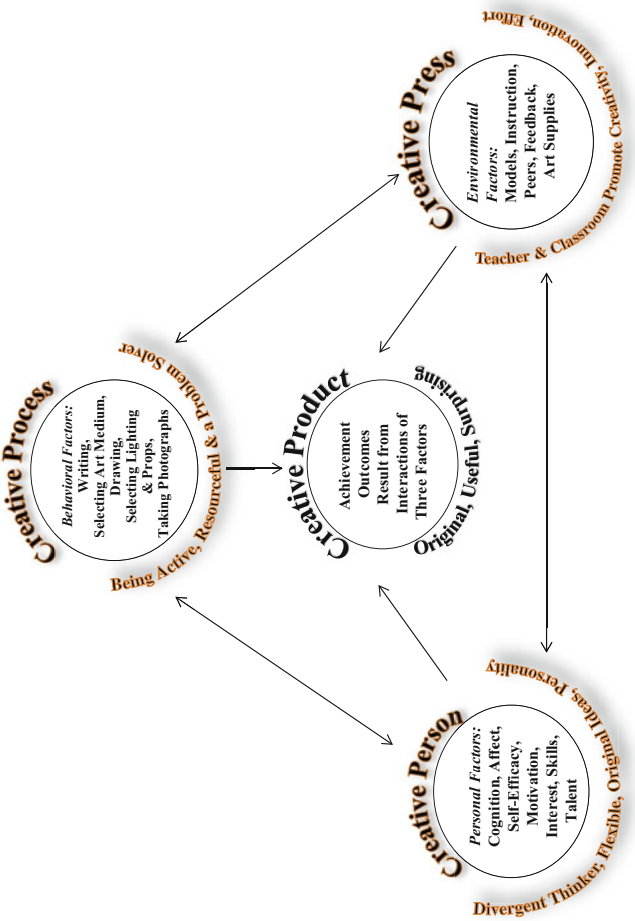

Fig. 10.5 Integrating triadic reciprocity and creativity in the visual arts classroom

and surprising in that it is novel. For example, a student who may be feeling tired from being out late the night before (personal factor/creative personality), may select dark colors from the art supplies available in the classroom (environmental factor/creative press) and sketch a dark bedroom with grey shading throughout (behavioral factor/creative process) resulting in a dark demonstration of how the student is feeling (achievement outcome/creative product). Each component of the model impacts the other and the integrated framework represents the interaction of the three determinants in social cognitive theory, as well as the "Ps" in Rhodes's theory of how creativity operates. The two lessons presented in this chapter provide examples of several processes within self-regulated learning grounded in social cognitive theory.

10.3.3 Visual Art Lessons and Self-regulated Learning

Table 10.3 presents a summary of the key self-regulated learning processes used in the present two art lessons and references, though not necessarily specific to high school settings, to support these processes. The *forethought phase* occurs before a learning event; it may be a new situation, or one in which the learner has experienced feedback and after self-reflecting, is determining what course of action to take next (Zimmerman & Schunk, 2001). The forethought phase includes motivational processes such as self-efficacy beliefs, intrinsic interest, and goal orientation. In the beginning of Ms. Garrett's two lessons, we infer that the students' *self-efficacy beliefs* differed. In the Fictional Self-Portrait lesson the students were initially self-efficacious because of previous experiences with taking "selfies" and they presumed the self-portrait would be as similar and easy as taking quick pictures of themselves. Research shows that students' self-efficacy at the onset of a learning activity is based on prior similar experiences, personal qualities, and social support (Schunk & DiBenedetto, 2014, 2016). One can infer the second lesson presented a different scenario. Here the students were instructed to first write about something deeply personal, and then to collaborate on a drawing using a technique in which they were unfamiliar, thus their self-efficacy beliefs were likely low due to unfamiliarity with the tasks. Through feedback, encouragement, and examples that served as models, students' self-efficacy appears to increase. The expertise of Ms. Garrett as a mentor and facilitator ensured that the creative "psychological environment" discussed earlier was established. This provided the students with support needed to get in touch with feelings and thoughts and to problem-solve on how to creatively draw them in collaboration with peers. Research supports the idea that art teachers must feel self-efficacious about their capabilities to teach art effectively in the classroom (Orek, 2004) and that students who are self-efficacious are more likely to be engaged in creating art (Catterall & Peppler, 2007).

Intrinsic interest refers to students wanting to learn because they obtain pleasure in doing the task in and of itself (Zimmerman, 2002b) while *goal orientation* refers to the reason that students are doing the task, such as because it is valued for the

sake of learning and not because they are motivated by the idea of receiving some form of social comparison such as a high grade (Zimmerman, Schunk, & DiBenedetto, 2015). In the Fictional Self-Portrait lesson Ms. Garrett sparks intrinsic interest in teenagers who often tend to be focused on their appearance and how they are perceived by others (Yeager, Lee, & Dahl, 2017). They are motivated to take pictures of themselves in ways they would like to be portrayed; they enjoy the activity and are interested in portraying their own personal goals (their images in a creative manner that speaks of themselves) rather than a grade goal. In the second lesson the students are curious about the link between the personal writing exercise and the collaborative drawing. The writing activity promoted intrinsic interest because the students were asked to write about themselves, and something they felt deeply about.

The next part of the activity was to draw a picture of what they had written about without disclosing the information to their peers. This sustained interest because now students were challenged with how to communicate creatively in an art form. While there is an abundance of research on intrinsic interest and creativity in work settings (De Dreu, Baas, & Nijstad, 2008) little research exists linking intrinsic

Table 10.3 Visual arts lessons and the processes within the three phases of self-regulated learning

SRL processes	Fictional self-portrait	Free writing and collaborative drawing	References linking art instruction and self-regulated learning processes
Forethought phase			
Motivational beliefs:			
Self-efficacy	Initially high, students believe selfies are self-portraits; through instruction teacher helps students learn that there is more to this genre than taking a selfie	Somewhat low, students are not sure if they are capable of writing something deep or profound. Teacher builds self-efficacy by encouraging students to write without worrying about grades or anyone else reading their writing. On the collaborative drawing, the teacher scaffolds and provides examples which help promote capability beliefs	Catterall and Peppler (2007), Orek (2004), Schunk and DiBenedetto (2014, 2016)
Intrinsic interest	Teacher sparks interest as teenagers tend to be focused on their appearance and how they are perceived by others	Students are curious about the link between writing and drawing. The writing exercise is personal, helping to	Bandura (1986), De Dreu and Nijstad (2017), Gorenendijk, Janssen, Rijlaarsdam, and van den Bergh (2013),

(continued)

Table 10.3 (continued)

SRL processes	Fictional self-portrait	Free writing and collaborative drawing	References linking art instruction and self-regulated learning processes
		promote intrinsic value. Intrinsic interest is sustained by having the students convey what they have written in an artistic form	Yeager, Lee, and Dahl (2017), Zimmerman (2002b)
Goal orientation	Students are motivated to convey an image that is meaningful about themselves. The focus is not on their grades or social comparison but on personal self-image	Students are motivated to describe something personal about themselves in an art form; their grades come after the final project is complete. Students know they will be scaffolded throughout the process and are therefore, less likely to be focused on grades	Kitsantas and Cleary (2016), Zimmerman, Schunk, and DiBenedetto (2015)
Task analysis			
Goal setting	Students set goals of what message they want to convey	Students work collaboratively to develop a shared work of art that also has personal meaning for each one of them. The goal of communicating their feelings in a short illustration that is connected to another classmate's is challenging	Zimmerman, Schunk, and DiBenedetto (2015)
Strategic planning	Students begin thinking and planning about how to set the frame for the picture: lighting, environment, clothing they will wear, etc.	Students must select the black and white media they want to use to convey a message. They also need to problem-solve and develop a strategy on how to add a personal drawing onto a small part of their previous classmate's drawing	Sternberg and Kaufman (2012), White and DiBenedetto (2015)
Performance phase			
Self-control			
Imagery	Teacher provides examples of previous	Teacher models and provides examples of	Efland (2002), Gorenendijk, Janssen,

(continued)

Table 10.3 (continued)

SRL processes	Fictional self-portrait	Free writing and collaborative drawing	References linking art instruction and self-regulated learning processes
	pictures which serve as models. Students need to imagine the image they would like to portray about themselves and experiment on ways to do this	the Exquisite Corpse technique. Students need to visualize what they will be drawing from what they have written	Rijlaarsdam, and van den Bergh (2013)
Attention focusing	Teacher highlights how critical it is for students to pay close attention to all aspects of the photograph	Students must focus attention to the details on the collaborative drawing that are visible and to the message they are going to draw about themselves. They must be aware of the media they are using as they create their artwork	Bandura (1986), Gorenendijk, Janssen, Rijlaarsdam, and van den Bergh (2013)
Self-observation			
Metacognitive monitoring	As students snap pictures of themselves they are examining them closely to determine if they are conveying the message they would like to convey	Students must monitor their drawings so that they are in sync with their writing and so that they convey a brief personal feeling or thought	van de Kamp, Admiraal, van Drie, and Rijlaarsdam (2014)
Self-recording	Students are instructed to ask questions of themselves to help them narrow and focus their ideas. Self-recording takes the form of both written (self-questions and proposal) and visual (photographs)	The initial writing exercise requires students to record their subconscious thoughts and feelings. The drawing is a visual representation of their writing. In both cases, the teacher is highlighting how the processes in art are equally important as the final project	McPherson and Renwick (2011)
Self-reflection phase			
Self-judgement			
Self-evaluation	Peers provide feedback to each other and students form their self-evaluations based	Students evaluate the group's collaborative drawing once completed. The	Kitsantas and Cleary (2016)

(continued)

Table 10.3 (continued)

SRL processes	Fictional self-portrait	Free writing and collaborative drawing	References linking art instruction and self-regulated learning processes
	on whether the message they are hoping to convey in the self-portrait is actually being communicated	self-evaluation involves how well they worked with their peers and whether their drawings were able to visually describe their thoughts and feelings	
Causal attribution	Instructor and peers help students attribute the message of the photographs to specific characteristics such as lighting, setting, dress, etc. This type of feedback is constructive and provides students with goals and strategies for adjustments and improvements	Students share their artwork with the class which through feedback, helps students understand that art can communicate something deep within themselves rather than what has commonly been done or is more superficial. Feedback helps students adjust plans for future work towards final project	Bandura (1986), DiBenedetto and Zimmerman (2010), Kitsantas and Cleary (2016)
Self-reaction			
Self-satisfaction	The instructor's goal is to teach students how to convey a personal message. The satisfaction they receive is determined by the degree to which they believe they have been able to do this	Students' reactions to their collaborative drawings may or may not result in satisfaction. The teacher uses the students' reactions to spark further interest and motivation	Zimmerman, Schunk, and DiBenedetto (2015)
Adaptive/ defensive	Students who struggle are encouraged to view the work of professional artists and to think deeply about themselves. Articulating their feelings in writing helps prevent students from becoming defensive about their photography	Students in the Honors art class are expected to be able to receive and provide critiques of artwork. The teacher scaffolds so that students learn from the feedback provided	Abdulla and Cramond (2017), Bembenutty, White, and DiBenedetto (2016), Kitsantas and Cleary (2016)

interest to visual arts instruction. In one investigation 131 Dutch 10th grade students who observed models create collages and write poetry tended to be more intrinsically motivated and creative than those who did not (Groenendijk, Janssen, Rijlaarsdam, & van den Bergh, 2013). Depriving high school students from taking ownership and responsibility for their learning can affect their interest in the learning event (Bandura, 1986; Yeager, Lee, & Dahl, 2017).

Ms. Garrett developed two distinct lessons that involved students creating a personal connection between themselves and their artwork thus the *goal orientation* became a personal one of mastery, rather than a social comparison one of performance. Mastery learning is obvious in her two lessons as students display laughter and joy in their creations. This addresses the arts learning standard of working towards synthesizing and relating knowledge and personal experiences to make art (National Core Arts Standards, 2014). Research suggests that students who are beginning a learning task, as was done in both of Ms. Garrett's lessons, should be directed to focus goals on learning and mastering new skills rather than on attaining performance outcomes, and that mastery learning leads to better outcomes and motivation (Kitsantas & Cleary, 2016; Zimmerman, Schunk & DiBenedetto, 2015).

Task analysis refers to processes which involve understanding the *goals* students set for themselves and the *strategic plans* to accomplish these goals (Zimmerman, Schunk, & DiBenedetto, 2015). In the Fictional Self-Portrait lesson students needed to determine what message they wanted their pictures to convey. This involved creative planning activities to reach their goals, for example, deciding where to take the picture, the clothes to wear, the time of day, background or props needed for the photo, and the lighting. In the Free Writing and Collaborative Drawing lesson, the students needed to articulate their feelings in a private writing exercise and then set goals of what aspect of their writing they would like to draw. This involved strategically planning which medium to use and how to go about creating the drawing (i.e. sketching, coloring, shading, abstractions). Sternberg and Kaufman (2012) indicate that individuals may choose different approaches to making creative contributions. For example, they may choose to replicate an existing work of art, redefine a work of art in a new perspective, or even redirect the artwork by taking it in a new direction. The students in both of Ms. Garrett's classes needed to make a decision about which approach they would take to accomplish their goals. Self-regulated students strategize what plan of action to take (White & DiBenedetto, 2015).

The performance phase involves exercising self-control and self-observation. Self-regulated students use various strategies such as *imagery* and *attention focusing*. In both lessons, Ms. Garrett showed students models of the kind of creativity she was trying to develop in them. The models likely helped the students create images of their own art work. The models served another purpose in requiring the students to pay close attention to critical aspects of the artwork and to be attentive in their own works of art. For example, the picture of the homeless girl who was very clean, wearing nice clothes, had manicured nails, and makeup that was obviously smudged does not convey a accurate picture of a homeless girl (See Fig. 10.1).

Prior to the investigation by Gorenendijk, Janssen, Rijlaarsdam, and van den Bergh (2013), there appears to have been no experimental studies on secondary arts classrooms examining the effect of observational learning with peer models on students' artistic creativity. This study looked at creativity in both the visual arts and in creative writing. Students observed models in videos think aloud about problem solving, exploration, generating ideas, and flexibility in material use. Students who observed the models produced work that was rated as more creative than those who did not. It is critical for observers to focus attention on key aspects of the model in order to learn from it (Bandura, 1986). Efland (2002) indicates that students need to create visual images, a cognitive task involving the ability to imagine or think about images that have not yet been created. Models can provide examples of this type of cognition by thinking aloud.

Self-observation includes two key processes: *metacognitive monitoring* and *self-recording*. In the Fictional Self-Portrait lesson, as students snapped pictures of themselves they were examining them closely to determine if they conveyed the message they wanted to convey. Ms. Garrett instructed them to ask themselves questions to help students narrow and focus their ideas. Self-recording took the form of both written (self-questions and proposal) and visual (photographs). In the Free Writing and Collaborative Drawing lesson, the students had to be metacognitive to ensure that their writing and drawings creatively reflected their personal feelings. Self-recording was evident when Ms. Garrett asked the students do the writing exercise first, followed by the drawing, a creative visual representation of their writing. Students needed to creatively problem-solve on how they were going to take the part of the previous student's drawing that was visible, and extend upon it to convey their own feelings.

In a study by van de Kamp, Admiraal, van Drie, and Rijlaarsdam (2014), 11th grade students were explicitly taught metacognitive strategies and assessed on their fluency, flexibility and originality as indicators of divergent thinking. Students taught the intervention scored higher on fluency and flexibility measures than those who were in the control group suggesting that teaching metacognition can help improve the quality of creative artwork in high school students. Self-recording has also been found to improve skill acquisition in musicians (McPherson & Renwick, 2011). Musicians will "mentally track" their performance and use these self-observations to monitor, adjust, and shape their performance until it approaches the targeted performance level.

In the self-reflection phase of self-regulated learning students engage in self-judgments and self-reactions to performance. Self-regulated students will form judgments about their performance based on *self-evaluative standards* and the *attributional causes* they assign to their performance. In the first lesson, students received feedback from their peers and teacher on the selfies they were taking. In the second lesson, the students evaluated their own ability to communicate feelings in a drawing form and on how well they worked with their peers. According to Kitsantas and Cleary (2016) adolescents focus their evaluations based on criteria they have set for themselves.

In both lessons students attributed performance based on their satisfaction of their own creative outcomes. A feature of art work is that it is unique to the creator; therefore, students were not expected to duplicate an existing portrait or collage. In both lessons, students received feedback from Mrs. Garrett, their peers, and themselves as they examined their artwork. In the photography class, features such as lighting, setting, dress, and demeanor were examined. In the second lesson, students received feedback as to whether their message was evident in their drawing. They selected a medium to use and an aspect of their writing to communicate. In both lessons, the feedback was based on items that a student can control by making adjustments and adaptations, creatively fine-tuning their portrait or drawing until it conveyed the message they wanted to convey. Bandura (1986) emphasizes the student as an active agent, one who is able to exercise control over learning. High school students who attribute performance to strategy use tend to outperform those who attribute outcomes to effort, skill, and ability (DiBenedetto & Zimmerman, 2010; Kitsantas & Cleary, 2016).

Regarding self-reactions, self-regulated students react with levels of *self-satisfaction* and *affect* (adaptiveness versus defensiveness). Because both lessons were beginning lessons, students may not have felt satisfied with the initial outcomes. Ms. Garrett used students' reactions to motivate them to improve, moving them towards reaching the art standard of generating and conceptualizing artistic ideas and work(National Core Arts Standards, 2014). She also provided models and demonstrations so that students could make connections between strategies and final artwork, which also addresses the art standard of interpreting intent and meaning in artistic work and of relating artistic ideas and works with societal, cultural and historical context to deepen understanding (National Core Arts Standards, 2014). By moving the focus away from personal attributes, students are more likely to respond adaptively rather than defensively to feedback. Ms. Garrett provided opportunities for scaffolding and peer modeling. Focusing on behavior versus personal skills and traits helps provide the self-control that is an essential characteristic of the self-regulated learner (Zimmerman, Schunk, & DiBenedetto, 2015).

To promote creativity and self-regulated learning in similar art lessons, it would be useful if there were more time for classroom discourse on the students' initial projects (selfies and collages). One of the critical features of the three-phase model is the dynamic nature of the learning (Kitsantas & Cleary, 2016). After discussion, the teacher can encourage students who feel unsatisfied with the outcomes to start again using a different strategy, thus emphasizing the adaptability and flexibility found in a self-regulated art student (Abdulla & Cramond, 2017; Bembenutty, White, & DiBenedetto, 2016).

10.3.4 Dimensions of the Self-regulated Visual Arts Student

Self-regulated students exhibit control over several aspects of their learning. Zimmerman (1998) refers to these aspects as psychological dimensions addressing the criteria questions of who, where, what, why, when, and how. *Who* refers to the social psychological dimension; for example whether students complete assignments on their own or with peers. It also refers to whether students seek help from others such as a teacher, librarian, or parent. *Where* refers to the environment of the learning event, be it a classroom, bedroom, playground, or park. The *why* question refers to students' motivation for engaging in the learning task. For example, are students motivated intrinsically or is the motivation socially driven? The *when* refers to the time dedicated to completing the task. It involves aspects such as time of day, length of time, whether students procrastinate or delay gratification to work on an academic task. The *how* refers to the psychological dimension of methods or strategies students use. The dimensions are critical in learning because they can be taught to students and because they provide students with choices. Teachers can help learners become better self-regulators by helping them understand the importance of the dimensions and how various decisions made influence task completion (Schunk & Usher, 2013).

Table 10.4 outlines some ways in which students regulate the dimensions for learning. In the photography lesson students make strategic decisions about where they will photograph themselves and how (i.e. location, time of day, lighting, dress, pose). The example of a poorly done self-portrait, the homeless girl, demonstrates a creative product by a student who did not take the dimensions into account, and serves as a model for students of what *not to do*. In the second lesson, the self-regulated student must make decisions about how to portray a deep and reflective self-image. While the environment is set for the class, students must problem-solve on what personal message they would like to covey, how they are going to extend their drawing from their previous classmate's, and how they are going to collaborate with group members to create a final product. White and DiBenedetto (2015) suggest that the ways in which a high school lesson is planned influence how well students can be trained to act on the psychological dimensions that promote self-regulation. Ms. Garrett sets up task requirements, classroom environment, and social conditions so that students are motivated to respond to the six criteria questions without necessarily being aware they are doing so. It might be more beneficial for a teacher to explicitly discuss the psychological dimensions with visual arts students as they undertake a creative project. A brief discussion can help promote self-directedness by ensuring students are cognitively aware of the dimensions and their role in creating art.

Research on creativity and art instruction supports the importance of the dimensions although most publications do not label these psychological processes in the same way as self-regulated learning theorists do. For example, there is an emphasis on whether the art work involves collaboration, a recognition of the need for a solution or novel product, a focus on the creator's motivation and problem

Table 10.4 Psychological dimensions and criteria of self-regulated learning in the visual arts' lessons

Lesson	With Whom?	Where?	What?	Why?	When?	How?
Fictional self-portrait	Individually and then with a classmate; students seek peer's feedback. Teacher uses professional artists' work as models of self-portraitures	Initially in the graphics design classroom; students must be strategic in deciding where to set the context for the final product	Differentiate between a selfie and the genre of self-portraiture; students must be self-directed to create an alternative representation of oneself in written form and in a photograph	Instructor provides students with the skills to convey a meaningful message about themselves. Provides teenagers with the opportunity to make their own decisions about how to express their individuality in artistic form	During class for 2–3 weeks; may also take place outside of school depending on environment selected by the student	Students use phones, discussions with peers, teachers, and artists' work as models. Students need to be strategic to set up the contextual background, lighting, dress, pose, and message about what they want to covey
Writing and collaborative drawing	Students work individually then with peers in groups of six. Teacher uses models of collaborative artwork to provide examples. Students encouraged to seek help as needed	Art classroom	Students use writing to get in touch with deep feelings which are then used as an inspiration for artwork. Students collaboratively create artwork. Final project involves a topic in which students feel deeply about	Instructor is teaching students that art making is more than just the skills of the artist. Emphasizes the importance of the strategies and processes used in addition to the final product	Students work on their art work inside the classroom over 2–3 weeks. Additional writing exercises take place for homework	Students need to problem-solve on a strategy to use that will allow them to extend their classmate's drawing onto one of their own. Students are encouraged to attend to feedback from their peers. Students must be strategic in their choice of medium and topic

solving skills, a structuring of the environment so that it is conducive for creativity, and an emphasis on creating something in a timely manner. While there is research linking music instruction in the secondary classroom to self-regulated learning (see Miksza, McPherson, Herceg, & Meider, 2018/this volume), research connecting creativity and visual arts instruction and social cognitive theory is extremely limited.

10.4 Future Recommendations

As previously indicated, there appears to be little research on self-regulated learning and the visual arts high school classroom. Many of the skills described earlier in the chapter highlight the importance of art and creativity in our lives. Skills such as the ability to think "outside the box," divergent thinking, flexibility, and adaptability, are needed on a daily basis. The Common Core State Standards require educators to teach students how to be college and/or career ready, which encompasses skills such as the ability to apply cognitive tasks in a creative manner to problem-solve for solutions (White & DiBenedetto, 2015). In our daily lives, we frequently encounter challenges in our environment. Social cognitive theory describes how our personal characteristics, behavior, and the environment interact. The models of self-regulated learning identify the processes involved in learning. Many people do not see themselves as "artistic" or "creative". Research on teaching art students to be self-regulated can help foster the belief that anyone is capable of thinking creatively. It moves students away from thinking about outcomes as the result of internal personal attributions or traits such as "artistic abilities" (Weiner, 2005) to what Bandura (1986) has described as thinking about themselves as agents with control over multiple aspects of their lives.

Future research should explore methods to help secondary art teachers become more self-regulated. Doing so might empower teachers to reach students who have misconceptions about their ability to be creative and artistic (Bembenutty, White, & Vélez, 2015). Research is also needed on how self-regulated learning can be used to teach visual arts instruction across multiple content areas. Efland (2002) describes opportunities for artistic work in subjects such as history, physical sciences, social sciences and the humanities. According to the University of North Carolina School of the Arts' Manifesto: "integrative arts education from an early age sparks a lifetime of creative thinking, powerful self-expression, and innovative problem-solving" (http://www.uncsa.edu/chancellor/strategic-plan/manifesto.aspx). Providing such instruction can help students transfer self-regulated learning skills for the visual arts across multiple disciplines. In conclusion, the better we understand how self-regulated learning can be used to teach the visual arts, the better prepared our students will be when they encounter life's challenges to meet these challenges with creative solutions.

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Chapter 11
Developing Self-regulated Musicians

Peter Miksza, Gary E. McPherson, Amanda Herceg and Kimberly Mieder

Abstract Highlighted within this chapter is a collection of best practices for encouraging student musicians to develop as self-regulated learners. Two model lessons are presented that are emblematic of the kinds of considerations, methods, and techniques that teachers may find useful for classroom applications with a variety of beginning, intermediate, and advanced level performers. A brief discussion of selected aspects of self-regulated learning theory follows the model lessons and this is used as a framework for understanding the processes, skills, and dispositions that are characteristic of self-regulated music learners. We present the primary components of the theory with an eye towards practical applications in the classroom. The chapter concludes with a commentary and analysis of the two model lessons and how these typify approaches to the teaching of musical self-regulation.

P. Miksza (✉)
Indiana University Jacobs School of Music, Indiana University, Bloomington, IN, USA
e-mail: pmiksza@indiana.edu

G. E. McPherson
Melbourne Conservatorium of Music, University of Melbourne, Melbourne, VIC, Australia

A. Herceg
McNabb Middle School, Montgomery County, KY, USA

K. Mieder
Hillsborough High School, Doctoral Candidate in Music Education, University of South Florida, Tampa, FL, USA

M. K. DiBenedetto (ed.), *Connecting Self-regulated Learning and Performance with Instruction Across High School Content Areas*,
https://doi.org/10.1007/978-3-319-90928-8_11

Table 11.1 Articulation accuracy lesson plan

Teacher: Amanda Herceg, BME, Indiana University; MME, University of Georgia; Indiana Teaching Certification, K-12 General & Instrumental Music	**Grade Level(s)**: Intermediate Instrumental Music (7–10th grade)
School: Tri-North Middle School	**Subject**: Band
City and State: Bloomington, IN	
Instructional Plan Title: Articulation Accuracy	
National Standards for Arts Education: **MUSIC** Anchor Standard 4: Select, analyze, and interpret artistic work for presentation Enduring Understanding: Performers' interest in and knowledge of musical works, understanding of their own technical skill, and the context for a performance influence the selection of repertoire Essential Question(s): How do performers select repertoire? Anchor Standard 5: Develop and refine artistic techniques and work for presentation Enduring Understanding: To express their musical ideas, musicians analyze, evaluate, and refine their performance over time through openness to new ideas, persistence, and the application of appropriate criteria Essential Question(s): How do performers interpret musical works? Essential Question(s): How do musicians improve the quality of their performance? Anchor Standard 6: Convey meaning through the presentation of artistic work Enduring Understanding: Musicians judge performance based on criteria that vary across time, place, and cultures Essential Question(s): When is a performance judged ready to present? How do context and the manner in which musical work is presented influence audience response?	
Learning Objectives: 1. Students will aurally discriminate between articulation styles 2. Students will demonstrate characteristic tonguing style on a band instrument given written notation 3. Students will set goals, evaluate and reflect on personal skill development 4. Students will demonstrate learning through lesson observations, focused practice sessions, and solo performances	
Instructional and Learning Materials Needed: Repertoire or etude featuring contrasting articulation styles, instrument for modeling, projector/dry erase board, Focused Practice Session paper (see Table 11.2 at the end of the lesson plan) Performance evaluation rubric (see Table 11.3 at the end of the lesson plan) Video recording technology	
Lesson Duration: 100 min over the span of two class periods	
Teaching and Learning	

Min on this Activity	Targeted Activity	Purpose of Activity
3	**Orienting Students to Lesson**: • Upon assembling their instruments, students write down the homework posted on the board into their practice journals (see Table 11.1) • Students then begin bell work: "air playing" (blowing through the instrument while fingering) an exercise in the book while focusing on tonguing technique	• Writing down their homework at the start of class ensures students aware of our goal for the day and have their assignments written down • Working independently on the bell drill gets the students ready and focused for the lesson

(continued)

Table 11.1 (continued)

10	**Motivation**: • Capture student interest by making a connection with prior knowledge • Remind students that they have been taught to tongue every note in the music • Informally assess by asking a member of each section to describe their instrument's tonguing syllable and engage the entire ensemble in a modeling exercise to review • The teacher or a student plays a rhythm on the mouthpiece or entire instrument and the rest of the class echoes back • Rotate through different students as a model • Play a melody two different ways (tongued and slurred) and ask the students to describe the similarities and differences • Explain the difference they hear is a technique called *slurring* • Show students the slurring symbol and explain that from now on it will become part of their everyday playing	• The modeling activity allows for informal assessment of the prerequisite of tonguing all notes before slurring is introduced • Engaging in activities where students work together to discover the learning objectives can enhance intrinsic motivation • Listening and identifying the similarities and differences between two melodies helps students to become aware that not all notes are tongued • A "rote before note" strategy can eliminate visual distractions and help students focus on the sensations necessary for skill development. For example, having students aurally identify and produce a slur between two notes on their instrument before learning what it is called and what it looks like in their music
10	**Whole Class Instruction**: • Introduce a simple piece of music that uses slurs and teach new practice strategies • Have students sing the articulation, "Ta-ah" and then sing the articulation while fingering along • Differentiate instruction to meet instrument specific demands, especially for trombone players and percussionists • Have students write a "T" over all of the notes in the music that they will tongue • Ask students if there are other practice strategies that can be used to practice slurring – e.g., repeating small sections, chunking it, and gradually speeding up the tempo • Conclude the group lesson by rehearsing practice strategies in conjunction with the new strategies	• Rehearse practice strategies to help students develop the skills to aurally detect errors or differences between two similar performances, set attainable goals, apply strategies effectively, and reflect on their progress • The two new practice strategies isolate the physical demands (sing the articulation while fingering along), and the conceptual understanding (write a "T" over tongued notes) • A student's performance of either exercise will help the teacher better address individual differences
10	**Guided Practice/Providing Feedback**: • Students are divided into pairs to prepare for a duet performance on a	• Individual, partner, and small-group practice are valuable because allow students to develop skills in a low-stress environment

(continued)

Table 11.1 (continued)

	piece that uses a combination of slurs and tongued notes – Considerations: carefully assign groups, giving each member of the group a rehearsing responsibility, hold each student accountable • Following group practice, video record the students' performance and fill out a rubric with additional open-ended comments – Consideration: call playing assessments "solo/duet performances," because it sounds like a celebration, whereas "playing test" sounds intimidating for some students • Students review the comments immediately after they perform	• Group practice engages students in interdependent problem-solving scenarios that prepare them for productive chamber music rehearsing
5	**Independent Practice**: • Students apply and transfer tonguing and slurring skills. • Monitor independent progress and mastery is monitored through weekly Focused Practice Sessions (see Table 11.2) documentation • Require students to complete one independent practice assignment per week and facto it into their band grade	• Focused Practice Sessions are important, because they help students develop goal setting, effective practice strategies, and reflective tendencies • Students can reflect on the progress made through recordings
10	**Evaluation of Learning and Assessments**: • Use classroom observations, guided practice, and independent practice activities as formative assessments • Use in-class solo performances for summative assessments • Use a detailed rubric and written comments to judge mastery on formative and summative assessments (see Table 11.3) • Students receive feedback via a rubric and comments instantly after a solo performance	• Solo performances carry the most weight in summative assessments because students demonstrate their achievement in a single performance with immediate feedback • The immediate feedback and saved video can be used later to form a portfolio of student growth
2	**Closing Activities**: • End each lesson by verbally spot-questioning student understanding of the new slurring technique, practice strategies, and homework practice assignments	• The closing activity reminds students what they accomplished in class and what they need to do to continue improving and be prepared for tomorrow's lesson

(continued)

Table 11.1 (continued)

Specific Strategies used to Address Exceptional Students and/or Students for whom English is a Second Language:
• Enrichment activities include having students compose a melody using slurs, be a leader for a modeling activity, or engage in structured improvisation activities that incorporate variety in articulation. See whole class instruction for ENL strategies
• ENL adaptations include modeling rather than using several descriptive words, asking students to repeat key vocabulary words, and having students point in the music where we are starting and comparing with their neighbor

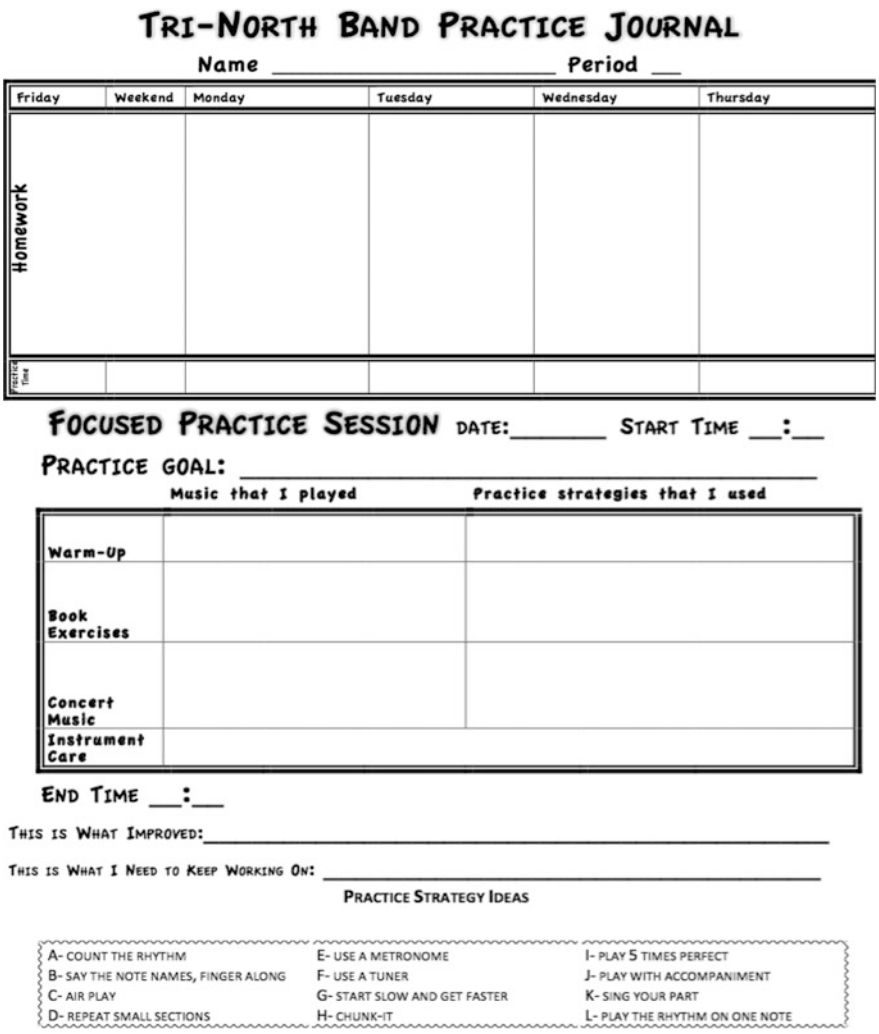
11.1 Narrative of the Articulation Accuracy Lesson

Tri-North Middle School is a public middle school in the Monroe County Community School Corporation in Bloomington, Indiana. Tri-North Middle School serves 591 students in grades 7–8; 38% of students received free or reduced lunch, and the minority enrollment (22%) is mostly African American and Asian students. A fine art credit is not required for high school enrollment and approximately 22% of the study body participates in band, choir, or orchestra. There are three heterogeneous sections of beginning band and two heterogeneous sections of advanced band (i.e., mixed brass, woodwind, and percussion instrumentalists) with all sections of each band coming together for concerts after a few full band rehearsals. The class size of each band section ranges from 10 to 30, and most classes contain 1 or 2 students with exceptionalities who require an Individualized Education Plan (IEP).

The learning objectives for this lesson were inspired by a common challenge for middle school instrumentalists: independent practice. In my own classroom, I realized that when students practice independently they tend to practice holistically rather than analytically. Such holistic practice is characterized by playing though a piece once from beginning to end before moving on to something new. Students often overlook mistakes and this results in inefficient practice in which errors are repeated without being corrected. Consequently, three learning objectives were chosen as a means of improving the students' practice. These three learning objectives aimed to enable the students: (a) to demonstrate characteristic tonguing style on a band instrument with written notation; (b) to set goals, evaluate, and reflect on their personal skill development; and (c) to demonstrate what they have learned through lesson observations, focused practice sessions, and solo performances (see Table 11.1). These objectives align well with the National Standards for Arts Education anchor standards related to performance outcomes (National Core Arts Standards, n.d.). The lesson duration is one hundred minutes over the span of two class periods, and the lesson materials included an etude featuring contrasting articulation styles, an instrument for modeling, a projector or dry erase board, a Focused Practice Session template (Table 11.2), and video recording technology.

An efficient music classroom learning environment is one where procedures are consistent and well-rehearsed. When students enter the band room, they immediately go to their assigned seat with their instrument, music stand, music, and a pencil. When

Table 11.2 Practice journal and focused practice session homework templates



TRI-NORTH BAND PRACTICE JOURNAL

Name _____ Period __

	Friday	Weekend	Monday	Tuesday	Wednesday	Thursday
Homework						
Practice Time						

FOCUSED PRACTICE SESSION DATE:_____ START TIME __:__

PRACTICE GOAL: _____

	Music that I played	Practice strategies that I used
Warm-Up		
Book Exercises		
Concert Music		
Instrument Care		

END TIME __:__

THIS IS WHAT IMPROVED:_____

THIS IS WHAT I NEED TO KEEP WORKING ON: _____

PRACTICE STRATEGY IDEAS

A- COUNT THE RHYTHM	E- USE A METRONOME	I- PLAY 5 TIMES PERFECT
B- SAY THE NOTE NAMES, FINGER ALONG	F- USE A TUNER	J- PLAY WITH ACCOMPANIMENT
C- AIR PLAY	G- START SLOW AND GET FASTER	K- SING YOUR PART
D- REPEAT SMALL SECTIONS	H- CHUNK-IT	L- PLAY THE RHYTHM ON ONE NOTE

the bell rings, students assemble their instrument, write down their homework in their Practice Journal (Table 11.2), and start on the bell work. The agenda for the day, bell work assignment (silently practice notes and rhythms in the etude), and homework assignments (complete a Focused Practice Session template and prepare the etude for a duet performance tomorrow) are projected in the front of the band room.

The targeted activity for the lesson described here is simplified to a novice level. I selected a simplified activity to demonstrate how the concept of slurring notes is introduced; however, these lesson procedures can be transferred to intermediate level articulation skills by reviewing familiar articulations before introducing new articulations or faster tempos.

I begin the lesson by informally assessing the prerequisites of tonguing by asking a member of each section to describe or demonstrate an appropriate tonguing syllable for their instrument (e.g., "Tah, Toh, Tu"). Then, I engage the entire ensemble in a call and response exercise to review good tonguing technique. Using the pitches concert Bb and concert D, I play a four beat melody for the class to immediately echo back on their instrument. I then assess tonguing technique, and address student-specific needs before repeating these activities several times and allowing student volunteers to model the pattern. Next, I play a melody two different ways (tongued and slurred) and ask the students to describe the similarities and differences between the melodies. Students should conclude that while the notes and rhythms are the same, the first melody was tongued and the second melody was not tongued. Then, I explain that the difference they hear is a technique called *slurring*, so I show students the slurring symbol, and explain that slurring will become part of their everyday playing to add variety in melodies. I continue with the call and response exercise with the addition of occasional slurred notes, and address specific student needs. Now that students can aurally identify and produce a slur between two notes on their instrument, I teach them what the slur symbol looks like in the context of the etude. The purpose of this "rote before note" strategy is to eliminate the visual distractions of the musical notation in order to focus on the physical demands required to master this skill.

Once I have reviewed the prerequisites, the students are able to visually and aurally identify the new articulation. It is important to rehearse practice strategies that will help them master the new articulation in the context of the etude with rhythmic variety. Two effective practice strategies for learning slurs in a group setting are to have students sing the articulation, "Tah-ah" and sing the articulation while fingering along. Differentiated instruction is required to meet instrument specific demands, especially for trombone players and percussionists. Trombone players can sing "Tah-dah" and percussionists can count the rhythm while playing on mallets. As a second strategy, I ask students to write the letter "T" over all of the notes in the music that they will tongue, and to identify other practice strategies that can be used to practice slurring such as repeating small sections and gradually increasing the tempo. I conclude the lesson by rehearsing these practice strategies as a group in conjunction with the new articulation strategies.

To close the lesson, I explain that the goal for tomorrow will be to split into pairs to rehearse and perform this etude for the class. For homework, students are expected to complete a Focused Practice Session template (Table 11.2), that requires students to employ several self-regulatory skills: goal setting, identification of effective practice strategies, and reflection.

On the second day of this lesson, students follow the same beginning-of-class procedures as the first day. I have the students play through the etude as a full class, and then ask them to identify areas of the piece that need the most improvement. I then encourage student input on the strategies that would be most effective to maximize improvement and rehearse a few of these with the full class before continuing to the guided practice section of the lesson. Next, I divide the students into pairs to prepare for a duet performance on the etude. Each pair is encouraged to share

Table 11.3 Performance evaluation rubric

Criteria	Ratings				Pts
Pitch Accuracy view longer description	All Correct 3 pts	Mostly Correct 2 pts	Sometimes Correct 1 pts	Needs Improvement 0 pts	3 pts
Rhythm Accuracy view longer description	All Correct 3 pts	Mostly Correct 2 pts	Sometimes Correct 1 pts	Needs Improvement 0 pts	3 pts
Air Support/Embouchure view longer description	Air support and embouchure are appropriate 2 pts	Air support or embouchure is inconsistent or needs improvement. See comments. 1 pts	Air support and embouchure need improvement. 0 pts		2 pts
Articulation view longer description	Tonguing technique is appropriate. Toungued and slurred notes are all accurately performed with clarity. 3 pts	Tonguing technique is appropriate. Tongued and slurred notes are mostly accurate. 2 pts	Tonguing technique is appropriate, but tongued and slurred notes are performed innaccurately. 1 pts	Tongued and slurred notes lack clarity. Tonguing technique needs improvement. 0 pts	3 pts

practice strategies that they found most useful in their Focused Practice Session homework assignment. Then, the students practice together in pairs for 10 min to prepare the piece using strategies that they have found to be most effective at home. Finally, each pair performs for the class. I then video-record each performance and fill out a rubric with additional open-ended comments so students have access to feedback immediately after their performance (Table 11.3). To maintain student engagement, I ask class members who are observing each pair, to think about one positive and one constructive comment that they can share with their classmates. I randomly call on these students to provide feedback for the performers.

To conclude the lesson, I use verbal spot questioning to confirm student understanding of slurring identification (visual and aural) and performance. For example, "When you see a piece of music, how do you know when to slur? What does it mean to slur? What steps would you take to teach this to a friend?"

A feature of this lesson is that it involves a sequenced approach to introducing the new skill of teaching through modeling, aural identification, physical performance of the skill, and finally visual identification. This allows teachers to quickly assess student comprehension and performance of the new skill before they apply this knowledge within the context of learning an etude. Another strength is the ability for students to engage in guided practice, individual practice, and collaboration with peers in order to develop a deeper understanding of the new concept. Teachers may find it challenging to engage students in independent group work if they are not careful to organize the activity and communicate expectations of student behavior. Given the large class sizes of instrumental ensembles, it is imperative that students have a clear idea of how to collaborate. If not, classroom management issues could result in significant problems. The most important feature of this lesson is that it allows students to transfer the skills, knowledge and understandings gained from the learning activity to any other skill and concept that is taught in a performance based class. It can also help to overcome some of the problems students experience when practicing without their teacher's guidance. In these situations, it is common for them to practice holistically by running through the etude without thinking analytically or using effective practice strategies. An expected outcome therefore is that students will apply the error detection and practice strategies they acquire as part of the lessons during their own daily practice. Teachers can help to ensure that their student's practice effectively by moving around the room during these types of group collaboration and asking individual members of the class to identify the sections in the music that they believe need the most improvement. Importantly, they should also encourage students to reflect on the strategies they need to employ in order to ensure they improve.

11.2 Narrative of the Practice Strategies for Band Lesson

This lesson describes a 90-min training class that takes place after school. Students representing grade levels nine through twelve and from all levels of playing ability often participate in the lesson (Table 11.4). The class this lesson was designed for

Table 11.4 Practice strategies for band lesson plan

Teacher: Kimberly Mieder, High School Band Director, Hillsborough High School, Tampa Florida; University of South Florida Doctoral Candidate in Music Education Research, Educational Psychology and Conducting	**Grade Level(s)**: High School Instrumental Music (9–12th grade)
School: Hillsborough High School	**Subject**: Band
City and State: Tampa, Florida	
Instructional Plan Title: Practice Strategies for Band	
National Standards for Arts Education: **MUSIC** Anchor Standard 4: Select, analyze, and interpret artistic work for presentation Enduring Understanding: Performers' interest in and knowledge of musical works, understanding of their own technical skill, and the context for a performance influence the selection of repertoire Essential Question(s): How do performers select repertoire? Anchor Standard 5: Develop and refine artistic techniques and work for presentation Enduring Understanding: To express their musical ideas, musicians analyze, evaluate, and refine their performance over time through openness to new ideas, persistence, and the application of appropriate criteria Essential Question(s): How do performers interpret musical works? Essential Question(s): How do musicians improve the quality of their performance? Anchor Standard 6: Convey meaning through the presentation of artistic work Enduring Understanding: Musicians judge performance based on criteria that vary across time, place, and cultures Essential Question(s): When is a performance judged ready to present? How do context and the manner in which musical work is presented influence audience response?	
Learning Objectives: Students will demonstrate an understanding of processes and strategies that can enhance practice effectiveness and performance achievement	
Instructional and Learning Materials Needed: • Unison band etude or a particular section of a full band arrangement of your choice that has been transcribed for unison practice • A list of suggested practice strategies (see Table 11.5 at the end of the lesson plan) • A "Rules of the Road" handout (see Table 11.6 at the end of the lesson plan) • A Practice Processes Worksheet that includes guidelines for Cooperative Group Activities (see Table 11.7 at the end of the lesson plan) • Video recording equipment	
Lesson Duration: 90 min (1 block session or split across two more typical class lengths)	
Teaching and Learning	

Min on this Activity	**Targeted Activity**	**Purpose of Activity**
3	**Orienting Students to Lesson**: • Students organize themselves by taking out their instruments, folders, and pencils and being seated by the starting time	• Everyone needs to be ready to begin at the same time

(continued)

Table 11.4 (continued)

10	**Motivation**: • Students will listen to several recordings of advanced pieces including a technically challenging unison etude	• Challenging yet appealing music will motivate students to practice during the lesson
15	**Whole Class Instruction**: • Explain the importance of practice • Play the unison etude will take place first with no attempt to correct errors or assess performance quality • Video record the sight reading session of the full band excerpt • A list of practice strategies is provided for reference – Check list consists of three categories strategies: repetition, element elimination, and make it musical (see Table 11.5) • Discuss the practice strategies and how apply them to solve musical problems • Question students about other challenges and what strategies they might apply to remedy performance problems	• Sight-reading etude will give the students an opportunity to experience the challenges present • The list offers guidelines for self-monitoring during practice and making adjustments when strategies appear to be ineffective
20	**Guided Practice/Providing Feedback**: • Students observe each other as they practice in small groups using the practice strategy checklist – The students are grouped in pairs of two and asked to practice for 10 min while one student observes and checks off the observed behaviors on the practice strategy checklist (Table 11.6) while the other practices the etude, then they switch roles • Students conduct small-group verbal mediation exercises using	• Group work provides opportunities for peer collaboration and risk taking • The sharing and modeling will further reinforce the definition and appropriate application of each strategy

(continued)

Table 11.4 (continued)

	the Practice Processes Worksheet (Table 11.7) – The students think aloud by saying what they are doing and why they are doing it during the practice session – One student will practice while the other interjects with questions pertaining to the purpose, goal, and effectiveness of their peer's practicing • Teacher leads group discussion where students share and model the practice behaviors that were verbalized using the practice strategy check list as a guide	
30	**Independent Practice**: • Students sight read a small section from a challenging yet appealing full band arrangement • Students then practice their respective parts individually for 20 min using the strategies that they have learned thus far	• Giving students an opportunity to apply the practice strategies to a full band work that they are motivated to play provides an opportunity for transfer • Individual practice will allow the instructor to observe students and assess their use of strategies
10	**Evaluation of Learning and Assessments**: • A video recording will also be made of the final performance of the etude after the practice session • A random sample of the practice behaviors the students observed among their peers will be compared to the teacher's observations made during the students' individual practice sessions	• The recordings can be played as part of the final discussion giving students an opportunity to provide feedback and assessment
12	**Closing Activities**: • Students return to the full band setting to perform the work a final time and to listen to recordings • A final group discussion provides opportunities for	• The final performance and discussion after the 20-min break out session of individual practice provides an opportunity for a summative assessment

(continued)

Table 11.4 (continued)

	feedback and assessment as well as a review of strategies and adjustments that were most effective • Students are provided with suggestions for future practice sessions	

Specific Strategies used to Address Exceptional Students and/or Students for whom English is a Second Language:
- Students with ESE limitations can be grouped with another student who speaks their language, and can mentor and assist struggling students
- Students of exceptionality can be given additional time to complete the group activities and can also be provided with extra follow-up reiteration by the instructor as well as more advanced band students

typically has 30 brass and woodwind players with about 10 years of experience on their instruments. All students are enrolled in either the intermediate or advanced level band course that meets daily in a public high school in the Southeastern United States. This particular high school is an inner-city urban school that serves a population of approximately 70% traditional students and 30% International Baccalaureate magnet program students. The class represents a diverse population of Caucasian (46.6%), African American (16.6%), Hispanic (30%), and Asian (6.5%) students. The lesson included in this chapter can be helpful for fulfilling the performance standards of the National Standards for Arts Education, particularly those pertaining to analyzing, evaluating, and refining performances.

My lesson begins with a short listening session of both a recording of a unison Etude for band that contained technical and lyrical challenges and the "Folk Song Suite" by Vaughan Williams. The unison etude and the full band arrangement were introduced in the previous week's classes during which students were given an opportunity to sight-read the music as a group before practicing the works on their own. The students' initial sight-reading of the Etude is video recorded. At the start of the lesson the students create a second video recording of the unison etude. This is followed by a teacher-led discussion that encourages the students to express their opinions concerning the challenges present in the music. Much of the discussion can focus on the technical challenges posed when attempting to play the etude at an appropriate tempo. I then provide students with a list of suggested practice strategies that I had compiled based on my own research of the most accepted and effective strategies of college music majors and professionals. Using the resulting 22 practice strategies check list (see Table 11.5), I then begin to connect the challenges and concerns students identified with the appropriate practice strategies on the list. While defining each of the 22 practice strategies, I also provide the students with an opportunity to make a connection between knowledge and function by applying each of the strategies to a problem area in the etude. The students are then asked to play through selected parts of the etude using these suggested strategies to

Table 11.5 Practice strategies checklist

22 Practice Strategies Check List

1. _____	Repeat a single measure
2. _____	Repeat a section of the music
3. _____	Repeat the entire work from beginning to the end
4. _____	Mark the part (indicate each time they attempt to mark the part)
5. _____	Slowing down a small part or the entire piece
6. _____	Slowing down and then gradually bringing a section or measure back to tempo
7. _____	Skipping directly to musical sections of the etude and just practicing those spots
8. _____	Use of metronome
9. _____	Sizzle or sing the music away from the instrument
10. _____	Sizzle or sing while fingering the instrument
11. _____	Speak the note names as you finger on your instrument
12. _____	Clap and count or just clap
13. _____	Chaining or whole part whole repetition
14. _____	Play it backwards
15. _____	Take out the articulation and practice with one constant articulation instead, then put the correct articulation back in and play the passage or section as originally written
16. _____	Take out the rhythm and just play the notes in a straight beat, then put the correct rhythm back in and play the passage or section as originally written
17. _____	Make up a more difficult rhythm then what is there in a particular section, then put the correct rhythm back in and play the passage or section as written
18. _____	Close your eyes and picture the musical passage in your mind (mental practice), playing the passage in your mind fingering the instrument and using the body movement that is required
19. _____	Make an attempt to demonstrate dynamics throughout the session
20. _____	Make an attempt to create musical phrasing and explore numerous ways to speak a particular musical thought or sequence of measures
21. _____	Examine different articulation, dynamic, and/or tone color for musical expression
22. _____	Taking a short technical passage and playing one note at a time then adding notes one by one gradually increasing tempo until the passage is solid and up to tempo (woodshedding)

experience the problem solving processes as a group. I categorize the 22 practice strategies into three groups for better recollection and understanding; Element Elimination, Repetition, and Make It Musical. This categorical list of the strategies is used alongside an additional document titled the Rules of the Road (see Table 11.6) which provides guidelines for adjusting and self-monitoring whilst practicing.

I use three group activities to scaffold the students' understanding and application of effective practice techniques. The three activities are the (a) Practice Behavior Observation exercise, (b) Verbal Mediation exercise, and (c) the Practice Processes Worksheet/Intermittent Questioning exercise (see Table 11.7). All three of the cooperative group activities are followed by a teacher-led group discussion that included questioning and student demonstrations for assessment.

Table 11.6 Rules of the road worksheet

Practice strategies by category and making adjustments
Take it out of context/element elimination
• Alter the tempo
• Skip directly to a difficult section
• Sizzle and finger the notes while adhering to dynamics and articulation
• Play a passage or entire selection in straight quarter notes while only focusing on pitch and fingering
• Take out the articulation and/or alter the rhythm to increase challenge
• Play it backwards
• Mental practice
Thoughtful repetition
• Repeat one measure, repeat small sections, or repeat from beginning to end
• Use chaining and/or whole part whole repetition strategies
• Use the metronome effectively
– Know where the pulses fall in each measure
– Understand what note value receives the beat
– Set the metronome either to the pulse or a subdivided pulse
• Woodshedding
Make it musical
• Experiment with dynamics, tone color, tempo variation
• Create phrasing by exploring expressive articulation, dynamics, and/or varied tone
• Explore numerous ways to speak a musical sentence or sequence of thoughts
Making adjustments along the way … "The 5 rules of the road"
1. Always slow things down
2. If you take it out, put it back
3. Don't go from zero to sixty
a. Always proceed gradually
b. Slow then gradually faster
c. When taking elements out put them back one by one
d. When woodshedding, vary the starting spot
4. Use Repetition with thoughtful Intent
5. Use Pauses: "what are you thinking and what you are focusing on"

For the Practice Behavior Observation exercise, the students are grouped in pairs to work collaboratively for 20 min. For 10 min, one student practices while the other observes and documents practice behaviors using the 22 practice strategies check list. The students then switch roles for another 10 min. A teacher led discussion follows the cooperative activity that gives students an opportunity to discuss and demonstrate the practice strategies that they observe. During this first break out activity, I make myself available for questions and assist as a guide while students work in their respective groups. For example, sometimes I observe a practice behavior and notice that the student observer is not checking it off, so I could then assist in re-centering their focus. The students learn to define and apply the strategies and tend to enjoy these opportunities to demonstrate how they can master the etude by using a particular strategy from the list.

The second activity, "Verbal Mediation," was designed to provide students with an opportunity to verbalize what they were doing as they practiced. Now that they have a language to use that could help them describe their choices, they can also be

Table 11.7 Practice processes worksheet

1. Practice behavior observation exercise
a. Students work in groups of two
b. One student practices while the other student checks off the practice behavior he or she observes on the practice strategy check list
c. A follow-up full-group discussion of the practice behavior observed
2. Verbal mediation exercise
a. Students work in groups of two
b. Students will take turns verbalizing every practice decision and goal as they practice while their partner observes
c. Observer will check off practice behaviors on the strategy checklist
3. Setting goals and making adjustments
a. In groups of two, students will set a practice goal and decide on strategies to use
b. While one student practices, the other student will interject periodically with the following prompts requiring the student to answer before continuing
1. What are you thinking about as you practice?
2. What are you focusing on?
3. Are you using a practice strategy, and if so which one?
4. Is the strategy you are using working, if not, what should you do now?

asked to think aloud by explaining their intentions and their processes as they practice while the other student checks off what they observe on the practice check list. This is done in groups of two and, again, the students switch roles after 10 min.

The third group activity, the "Intermittent Questioning" exercise, encourages students to work together to define a practice goal related to refining the etude. One student then practices with this goal in mind while the partner student intermittently interjects questions such as: "What are you focused on? Why?"; "What strategy are you using right now? Why?"; and "Is what you are doing right now helping you reach your practice goal?"

After completing all three group activities and the respective follow-up discussion sessions, the students perform the unison etude as a group once more. The performance is video recorded and played alongside the earlier recordings so that the students can assess the performances and evaluate their progress. As a final activity, I play the exemplar recording of the "Folk Song Suite" by Ralph Vaughn-Williams again, remind the students of their desire to learn this new and challenging piece, and we sight read the work again. I then instruct the students to practice individually for 20 min using what they had learned from the group activities and the 22 practice strategies check list. After the 20-min break out practice session, we play the piece again, which provides the students with an opportunity to perform with greater proficiency and ensemble cohesiveness. The students are then engaged in a discussion concerning their goals and the "what", "when" and "how" of practice strategies that can be used to improve one's playing. I then ask the students to explain what their individual challenges were with this piece, what practice goal they set for themselves, and what strategies they used to accomplish that goal. The students are also asked to share what they had achieved and how they accomplished this by modeling their practice behavior for the group.

The lesson concludes with a collective commitment to continue to practice using the 22 practice strategies and "Rules of the Road". I also provide the students with a handout that I designed to assist them in organizing both their individual practice time as well as their small ensemble and instrument sectional rehearsals. The handout provides suggestions for keeping a practice log for themselves and a framework for section leaders to design well-balanced practice sessions with follow-up and accountability procedures for their section members.

My students enjoy working in small groups as the cooperative learning activities provided them with an opportunity to reflect, share ideas, and take risks. It is typically evident in their mastery of the strategies and concepts that this collaborative model helps to stimulate learning in a way that direct- or teacher-led instruction alone does not always achieve. Coordinating small-group practice activities can be challenging for some students since it requires that students be prepared to analyze their own and/or their peers playing and practicing. However, with careful planning and preparation, students will enjoy the change of pace. In addition, navigating the recording technology for immediate listening can be problematic if not prepared carefully ahead of time. The curriculum that this lesson plan is based on provides students with an accessible tool box of practice strategies and processes that help them to problem solve in their practice endeavors both as a group and individually. In this way, it contributes to the advancement of their independent learning abilities.

11.3 Self-regulated Learning Theory and Musical Development

11.3.1 Introduction

Successful musicians devote large amounts of their time to individual, solitary practice in order to improve their performance abilities (Hallam et al., 2012). As such, acquiring music performance skills necessitates learning how to more effectively and efficiently monitor and control one's own learning. It is clear that accomplished musicians have at some point acquired a deep understanding of how to motivate and manage their own learning processes (Hallam, 1997; McPherson, 2005). Traditionally, the development of these understandings hinges on individualized instruction from an expert performer and master teacher (Sosniak, 1985). However, music performance instruction in North American schools typically involves large-group instruction in bands, choirs and orchestras where the needs and priorities of the ensemble can often outweigh those of any given individual. Unfortunately, music teachers tend to emphasize instructional objectives that lead to fine ensemble performances but lack sufficient specific emphasis on the development of each individual student's abilities. For example, it is relatively common within this area of music education to find that although a school music ensemble

may be quite successful, the individuals that make up the ensemble are lacking in independent skill and understanding. As a result, many students in these types of ensembles do not develop the intellectual and musical capacity to guide their own practicing outside of the classroom, which for some can lead to a lack of motivation and/or ultimately attrition from their school program (McPherson, Davidson, & Faulkner, 2012a). Moreover, it is also the case that many of those who continue to learn music until the final years of schooling do not continue performing once they leave school. Part of the reason is that they have not developed sufficient self-regulatory abilities to take charge of their own musical learning independent of their membership of an ensemble (McPherson et al. 2012a).

It is clear that music teachers can benefit from a conceptual model that provides a clear description of the critical processes as well as the dispositions, skills, and intellectual abilities that support individualized learning. We believe therefore that self-regulated learning theory is an intuitively-appealing, evidence-based framework for describing how developing musicians can be empowered to take control of their own learning. In this section of the chapter we will describe how the model lessons documented above can mitigate some of the challenges inherent in school music performance instruction by explicitly and systematically reinforcing principles that are consistent with self-regulated learning theory.

11.3.2 Self-regulation Principles and Music Learning

The principles of self-regulated learning theory are directly aligned with best practices in music education. Several scholars have provided extensive treatments of the relevance and application of self-regulated learning theory to research and pedagogy in music education (e.g., McPherson, Nielsen, & Renwick, 2012b; McPherson & Zimmerman, 2011; Prichard, 2012; Varela, Abrami, & Upitis, 2016). Zimmerman's (2000) social cognitive theory of self-regulated learning is the most prevalent framework in the music education literature and consequently, it is this framework we apply to the discussion in this chapter. There are two key aspects of Zimmerman's theory that we will focus on as we relate self-regulated learning theory to practical issues of music teaching and learning. The first is the three-phase, cyclical process that can be used to illustrate how self-regulated learning is carried out in the moment, and the second is a developmental trajectory involving four stages that describes the steps along the journey of becoming self-regulated. We refer the reader to DiBenedetto (2018/this volume) for a more in-depth discussion of the various components of self-regulated learning theory.

Self-regulated learning unfolds in real-time as a cyclical process wherein a learner negotiates through three phases: forethought, performance, and self-reflection (Zimmerman, 2000). McPherson and Renwick (2011) have presented a detailed description of some of the context-specific processes that each of these phases can embody in music learning. We provide a summary of some of the primary considerations here.

The forethought phase of the self-regulated learning cycle is characterized by the application of task analysis abilities and the influence of selected self-motivation beliefs. In this phase, the music student chooses goals and develops a strategic plan for achieving those goals. Many music teachers would agree that developing musicians are often unaware or at least unfamiliar with the work associated with this phase. For example, beginning and intermediate musicians typically start their practice without clarifying specific goals and without having a pre-conceived strategy for working through the musical challenges they face (Miksza, Prichard, & Sorbo, 2012). Music teachers can help their students become more thoughtful in the forethought phase of learning in a variety of ways. For example, ensemble directors can ensure that they teach students how to analyze musical works by identifying the challenges that are posed when learning new repertoire and then prioritizing techniques for mastering these challenges through positive habits that increase the efficiency of students' practice. Moreover, it can be insightful for students when their ensemble directors share their own insights and reasons for setting rehearsal goals, developing rehearsal plans, and applying rehearsal techniques.

The forethought phase also incorporates the influence of motivational beliefs from the outset of the learning process. Accordingly, students' efficacy beliefs, interests, achievement orientations, and outcome expectations can play a large role in (i) what they choose to do, (ii) their attitudes towards the learning process, and (iii) their willingness to invest deeply and persist with their learning. Music teachers can influence their students' beliefs by helping them choose moderately challenging goals they can accomplish in a reasonable period of time, delivering careful feedback, and designing assessments that emphasize mastery and progress as opposed to social comparison and competition among peers.

Within the performance phase of the self-regulated learning cycle students engage in self-observation as well as learn how to take control of their approach to solving musical challenges during the act of performing. During this phase, students need to balance their ability to be flexible and adaptive to performance problems as they arise with an emphasis on directing their attention towards their immediate goals and desired level of performance. Self-regulated musicians are able to balance these two tasks and/or toggle back and forth between them without overwhelming their working memory capacity (Duke, Cash, & Allen, 2011). Capable self-regulated music learners will keep the musical product they are striving to achieve at the focus of their activities but are also able to adapt and adjust according to performance errors as they occur. Music teachers can encourage students to practice with an ideal image of the musical product in mind. It would also be beneficial for teachers to encourage their students to use tools to help them develop an awareness of their progress during the act of performing. For example, backing tracks, metronomes, and recording devices can be effective as external reference points and forms of feedback for students when performing on their instrument (or voice).

Self-regulated music students will also direct their own learning in the performance phase by covertly or overtly monitoring their concentration, regulating their emotions, and applying effective learning strategies. Students who demonstrate

self-control during learning have been able to direct themselves towards priority goals and recognize when they are becoming distracted, and when they need to re-direct their attention. They will also be able to manage negative emotions emerging from failures or repeated unsuccessful trials such that they will retain or rebuild enough energy to persist. Self-regulated musicians also have the ability to choose appropriate strategies for mastering challenging tasks (e.g., chunking, slowing, whole-part practice) and are able to apply their strategies thoughtfully. Music teachers can reinforce these strategies, techniques and approaches by encouraging an adaptive attitude towards unsuccessful attempts and explicitly modeling how to apply learning strategies during rehearsals.

McPherson and Renwick (2011) suggest that the self-reflection phase involves four basic processes: self-evaluating, developing attributions for success and failure, an affective response to the learning process, and the degree to which learners are able to adopt an adaptive or defensive stance towards their future learning. Given that musical performance is an aural phenomenon that unfolds over time, opportunities for self-evaluation are abundant. Students will naturally compare their musical progress to peers as well as their models, and teachers can help them do this more efficiently by teaching them to listen for and assess specific musical criteria. Directly related to self-evaluation is the formation of causal attributions. Generally, self-regulating musicians will attribute their learning successes and failures to malleable, effort-based causes rather than fixed abilities or random causes. In so doing, they develop a mindset that allows them to see their successes as a result of their work and their failures as simply a challenge that has yet to be mastered. The nature of the feedback teachers provide their students can help to shape an attributional frame of reference that is more conducive to growth. An ideal outcome of teaching that adopts the self-regulated learning framework is for students to reflect on their learning process and feel proud of the progress they have made at each step of the learning process. In this way, they learn how to master the goals that are set by their teacher and the goals they set themselves. Coaching students to arrange their tasks and routines such that they will have a high probability of successes near the end of a practice session can help to reinforce positive affect towards learning. In general, a self-regulated musician can engage in the self-reflection process and emerge with an adaptive rather than defensive attitude towards learning. A student's reaction to the learning process can greatly impact the next iteration of the self-regulation cycle and whether a student approaches the next forethought phase with an enhanced or diminished sense of self-motivation and willingness to set challenging goals.

It is important for teachers to recognize that self-regulation can be thought of as a context-specific set of processes that can be explicitly taught to students. Schunk and Zimmerman (1997) describe four, hierarchical stages that characterize the changes learners move through as they refine their abilities to self-regulate. These stages are useful signposts for teachers to take into consideration as they reflect upon the level of independence and challenge for which their students may or may not be ready. First is the 'observation' stage in which students are exposed to the skills necessary to be self-regulated. Teachers can expect that students in this stage

would benefit from a wide range of instructional approaches including, but not limited to, direct instruction in self-regulatory skills, modeling from teachers and peers, and opportunities for abundant feedback and encouragement. Opportunities to observe exemplar demonstrations of self-regulatory behaviors and opportunities to receive explicit guidance as they try these out are important for developing musicians.

Once students are able to imitate a competent model, they can be scaffolded to the next stage which self-regulation theorists refer to as 'emulation' (McPherson & Zimmerman, 2011). Teachers can aid the development of students in the emulative stage by assigning self-directed self-regulatory tasks like practice assignments that students can complete on their own and by gradually challenging the student to demonstrate more metacognitive involvement such as through goal-setting activities and peer- and/or self-evaluation assignments. The observation and emulation phases each involve a good deal of social guidance via teacher scaffolding.

In contrast to the first two stages described above, the third and fourth stages entail the learner depending progressively more on self-reinforcement and individually-derived goals and standards. The third stage of self-regulation development is referred to as 'self-control'. Students at this level are able to transfer what they have learned in the observation and emulation stages to similar tasks and learning targets. For example, music students in the self-control stage can be challenged to adopt a process they have learned from a teacher to a new etude or piece of music they have not explicitly studied with the teacher in class. They might not necessarily be able to invent new strategies or develop tools to solve novel problems, but they are typically able to apply the methods and concepts their teacher has taught them in an independent, yet somewhat structured setting. In contrast, students in the self-regulation phase are able to modify their self-regulatory approach and adapt and alter their strategies to fit their idiosyncratic, personal needs. Moreover, self-regulated students have come to predominantly rely upon their own motivational resources as opposed to reinforcement and encouragement from their teacher or significant others.

11.4 Model Lessons: Analysis of the Pedagogical Approaches to Teaching Music

We will now discuss the two lesson plans included in the first section of this chapter with reference to the cyclical processes and hierarchical stages of self-regulation described above. The lessons from Amanda Herceg are emblematic of best practices for developing self-regulatory skills among beginning and intermediate music performers. Although these lessons are extracted from a middle school setting, the goals and procedures would be suitable for any developing instrumental ensemble at the high school level. Herceg's lessons emphasize activities that are effective for mitigating the self-regulatory challenges that students in the observation and emulation

stages often face. The lesson from Kimberly Mieder is an exemplar of best practices for developing self-regulatory skills among intermediate and advanced music performers. This lesson is situated in a high school setting and includes teaching strategies that address some of the sophisticated metacognitive challenges that more advanced musicians in the junior or senior grades are typically equipped to deal with. As such, Mieder's lesson emphasizes activities that can help to mitigate challenges commonly encountered during the emulation and self-control stages.

Although these lessons are tailored for students with different levels of self-regulation ability, it is important to recognize that high school music performance courses typically involve students with a wide variety of skill and experience levels. For example, it is common for a school band, choir, or orchestra to include students from each grade level enrolled in the same class (i.e., freshman, sophomore, junior, senior). This reality makes curricular sequencing for school music ensemble instruction extremely challenging and often results in teachers delivering instruction in foundational concepts to their entire group each year in order to achieve a baseline of musical understanding across the students. Most high school music teachers will begin each school year with classes that have relative beginners intermingled with intermediate and advanced students. Consequently, the lessons included in this chapter are relevant to a wide variety of instructional settings at the high school level.

Interestingly, the updated National Standards for Arts Education seem to emphasize learning goals that are consistent with self-regulated learning theory. For example, the music performance standards cited in both model lessons discussed in this chapter stress the development of student agency and autonomy as individuals. The standards require that students are able to self-evaluate to determine their own strengths and weaknesses, analyze their performances for errors, guide the improvement of their performance in practice, and judge the outcomes of their playing. These elements of the standards are aligned particularly well with the cyclical phases of forethought, performance, and self-reflection described by Zimmerman (2000).

11.4.1 Lesson Sample One: Herceg

Herceg's lessons are explicitly aimed at developing students' skills for "self-regulated independent practice". In describing the learning objectives for her lessons, Herceg specifies long- and short-term goals consistent with reinforcing self-regulated learning. She emphasizes a desire to help students approach their practice in an analytical manner by cultivating skills related to error detection, strategy choice and application, and self-reflection. These elements are supported by a wide range of literature (e.g., Hallam, 2001; Miksza, 2007). The long-term goals are aligned perfectly with the cyclical processes of forethought, performance, and reflection that are emphasized by Zimmerman (2000). Herceg then specifies more detailed short-term goals related to this specific lesson such as mastery of

articulation (e.g., tonguing) styles, independent applications of practice techniques, and mastery of solo performance on specific musical tasks. This set of learning objectives represents her awareness of the kinds of challenges that beginning and intermediate students are typically capable of addressing. The objectives also stress process and product outcomes that indicate her recognition of the importance of teaching students "how" to approach learning as much as "what" to do while learning (McPherson et al. 2012b).

Herceg begins the lesson by modeling an optimal learning environment for the students; one that is focused, organized, and in which procedures and goals are in place. In so doing, she is explicitly socializing her students to arrange their physical and social space in a manner congruent with self-regulated learning (McPherson & Zimmerman, 2011). The next steps in the lesson involve systematic teacher-modeling and demonstration. The imitation activities that are interspersed throughout provide her students with multiple opportunities to internalize the sound of the musical goal. These activities also provide the teacher with a means for sequencing the instruction according to the students' ability level as well as multiple opportunities to provide feedback. The careful sequencing of call and response exercises helps the students focus their attention on goal production during each trial while also giving them concise enough targets that they can devote some degree of attention to self-evaluation without overwhelming their working memory (Duke et al., 2011; McPherson & Renwick, 2011). Once she is sure the students have reached a criterion level of mastery, Herceg then teaches them two learning strategies that can be applied in home practice. Importantly, these are initially worked through and practiced during her class before the students try out the techniques in their home practice. Finally, the students are given a homework assignment that is intended to reinforce the principles of goal setting and strategy choice and application that were demonstrated in class. This assignment illustrates the kinds of tasks that learners moving from the observation to the emulation stage of self-regulation ability should be challenged to master.

In contrast to the first day's lesson, Herceg's plan for the second day of instruction is much more student-directed. For example, it begins with an informal assessment of the students' understanding of how to identify problem areas in the music and how to apply rehearsal strategies to solve those problems. The students are then put into pairs to work on a piece of music together. The students share ideas for how to practice the music, record each others' performances, and practice evaluating the performances using an analytic rubric. In addition to capitalizing on the social reinforcement of peers, Herceg's in-class duo assignment provides the students with an opportunity to work on the independent evaluative skills necessary to move from the emulative to the self-control stages in self-regulated learning. The goal of this second day is for students to begin to grasp how they could transfer the learning processes that are demonstrated in class to other pieces of music they may work on by themselves at home.

11.4.2 Lesson Sample Two: Mieder

Mieder's lesson stresses the development of metacognitive skill and includes many activities that are designed to help the students become more aware of the relatively covert elements of self-regulated learning (e.g., intentionality, concentration, decision making, motivational disposition) (McPherson & Renwick, 2011). Mieder's general goals are for the students to have opportunities to apply self-regulated learning principles to several musical challenges and to recognize the impact that self-regulated practice can have on performance achievement. In contrast to Herceg's lessons, the content of Mieder's lesson emphasize activities that are more appropriate for students who are ready for more independence and autonomy such as those that might be characterized as being in the self-control stage of self-regulation development (Schunk & Zimmerman, 1997).

The lesson begins by recording the students' early attempts to perform their etude in order to establish a baseline reference level of performance achievement. The students are also given an opportunity to internalize the ideal learning outcome by listening to a professional recording of their repertoire. This activity reflects Mieder's awareness of the value of modeling for developing performance achievement and self-evaluation skill (Hewitt, 2001). The teacher then guides the students through a discussion of how to identify learning challenges and presents a set of practice strategies that are matched to particular types of musical problems the students will encounter. Next, the students demonstrate the practice strategies as a full ensemble. Throughout this introduction, Mieder serves as a guide and facilitator by balancing direct instruction with inquiry-based strategies. These introductory activities also include an emphasis on conditional decision making so that the students understand that knowing "when" and "how" they can apply the practice strategies is just as importance as knowing what strategies are generally useful (Miksza, 2015). For example, her "Rules of the Road" exercise is aimed at encouraging students to be more flexible and adaptive to challenges that arise from moment-to-moment during practice.

Mieder's lesson then quickly transitions to a block of peer- and group-based activities for highlighting self-regulated learning principles. These activities reflect important elements of the cyclical process of self-regulated learning (McPherson & Zimmerman, 2011). The "Practice Behavior Observation" exercise is aimed at helping students identify effective task strategies that are representative of the thinking involved in the performance phase. The "Verbal Mediation" and "Intermittent Questioning" exercises stress aspects of goal-setting, intentionality, and self-monitoring that are critical to both the forethought and performance phases. Following these activities, the students are then tasked with recording a performance of their etude a second time and given an opportunity to openly reflect on the progress they have made in addition to identifying the qualities of practice that led to their improvement. This discussion activity is representative of the kind of thoughtful analysis self-regulated learners demonstrate in the self-reflection phase. This evaluative, listening exercise can also serve to reinforce adaptive affective

responses to the learning process by providing evidence that the students' increased performance is a direct result of effort and thoughtful work. As such, the evidence of the students' success can lead to cultivating effort-based attributions, stronger mastery motivation orientations, and increased levels of self-efficacy. Lastly, toward the end of Mieder's lesson, the students were challenged to apply the principles covered thus far to a full piece of music. However, prior to doing so, Mieder had the students apply their self-regulation skills on their own with minimal guidance.

Mieder's lesson is an excellent illustration of methods for encouraging students to engage thoughtfully in their own learning. The challenges presented to the students are exemplary examples of activities that will help students become more autonomous learners.

11.5 Recommendations for Future Research

Reflecting on the practical application of self-regulated learning theory to music practice uncovers several avenues for future research. Further research dealing with approaches for assessing music students' self-regulatory abilities is necessary. In particular, there is currently a lack of research that highlights the specific behaviors, metacognitive activities, and dispositions that correspond to each of the three cyclical processes outlined in self-regulated learning theory, forethought, performance, and self-reflection. It is important that measurement methods be developed that yield rich, detailed accounts of how individual's self-regulatory abilities manifest themselves. It is also important that further research be conducted on the manner in which novice musicians can be taught to move through the hierarchical stages of self-regulated learning. Determining what types of pedagogical approaches can help students become more independent in their music practicing would be particularly beneficial for teachers. Moreover, it is important that this research consider both individual-, small- and large-group learning settings. Although, one-to-one music instruction is common, school-based music instruction typically occurs in large-group, ensemble settings. Research that tests the effectiveness of a variety of interventions is critical for the enhancement of future music pedagogy.

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Part VII
Health and Physical Education (Two Lessons)

Chapter 12
Connecting Self-regulated Learning and Performance with High School Instruction in Health and Physical Education

Anastasia Kitsantas, Athanasios Kolovelonis, Georgios S. Gorozidis and Evdoxia Kosmidou

Abstract The purpose of the present chapter is to demonstrate how health and physical education teachers embed self-regulatory practices into their teaching designed to enhance students' self-regulation of learning. Two teachers were asked to create lesson plans in health and physical education with the goal to engage students in self-regulatory processes; such as goal-setting, self-monitoring, and self-evaluation. Using Zimmerman's model of self-regulated learning, these lesson plans were described and analyzed. Findings showed that both teachers, through specific practices built into their lesson plans, were able to teach students how to become self-regulated learners. In particular, teachers facilitated self-regulation of their students' learning by setting appropriate goals, planning how to achieve these goals, and motivating them to attain these goals. In lesson one, students set goals for personal health behaviors, recorded their physical reactions to a health-related activity, and evaluated progress towards their goals. In lesson two, the development of specific physical education exercises were enhanced using process-oriented goals and self-monitoring. Teachers provided feedback throughout the practice sessions, asked

A. Kitsantas (✉)
College of Education and Human Development, George Mason University, Fairfax MSN 6D2, USA
e-mail: akitsant@gmu.edu

A. Kolovelonis
Department of Physical Education and Sport Science, University of Thessaly, 42100 Karies, Trikala, Greece
e-mail: sakisanta@hotmail.com

G. S. Gorozidis
2nd General Lyceum of Amaliada, Riga Feraiou - Amaliada Municipality of Ilida - Regional Section of Ilei, 27200 Ilida, Greece
e-mail: 2lykamal@sch.gr

E. Kosmidou
11th Primary School of Thessaloniki, Amalias 60, 54640 Thessaloniki, Greece
e-mail: mail@11dim-thess.thess.sch.gr

M. K. DiBenedetto (ed.), *Connecting Self-regulated Learning and Performance with Instruction Across High School Content Areas*,
https://doi.org/10.1007/978-3-319-90928-8_12

students to reflect on their performance, and assisted them in planning subsequent learning efforts until skills were automatized. Implications are discussed regarding how these lesson plans can serve as illustrative examples of how teachers can develop students' self-regulatory competence in the domains of health and physical education.

Table 12.1 Picturing health lesson plan

Teacher: Evdoxia Kosmidou, Ph.D. in Health Education, State Certified Educator	**Grade Level(s)**: 10th grade **Number of students**: 25
School: 10th High School of Thessaloniki	**Subject**: Health Education
City and State: Thessaloniki, Greece	
Instructional Plan Title: Picturing Health	
National Health Education Standards Standard 1.12.1. Explain how healthy behaviors can affect health status Standard 3.12.1. Evaluate the validity of health information, products, and services Standard 8.12.4. Adapt health messages and communication techniques to specific target audiences	
Learning Objectives: After the end of the lesson students will: 1. identify at least two benefits related to healthy living and two consequences related to health compromising behaviors 2. identify persuasion through central and peripheral routes in their daily lives 3. make lifestyle changes towards healthy living via goal setting and problem solving techniques	
Instructional and Learning Materials Needed: Straws (one per student), checklist (see Table 12.2), notebooks and pencils (one per student), Power Point presentation with key components of the Persuasion Theory	
Lesson Duration: 100 minute	
Teaching and Learning	
Min on this Activity	**Targeted Activity** / **Purpose of Activity**
5	**Orienting Students to the Lesson**: • Students discuss previous day's homework assignment: playing a physical game (basketball, climbing stairs) with a family member who smokes • Students share with one another their observations and notes • Engage students in the lesson by having them observe first-hand, the challenges and demands of physical activities on a smoker versus a nonsmoker
10	**Motivation**: • Students play a physical activity game "Like a smoker"—using a straw to breathe • Students record three types of emotions they experience during the game • Students discuss their emotions, thoughts, and challenges they experienced • Increase students' motivation by having them monitor the emotions triggered by the stress of breathing through the straw while performing a physical activity • Prompt students through questioning to think about the effects of restricted breathing when engaging in a physical activity
15	**Whole Class Instruction**: • Persuasion Theory is presented using key points (e.g., how people are persuaded positively or negatively towards a person, object or behavior) and examples from • Enhance students' understanding of central and peripheral routes of persuasion included in the messages and advertisements

(continued)

Table 12.1 (continued)

	students' daily lives (via a Power Point presentation). Students will understand what a persuasion message is, how it is delivered, and how it can persuade or not persuade others	aimed to convince them of adapting certain behaviors
30	**Guided Practice/Providing Feedback**: • Each group selects an advertisement (direct or indirect) about a health product or behavior and uses a two-column table to depict methods of persuasion used (central vs. peripheral route) • Students engage in role-playing where a student (or a group of students) argues against the product/behavior and another student (or group of students) argues in favor of the product/behavior • Each student "creates" his/her own message about a healthy behavior involving their family or a significant person. Goal setting on how they will deliver their message to the recipient is applied	• Practice identifying persuasion methods. Feedback is provided both by other groups and (mostly) by the teacher • Engage in role-playing to experience message delivery, both as a recipient and as a persuader
15	**Independent Practice**: • Students select a goal geared towards developing a healthy lifestyle and a plan to overcome challenges • Students create smart and short messages using the Persuasion Theory guidelines provided towards an issue involving their own family or a significant other	• Implement Persuasion Theory guidelines towards an issue relevant to their family or a significant other
15	**Evaluation of Learning and Assessments**: • Teacher provides students with a health message and students identify methods of persuasion used. Using checklists students assess their learning (see Table 12.2)	• Enhance use of persuasion guidelines by respective practice and use of checklist
10	**Closing Activities**: • Students create a single message, according to Persuasion Theory guidelines. The message is addressed to a specific audience (e.g., other students, parents, community). They explore ways to spread the message • If time permits each group discusses the message created (e.g., content, presentation, etc.)	• Conclude with an activity which promotes group cohesion and recall of knowledge
Specific Strategies used to Address Exceptional Students and/or Students for whom English is a Second Language: • Exceptional students are randomly assigned to various groups. For students for whom English is a second language, messages may contain just images/pictures or videos and any text is presented in both languages • No borders in health education. Everyone is accepted, and everyone can contribute to knowledge		

Table 12.2 Checklist for evaluating learning

The message…	*Yes*	*Maybe*	*No*
…uses appropriate words	2	1	0
…contains positive words	2	1	0
…contains pictures and/or images	2	1	0
…includes colors	2	1	0
…includes an attractive source	2	1	0
…includes a well-known source	2	1	0
…includes a reliable source	2	1	0
Do you think the message was effective?	2	1	0
Total scores			

12.1 Narrative of the Picturing Health Lesson

Health education differs from other school subjects as students are encouraged to express themselves, ask questions, and actively engage in all activities. The lesson provided is centered on Persuasion Theory (Petty & Cacioppo, 1986). According to this perspective, the aim of a message is to persuade people towards a product or behavior. Persuasion Theory is based on who delivers the message, the content of the message itself, and the recipient of the message. Thus, any health education lesson can be considered a persuasion message. Students can be persuaded using central and peripheral routes of persuasion.

It is important for the instructors to be familiar with Persuasion Theory to serve as models (a peripheral route of persuasion), and to use the appropriate-effective ways of persuasion. Specifically, the person who delivers a health education lesson is an important factor influencing the program's effectiveness. The role of the instructor is complex, so when implementing this lesson plan, I create and monitor groups, use discussion strategies that are appropriate for the participants' age and prior knowledge, and use personal and students' experiences to effectively deliver the lesson. Further, it is important to remember that as a teacher, I am also a model (a peripheral route of persuasion) for my students.

The 100-minute lesson plan is implemented in a co-educational class of 25 students in a public high school located in a large city (Table 12.1). A health education class does not resemble a typical education class. I teach this lesson in a typical classroom or in a gym. Students need to feel comfortable in expressing themselves, so most times I choose the gym over the classroom. Although it is important to allow students to form their own groups, I also ensure that exceptional students are assigned among the various groups. Similarly, if the class has many athletes or students who have already been involved in smoking, I make sure they

participate in different groups. Finally, for students for whom English is a second language, messages are written in both languages.

A week prior to implementing the lesson plan, I provided my students an assignment to play a physical game (e.g., basketball, climbing stairs) with a family member who smokes, observe their performance, and record their observations. At the beginning of the lesson, I asked students to recall their observations and discuss how and why the body of a smoker reacts differently during participation in a physical activity, and what other personal behaviors or choices can affect personal health. I asked students these questions (i.e., guided discovery) to ensure they understand that consequences from health behaviors have the potential to affect the self physically, mentally, and/or emotionally.

Then, I asked students to play the "Like a smoker" activity. It is a form of a tag game, in which a student is the "hunter" who must touch the other players who run around in a specified area. The first player who is tagged is the new "hunter." Students are familiar with this game because they frequently play it in physical education class. However, this time, all students must breathe through a straw. I pause the game after a few minutes and I ask each student to record in their notebook three emotions they experience during the game. I discuss with them how they felt, what were their thoughts, and what they could or could not do during this activity. I encourage them to participate as much as possible. Through discussion, each student should realize that personal health is unstable, and can change through events beyond one's control. Thus, students become aware of how choices can affect their health.

Next, I teach students how to create effective persuasive messages. First, I use Persuasion Theory to show how a message affects persuasion and explain the differences between direct and indirect persuasion. I use a Power Point presentation to incorporate lesson images, photos, colors, and examples appropriate to the students' age and prior knowledge. I discuss the effect of the message's source, the message (type, length, content, repetition, wording, discrepancy with other attitudes, etc.), and the recipient. A message can be written as an image, long or short, delivered once or repeated, and contain positive or negative text. The same message can be delivered in different ways, so each recipient may be influenced by the one most relevant to him/her. During teaching, I use strategies such as shared reading, thinking aloud, and discussions.

Subsequently, I provide students with three activities to practice. First, I provide students in each group with advertisements related to health products or behaviors. These include direct and indirect messages in several forms, for example, magazines, videos, newspapers. In this activity, key points from previously-obtained knowledge can be repeated. I ask each group to write in their notebook the ways persuasion was used. To provide feedback, I ask the following questions: "Does the message use positive/negative/scientific words?;" "What kinds of words are more effective and why?;" "Who is the communicator (an actor, someone famous, a scientist, a good looking person, male or female) and why?;" "Who is/are the best source?;" and "Is the message funny or serious, and why?"

The second activity is role playing. Students engage in a play where a student (or a group of students) uses arguments against the product/behavior and another student (or group of students) uses arguments in favor of the product/behavior. Subsequently, through discussion, each student should realize the benefits of using the theory of persuasion.

In the third activity each student must "create" his/her own message about a healthy behavior geared towards their family or a significant other. I encourage students to use goal setting during this activity. In particular, students' goal is to create an effective message and to make a plan to effectively deliver their messages to recipients; including, overcoming potential obstacles. This activity is used to practice identifying persuasion methods. During the activity, feedback is provided by other groups and (mostly) by me. Possible questions include: "What words are used (positive, negative, scientific terms)," "Who delivers the message (an actor, someone famous, a scientist, a good-looking person, male or female)," "Is the message repeated or not," "Is motion or music used," and "What kind of music?"

Then, students work independently using goal setting (that has been taught in physical education), to create effective messages for potential problems with the goal to overcome each problem. I encourage each student to select a health behavior, write down his/her personal goal setting plan, and potential obstacles that she or he may encounter. Messages can be either motivational or instructional. I provide students with feedback to help them present their message creatively (e.g., how the message is presented, how often, and where). I also provide them with feedback on setting effective goals and overcoming problems. Students record in a journal all information with the goal to engage in discussion and reflection.

I evaluate students' learning by providing them with an electronic short health message to identify and check methods of persuasion used. I provide students with a checklist (see Table 12.2) to assess their learning in regard to using the key characteristics of the message (2 minute completing checklist, 5 minute discussion). Higher scores are associated with effective messages. Students continue to use key guidelines of persuasion after completing the checklist to enhance persuasion by repetition and typically reflect on their knowledge regarding health enhancing and health compromising behaviors. As the instructor, I use peripheral routes of persuasion to increase their involvement and interest.

Overall, the present health education lesson plan provides students with the knowledge about how exercise and smoking affect their health status. It also gives them the opportunity to identify health information and messages provided by the media/health industry and help them internalize communication techniques. In addition, the assessments, learning objectives, and instructional strategies of this lesson plan align with the National Health Standards (2016). These standards are clearly addressed as students communicate and collaborate with each other, engage in critical thinking, problem solving, decision making and apply the theory of persuasion to promote use of health enhancing behaviors.

Table 12.3 Learning strength-resistance exercises lesson plan

Teacher: Georgios Gorozidis, Ph.D. in Physical Education and Sports Science, State Certified Educator	**Grade Level(s)**: 10th grade **Number of students**: 20
School: 2nd Lyceum (High School)	**Subject**: Physical Education
City and State: Amaliada—Greece	
Instructional Plan Title: Learning Strength-Resistance Exercises	
National Physical Education Standards: S1. Demonstrates competency in a variety of motor skills and movement patterns S2. Applies knowledge of concepts, principles, strategies, tactics related to movement, and performance S3. Demonstrates the knowledge and skills to achieve and maintain a health-enhancing level of physical activity and fitness S4. Exhibits responsible personal and social behavior that respects self and others S5. Recognizes the value of physical activity for health, enjoyment, self-expression and/or social interaction	
Learning Objectives: After the lesson students will: 1. execute resistance exercises for targeted muscles 2. recognize muscles and corresponding exercises 3. set personal relevant goals and design weekly strength training programs to achieve their goals 4. demonstrate responsible behavior while training with peers and monitor individual performance	
Instructional and Learning Materials Needed: Indoor gym (Fitness center), Elastic/resistance bands (10–15 items), Gymnastic mats (10–15 items), Wall bars (5–10 items), Reciprocal criteria task-cards (see Table 12.4 at the end of the lesson plan), Self-check criteria task-cards (see Table 12.5 at the end of the lesson plan), Self-check training-sheets/logs (see Table 12.6 at the end of the lesson plan). Optional: a 10-in. Tablet, Task Posters, Mirrors, Chairs (10 items)	
Lesson Duration: 90 minute divided into two 45-minute sessions	
Teaching and Learning (Lesson 1)	
Min on this Activity	**Targeted Activity** / **Purpose of Activity**
5	**Orienting Students to Lesson**: • Students gather in the gym and the teacher introduces the subject immediately after taking attendance • The teacher highlights the instruction as a sequence of phases with different tasks and responsibilities • Persuade students that the lesson provided is relevant to their own health and well-being
10	**Motivation**: **Warm-up**: • Students begin with warm-up activities that include: jogging, walking, jumping-rope/jacks • Students engage in stretching activities such as arms, back, chest and leg extensions while the teacher asks questions and discusses the importance of muscle strength for everyday activities, sports, and one's well-being • Prepare students through warm-up and stretching exercises for strength training intensity • Use questions to introduce topic, activate prior knowledge, and help students make the link between exercise and one's well-being

(continued)

Table 12.3 (continued)

5	**Whole Class Instruction**: • Students demonstrate exercises they know that target specific areas of the body • Teacher demonstrates (i.e., orally, via videos, posters) specific exercises emphasizing critical cues: (a) Biceps curls (elastic bands), (b) Semi-squats (body weight)	• Teachers' questioning aims to revisit students' prior knowledge • Direct teaching and modeling help students to master the key elements of each exercise. Advanced students model exercises in place of the teacher
20	**Guided Practice/Providing Feedback**: • Students form pairs and work together • Focus on process goals as they practice for 1 minute each exercise (one executing—one observing/resting). Teacher provides feedback and signals every 1 minute to change roles • Students practice using the reciprocal criteria task-cards (Table 12.4). Students read aloud the cards and teacher asks questions. They execute 8–12 reps for each task and change roles (2 sets). Teacher observes and provides feedback	• Focus on process goals (i.e., proper execution of the tasks' key points) and teacher feedback helps students master key points of exercises • Understand how to use task-cards and execute exercises correctly • Reciprocal teaching assists students learn key points of each task while providing and receiving feedback
5	**Closing Activities**: • Whole class static-stretching activity • During stretching, teacher-students discuss and review shortly of what has been learned, emphasizing the benefits of strength training • Homework 1: Students identify some exercises with body weight or bands to demonstrate in the next session	• Stretching helps to cool-down the body • Brief discussion aims to conclude the lesson and reinforce the learning objectives • Homework provides an extension to learned tasks and follow-up for the next session
Teaching and Learning (Lesson 2)		
8	**Motivation**: **Warm-up** • Similar to the first session	• Warm-up activities help prepare the body and avoid injuries
7	**Whole Class Instruction**: **Introductory Activity** • Students in pairs perform twice push-ups or curl-ups for 30 s aiming to outperform their counterparts (1st trial; other-referenced goal) or their previous performance (2nd trial; self-referenced goal) • Students discuss their emotions, thoughts, and challenges of this activity with a focus on the value of setting personal realistic goals	• Help students understand the importance of setting goals for personal improvement versus competitive goals

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Table 12.3 (continued)

20	**Independent Practice** • Students practice in five stations (2 minute practice, 1 minute to change stations). Each station contains an exercise (rows, bicep-curls, semi-squats, push-ups, curl-ups) targeting a muscle group. They choose the sequence of stations and the intensity of practice. Using the self-check criteria task-card (see Table 12.5), they set process goals and record their performance • Students design and execute a personal strength-training program using the self-check training sheet (see Table 12.6) and exercises from Homework I. They set both process and performance goals depending on phase of learning	• These activities help students to: – Automatize exercise techniques, adopt process and performance goals and self-monitor performance – Cultivate autonomy and responsible behavior when practicing resistance exercises – Practice on transferring, modifying, and applying old and newly learned exercises to form a personal strength-training program
5	**Evaluation of Learning and Assessments**: • Students identify the critical cues of each task, identify errors, and explain how to correct these errors • Students execute properly each exercise for at least 8 repetitions • Students are reminded of their personal goal attainment and asked to maintain all individual task cards in their personal PE portfolio	• Assess student leaning of the lesson objectives • Judge student mastery and offer feedback on assessments • Review student portfolio which contains all materials used during classes (e.g., sheets, logs, task cards etc.)
5	**Closing Activities**: • Emphasize the benefits of stretching, regular strength training and goal-setting • Homework II: Students set goals and keep a strength-training diary for the next 1–3 months to check their progress	• Emphasize that stretching helps cool-down the body • Reinforce the learning objectives • Provide extension activities and homework as a follow-up
Specific Strategies used to Address Exceptional Students: • Teacher demonstrates alternative types of exercises and instructs students to customize and select their preferred level of difficulty, resistance, and intensity • Advanced students or athletes are paired with other typical students and serve as models for the proper execution of tasks • Students with special needs are assisted, if needed, by athlete students or the teacher		

Table 12.4 Reciprocal criteria task-card. Exercise example

Semi-squats with body weight (Quadriceps—Gluteus) (knees up to 90° to prevent knee injuries) Name…….. ….. Peer-tutor…… Repetitions…….		
Key points—Cues	Yes	No
Does s/he keep feet shoulder-width and toes pointing forward (keeping hands on the bar)?		
Does s/he look forward with back straight?		
Does s/he bend knees up to 120°–90° (over the chair)?		
Does s/he return to the initial position with knees-hips fully extended?		
Does s/he always keep knees behind toes?		

Table 12.5 Self-check criteria task card. Exercise example

Bicep curls (seated or standing with resistance bands) Name…….. …….. Set 1/Reps: … Set 2/Reps: … Set 3/Reps: …		
Key points—Cues	Yes	No
Do I keep elbows-body steady (back straight) and palms facing forward-upward?		
Do I bend elbows up towards my shoulders?		
Do I bend knees up to 120°–90° (over the chair)?		
Do I return to the initial position with elbows extended?		
Do I keep feet shoulder-width and knees slightly bent (If standing)?		

Table 12.6 Self-check training sheet/log. Personal strength training program

My Muscle Strength Training Routine					
Name …… Date …… Class…… School …… *My goal is to perform ... sets of ... reps/exercise ... or ... reps in total/exercise*					
Exercises 1–6 with body weight, 7–11 with resistance bands	**1st Set** Reps	**2nd Set** Reps	**3rd Set** Reps	**4th Set** Reps	**Total**
(1) Push-ups (Pectorals/Triceps/Abs)					
(2) Curl-ups (Abs/Rectus abdominis)					
(3) Trunk Lifts (Latissimus dorsi/ Trapezius)					
(4) Semi-Squats (Quadriceps/Gluteus maximus)					
(5) Heel raises/Calf and toe raises (Gastrocnemius)					
(6) *Other …					
(7) Biceps curls					
(8) Triceps extensions					
(9) Rows (Latissimus dorsi/Trapezius)					
(10) Side Raises (Deltoids/Shoulders)					
(11) *Other…					
Select six exercises to execute with (a) three using body weights and (b) three using resistance bands. Select the number of repetitions and modify the intensity of each exercise according to your goals. Every set is complete when you have executed all six exercises					

12.2 Narrative of the Learning Strength-Resistance Exercises Lesson

This 90-minute lesson plan is implemented in a coeducational public high-school (N = 230) located in a small city (20,000 inhabitants) in southwestern Greece. Class size is 20 students (10th Grade) who participate in physical education two times per week (Table 12.3).

After the bell rings, I meet my students in a pre-determined spot inside the gym and take attendance while students sit on the floor. I explain briefly the main subject, the structure of the next two sessions, and describe the instructional approach to be used supporting its effectiveness. Next, I ask students to spread out in the gym, keeping appropriate distances from each other for warm-up activities. A volunteer student is assigned to demonstrate the warm up sequence and stretching. During stretching, I discuss with students the lesson's topic and learning objectives. Through questioning (guided discovery technique) relevant to physical abilities (strength, endurance, flexibility etc.), I try to activate their interest and prior knowledge and guide students to discover the relevance of muscle strength to their own well-being. I also underscore the importance of muscle strength for sport movements/performance, everyday activities, and the quality of life to help students recognize the value of physical activity for health and well-being.

After warming-up, I ask students to demonstrate exercises for the targeted body parts (i.e., back, arms, legs) with the goal to review their prior knowledge. Next, I demonstrate the proper execution of the exercises, providing oral instructions, emphasizing the fundamentals of strength training, and the critical cues of each exercise to help students cognitively acquire the key elements of each task. In particular, I instruct students how to use resistance bands to conduct rows (seated/standing rows, in front of the wall bars) and bicep curls (seated/standing), and perform semi-squats or lunges with body weight in a precise and safe fashion. Alternatively, I present instructional videos or posters for each exercise. These visual aids help me to address English-as-a-second-language (ESL) students. Advanced students serve as models or peer-tutors.

Next, students form pairs and practice the new tasks while I provide feedback. Each pair stands in front of a wall bar with a mat, a chair, and a resistance band to practice. In this phase, I ask students to adopt only process goals (i.e., key points of the proper technique, such as inhale bending, exhale extending, repeat slowly, keep steady) and practice each exercise for one minute (i.e., when one student is practicing the other rests observing his/her partner and the way the teacher provides feedback). After every minute, I signal (e.g., pause-start music) and students change roles. Periodically, I remind students to focus on the key points of each exercise (e.g., tempo-breathing-positioning) and provide them with various types of feedback. Some of my feedback is more constructive and focused on fine-tuning their exercise execution. Other feedback is affirming and reinforcing what they are doing

correctly, while other feedback is animated as I try to motivate students. I also place posters on the walls explaining each exercise to remind students the proper execution of the tasks. If possible, I place large mirrors on the walls to help students self-check and self-correct their mistakes during practice.

Moreover, students engage in reciprocal teaching to acquire the key points of each task. I provide each student with the reciprocal criteria task card (Table 12.4) and a pencil and ask them to work in pairs on the newly-learned exercises. Specifically, I ask students to perform two sets of 8–12 repetitions, focusing on performing correctly the key points of each exercise (i.e., process goals). After the completion of each set, students change roles. Student-tutors help students by monitoring and checking, correcting, providing encouragement while practicing, and providing help when needed. I walk around to observe students, provide affirmative feedback and positive reinforcement, and instruct them how to provide feedback to their peers. If the criteria are not met, I remind students of the key points.

Lastly, I end the lesson by asking students to spread out and engage in a cool-down activity (e.g., static stretching routine) targeted for the muscles used most that session. During stretching, I ask students questions about what has been learned, emphasizing the benefits of muscle strength training and the proper execution of exercises. Finally, I assign homework where students identify similar exercises to use in the next session.

In the second session (3 days later), as soon as the bell rings, I meet my students in the gym, and take attendance while students are standing. Then, students perform warm-up activities as in the previous session. During stretching, I remind students of the lesson's topic and structure. With the completion of the warm-up, I ask some students to present exercises they have identified for homework to use later in the final phase of the session.

Initially, students form pairs, take a mat, and spread out in the gym. They work together to learn the importance of setting goals for personal improvement. I examine students' prior knowledge by asking them to show the correct execution of well-known exercises (push-ups, curl-ups). Next, I highlight the key points of the proper execution of each exercise showing them how these can be modified to be more or less challenging. I ask each pair of students to select and perform one of these two exercises. Each student may select their preferred level of difficulty (e.g., for modified push-ups: bent-knees or wall inclined, curl-ups with bent-knees). Within each pair, one student executes for 30 seconds and the other counts the repetitions and vice versa. When all students complete their first trial, they prepare for the following: in the first trial, students are asked to outperform their pair; in the second, to improve their previous performance. After that, I ask students how many achieved their goal (other-referenced goal or self-referenced goal). Next, I guide a short discussion/reflection about students' emotions and thoughts during exercise to help them realize the significance of setting personally-relevant goals. Basic questions I ask are (a) in which trial they felt more relaxed or stressed, (b) which trial they preferred, (c) why it matters to set personal goals, and (d) how they could set realistic goals.

Next, students practice independently at five stations to automatize their technique. After describing it, I provide students with the self-check criteria task-card (Table 12.5) and pencils to work individually. Students focus on performing correctly the key points of each exercise (i.e., process goals) while they record their repetitions in each exercise. I divide the gym into five stations; each containing an exercise targeting a specific muscle group (i.e., latissimus dorsi/trapezius, biceps, quadriceps, pectorals/triceps, abs). Practice in every station lasts 2 minute with a 1-minute rest interval between stations. I keep track of the time and provide signals (e.g., play-stop music) to change stations. The criterion of students' mastery is to execute correctly at least 8 reps on each exercise and to follow a training routine without distractions.

I provide differentiated instruction to increase students' confidence and autonomy, encouraging them to choose the sequence of stations, the volume/pace (number of sets, repetitions, intervals), and the level of difficulty/intensity (e.g., modified executions with different positioning/angles of the targeted body parts, use of double bands, very small/no intervals) to practice. The provision of choices in execution of exercises helps me to address all students concerns, who wish to exercise with higher or lower levels of resistance. I move around the stations to monitor students' individual practice and to provide feedback when asked or needed. If I detect problems in technique, I return students in the previous phase to practice with a peer-tutor (i.e., an advanced student or someone having reached mastery). Instructional self-talk is highly appropriate in this phase, thus I provide students with key-words to use during practice (e.g., "back-straight", "breath-in/out", "slowly bend-extend").

In the final phase of this instruction, students design their personal strength training program and practice independently combining process and performance goals. They work individually trying to transfer, modify, and apply old- and newly-learned exercises, to form their personal full-body strength training routine. Students using the self-check training list (see Table 12.6) choose their preferred exercises and set performance goals for specific number of sets and correct repetitions for each task. Next, they execute their program and self-record sets and repetitions for each exercise. I also encourage students to engage in instructional ("pull", "push") and motivational ("I can do it", "strongly", "powerfully") self-talk during practice.

To complete the lesson students perform freely a cool down activity as in the first session (e.g., stretching) in conjunction with a short discussion. I ask students evaluative questions (e.g., what are the critical cues of each task? Are there any errors (teacher executes each task correctly-incorrectly) and how they can be corrected; reflective questions (e.g., did you achieve your goals? And to what do you attribute your success?). Finally, I assign as homework for students to set goals based on self-monitored outcomes and keep a strength training diary for the next month to check their progress. Overall, this lesson plan addresses the national standards (National Physical Education Standards, 2016) in multiple ways. Specifically, in the initial phase and throughout sessions, students acquire the necessary knowledge and experience to recognize the value of physical activity for

health, enjoyment, self-expression and/or social interaction. During the lesson, students have the opportunity to apply knowledge of concepts, principles, strategies, tactics related to muscle strength training, and performance. Exercising and practicing with reciprocal and self-check teaching styles students have the opportunity to exhibit responsible personal and social behavior that respects self and others. Finally, the sequential instruction and progressive nature of the plan helps students to demonstrate competency in a variety of motor skills and movement patterns relevant to strength training.

Learning how to set personally-appropriate goals and engage in self-monitoring are the key elements of the lesson. In general, students learn the fundamentals of the proper execution of resistance training exercises and the general philosophy of strength training. One challenge in teaching is to keep track of all students during their practice and to follow the schedule (time-duration) in each activity. To address the dynamic nature of instruction and the time limitations of the lesson, more than adequate time is allocated for each activity (as indicated in the plan). If necessary, teachers have the flexibility to adjust time spent in each activity according to their needs. Another challenge is motivating and convincing students to implement a personal weekly strength-training program out-of-school. Untrained, unfit students with low experience in resistance training might experience muscle tightness and will likely complain about muscle soreness for the next couple days. Future lessons should use more advanced equipment and materials (e.g., medicine balls, kettle bells, weight lifting machines).

12.3 Self-regulated Learning Overview

The physical and health education lesson plans presented are analyzed through the lens of a social cognitive perspective of SRL and respective empirical research. First, we provide a brief overview of Zimmerman's cyclical model of Self-Regulated Learning (SRL) and the four-level model of the development of SRL (Zimmerman, 2000; Zimmerman & Kitsantas, 2005). Second, we identify SRL processes in the physical and health education lesson plans provided, highlighting the way the two instructors used them in their lessons to promote their students' self-regulated learning. These processes include goal setting, self-monitoring, providing social support, building self-efficacy, and engaging in self-reflection. Empirical evidence regarding these SRL processes was reviewed to support their role in students' learning and performance. Lastly, practical implications and recommendations regarding these self-regulatory processes are discussed.

12.3.1 Self-regulated Learning: A Social Cognitive Perspective

Self-regulated learning, as theorized by Zimmerman (1989, 2000, 2008), provides a framework for understanding how learners proactively generate, assess, and adapt their thoughts, behaviors, and emotions to accomplish their goals. Self-regulated learners are more likely to experience academic success and achievement as they: (a) actively plan, organize, monitor, and self-evaluate at various points during the learning process; (b) perceive themselves as competent and efficacious, while employing productive goal orientations and outcome expectations; and (c) develop structure and create environments that optimize their learning (Zimmerman, 1989, 2000, 2008) SRL can be understood in terms of three cyclical phases (forethought, performance, and self-reflection) where each influences each other through a feedback loop. The *forethought phase* consists of processes that precede actual performance and help students prepare for the upcoming task. These processes fall under two broad categories: task analysis and self-motivational beliefs (Zimmerman, 2000, 2008). In general, it is understood that task analysis processes help students strategically prepare for upcoming tasks and self-motivational beliefs will help instigate subsequent behaviors (Zimmerman, 2000, 2008). The *performance phase* involves processes that occur during actual performance and task engagement. These processes also fall under two broad categories: self-control and self-observation (Zimmerman, 2000, 2008). These processes help learners attend to aspects of their performance, an important aspect of self-regulation as students can make adjustments to their learning based on their ability to monitor and evaluate their performance (Zimmerman, 2008). Lastly, the *self-reflection phase* consists of processes that fall under two categories: self-judgment (e.g., self-evaluating) and self-reactions (e.g., self-satisfaction/affect). These processes influence the forethought processes of students' subsequent learning efforts in completing a self-regulatory cycle.

A key question is how do learners develop self-regulatory skills and engage in feedback loops to enhance their learning and performance? From a social cognitive perspective, learners can effectively develop self-regulatory skills when they proceed through four sequential levels, namely: observation, emulation, self-control, and self-regulation (Zimmerman & Kitsantas, 2005). The *observation* level includes oral instructions and demonstration of the new skill by an expert model that assists students to cognitively acquire the key elements needed for performing the new skill. At the *emulation* level, students are involved in guided practice while receiving social feedback (e.g., from their teachers) that helps them correct potential errors and form appropriate performance standards. At the *self-control* level, students practice the skill independently in structured learning environments. Students who reach the *self-regulation* level have mastered the skill and can adapt and use it in changing conditions and developing their own distinctive styles of performing. Extensive research consistently shows that students who are exposed to social modeling experiences and social feedback, who are asked to set process oriented

goals and self-monitor, and to evaluate their goal progress in the initial stages of learning, report higher levels of motivation and show higher levels of achievement (Schunk, 1999; Schunk & Zimmerman, 1997; Zimmerman & Kitsantas, 1997, 1999). For a more detailed review on the models and recent research of SRL by Zimmerman and his colleagues, see chapter in this edited book by DiBenedetto (2018).

12.4 SRL Processes in the Health Education Lesson Plan

12.4.1 Orienting Students to the Lesson: Building Student Motivation

Zimmerman's (2000, 2008) view of SRL places a significant emphasis on students' motivational beliefs. The health education lesson as implemented supports students' motivational beliefs by attempting to appeal to students' perceptions of task interest and task value (a forethought process). By associating the topic at hand to students' own lives (in terms of interacting with family members), students might perceive greater value in the lesson as the lesson's topic has relevance in their lives. There is empirical support for this notion as perceptions of task value have been associated with increased academic efforts among students (Wigfield & Eccles, 1992, 2000).

In addition, various strategies were employed to enhance students' self-efficacy. Students were asked about their self-efficacy beliefs regarding their persuasive arguments in a role playing activity. During the discussion that followed, the teacher provided students with feedback to help build their self-efficacy regarding the use of arguments produced (Bandura, 1997). Further, the instructor instructed students in goal setting and self-recording; processes that have also been associated with enhanced self-efficacy (Schunk & Meece, 2006). In fact, research on the development of sport skills shows that students who set process goals and self-record their performance report high levels of self-efficacy (Kitsantas & Zimmerman, 1998; Zimmerman & Kitsantas, 1996). Vicarious experiences (e.g., modeling) can also be a source of enhancing students' self-efficacy (Bandura, 1997). The health education instructor demonstrated skills and advanced peers were used as tutors and role models for their peers as another means to facilitate students' self-efficacy.

12.4.2 Guided Practice and Social Support

From a social cognitive perspective, social sources (e.g., modeling and social feedback) can facilitate the development of self-regulated learning. The development of self-regulatory competence begins with extensive social guidance which is

systematically reduced and replaced by self-sources as students acquire self-regulatory skills (Zimmerman, 2000). The health education instructor included activities in her lesson plan to provide students with social support, such as oral instruction, modeling, and social feedback during their initial learning efforts. Research results (e.g., Kitsantas, Zimmerman, & Cleary, 2000) show that providing students with observational learning and practice with social feedback can have positive effects on their performance. Peers can also be used as tutors in the reciprocal style of teaching; an approach found to have positive effects on students' performance in physical education (Kolovelonis, Goudas, & Gerodimos, 2011).

Social support in the first phases of learning helps students to form performance standards. In particular, verbal instruction combined with behavioral modeling helps students focus on the critical elements of the skill (Bandura, 1997), while social feedback (e.g., affirmative performance feedback, reinforcements, and reminders about the proper performance that were included in both the physical and health education lesson plans) helps students master these key elements (Kitsantas et al., 2000). As students progress in mastering the skill, social feedback should be gradually withdrawn and students should continue to practice independently focusing on self-monitoring their performance and generating internal feedback to self-regulate their learning (Zimmerman, 2000). This sequential learning involving observation, emulation, self-control, and self-regulation can result in superior learning and used as an instructional approach for developing students' SRL (Kitsantas et al., 2000; Kolovelonis, Goudas, Dermitzaki, & Kitsantas, 2013; Kolovelonis, Goudas, Hassandra, & Dermitzaki, 2012; Zimmerman & Kitsantas, 1997).

12.4.3 Emphasis on Goal Setting, Self-monitoring, and Self-evaluation

Goal setting is a technique that can guide students' every day practice in health education classes and help them self-regulate their learning and performance. As part of the independent practice plan, the instructor asked students to choose one health-related change towards a healthier lifestyle. This strategy has the potential to help students continue to develop the forethought phase processes of goal setting and strategic planning; both of which have been shown to increase student learning (Schunk, Pintrich, & Meece, 2008; Zimmerman & Kitsantas, 1996, 1997). By asking students to set a goal, they are encouraged to think about (analyze) their lives in terms of one way to become healthier. Once students choose their goal, the teacher should ask follow up questions with the purpose of assessing if students have thought out how they will accomplish their goal (strategic planning). For instance, if the goal is to eat less sugar, strategic planning is needed to figure out a number of specific steps (reduce temptations in terms of "out of sight/out of mind", etc.) necessary to achieve this goal.

In addition, this part of the lesson encourages the practice of self-evaluation as students are asked to appraise advertising practices and then judge such practices as being positive or negative. This activity could be enhanced by using follow-up questions to support their evaluations with explanations and evidence, which may help to draw out students' affective reactions. Moreover, the "breathing through straws" activity supports the self-regulatory practice of self-monitoring by assessing how students' "feel" after breathing through the straws. This activity could be enhanced (in terms of greater self-monitoring) by having students perform the activity twice (once with and once without straws), while also asking students to monitor and record (another performance phase process) their heart rate during both activities. Such comparison of data can encourage students to continue engaging in self-recording, which in-turn facilitates learning (Zimmerman & Kitsantas, 1996).

In addition, during the game "like a smoker" students recorded their emotions. These recordings were used as the basis for a discussion aiming to sensitize students regarding the side effects of smoking on breathing and furthermore to motivate them to actively participate in the lesson. Moreover, students were asked to form their own persuasive messages using self-recording as a technique to check if the messages they produced had the appropriate characteristics. Self-monitoring can be optimized by recording because students can discern and interpret changes in their performance over time based on written data without having to rely on memory recalls (Zimmerman & Kitsantas, 1999).

12.5 Self-regulatory Processes in the Physical Education Lesson

12.5.1 Orienting Students to the Lesson Through Modeling and Goal Setting

The lesson focused specifically on explaining to students that "instruction is a sequence of phases" which can help establish an appreciation for the importance of strategic planning and goal setting. By explaining that the end result (e.g., developing strength) is achieved through a series of steps, this can help highlight the importance of process-oriented goals in learning (Zimmerman & Kitsantas, 1996, 1997). Helping students master "steps" along the way to the end goal will also have positive motivational effects on students as they will increase in confidence (Schunk & Usher, 2013).

Goal setting is a key construct in self-regulated learning. In the physical education lessons, students were taught basic resistance training exercises to focus on during their practice that included both process (i.e., the basic elements of each exercise) and performance goals (i.e., number of technically correct trials). Moreover, the instructor (see homework 2) encouraged students to set process and performance goals depending on their needs for longer periods of time (e.g., a

month). Goals help students to master new tasks because they focus the learners' attention on basic elements of the skill, and provide direction (Zimmerman, 2008). Both process and performance goals can have positive effects in students' performance (Kolovelonis, Goudas, & Dermitzaki, 2011). However, during their initial learning efforts to master a skill, students should focus on process goals (Kitsantas & Zimmerman, 1998; Zimmerman & Kitsantas, 1996). After students have acquired the basic elements of the skill, they can focus on improving their performance by setting outcome goals of personal improvement (Zimmerman & Kitsantas, 1997). This transition in goals is considered important for the development of SRL (Kolovelonis, Goudas, & Dermitzaki, 2010) and was followed in the physical education plan. Overall, the effectiveness of goal-setting can be maximized when: (a) students are taught to set specific, proximal, challenging, and personal goals; (b) write down their goals to commit themselves; and (c) make plans for how to achieve their goals and monitor their attainment (Goudas, Kolovelonis, & Dermitzaki, 2013).

12.5.2 Enhancing Student Motivational Beliefs

The physical education instructor made an effort to increase students' task interest. Specifically, during warm ups, the practice of asking students questions about the importance of muscle strength for everyday activities, taps into the motivational process of task interest and value. Task value is a multidimensional construct that includes value perceptions of instrumentality (the importance of the task), interest (joy experienced while engaging in the task), and utility (value a task acquires in relations to some future goal) (Eccles et al., 1983). By highlighting these three aspects of "importance" (in terms of muscle strength), there is a greater chance that students will "see" the importance of the task as different students react differently to perceptions of instrumental, interest, and utility value (Wigfield & Eccles, 1992).

In addition, asking students to demonstrate exercises may result in an increase in students' motivation in terms of their self-efficacy. As Bandura (1997) states, the second source of self-efficacy is vicarious experiences. If a student sees a fellow student (whom he/she believes is similar to them) succeed, this will increase their sense of efficacy. It is important to choose models of different abilities so that students who may struggle with the exercises may see a model that is similar to them. Furthermore, during independent practice, students were provided with the autonomy to select aspects of their practice (e.g., sequence and level of difficulty of the exercises, number of sets, repetitions, intervals). Such instructional approaches facilitate personal practice episodes by increasing self-satisfaction derived from achieving their goals and influencing their self-efficacy beliefs regarding further engagement in the resistance training (Bandura, 1997).

12.5.3 The Value of Self-monitoring in Personal Strength Training Program

Self-regulated students use self-observation processes to generate internal feedback to control and regulate their learning and performance. Self-observation can take the form of metacognitive monitoring and self-recording. Metacognitive or self-monitoring involves informal mental observations and tracking one's own performance and outcomes while self-recording refers to creating records of learning processes or outcomes (e.g., number of successful repetitions) that help students capture performance information as it occurs (Zimmerman & Kitsantas, 2005).

The use of self-check task sheets is an important practice that encourages a number of self-regulatory processes. First, self-checking encourages students to monitor their activities. Second, keeping records encourages the practice of self-recording, which aids students' monitoring. Third, the use of a self-check sheet encourages self-evaluation. As students determine whether they accomplished their goals, they are making connections between all three phases of self-regulation as they: self-record (performance phase), and evaluate whether they reached their goal (self-reflection phase), which can affect their motivational beliefs (performance phase) (Zimmerman, 2000).

In the physical education lesson plan, during independent practice, students self-recorded both their performance in resistance training exercises (i.e., key technical elements of each exercise) as well as their performance outcomes (i.e., numbers of correct repetitions in each exercise). Empirical research has shown that self-recording has positive effects on students' performance (Cleary, Zimmerman, & Keating, 2006; Kitsantas & Zimmerman, 1998; Kolovelonis, Goudas, & Dermitzaki, 2011; Kolovelonis, Goudas, & Gerodimos, 2011; Zimmerman & Kitsantas, 1996). From a practical perspective, self-observation processes should focus on one or two elements each time, while task sheets and recording cards should be kept simple (Goudas et al., 2013). Finally, emphasis should be placed on the accuracy of the information derived through self-monitoring processes. Students should first monitor large and gross body movements because it is easier to discriminate performance on such movements compared to the finer ones (Kolovelonis & Goudas, 2012).

12.5.4 The Value of Self-reflection

Self-regulated learners, after their engagement in learning efforts and performance, employ self-reflection processes that influence their subsequent cycles of self-regulated learning. Similarly, in the physical education lesson plan, students self-evaluated their performance in the strength-training program they had designed using self-referenced evaluative standards representing their own goals. Research

findings show that self-evaluation has a positive effect on student skill acquisition (Kitsantas, Reiser, & Doster, 2004). Moreover, the use of graduated (incremental) self-evaluative standards, compared to absolute ones, can have positive effects on students' performance and increase their satisfaction with their performance (Kitsantas & Zimmerman, 2006).

Furthermore, students were prompted to self-reflect through self-reflection questions and engaged in discussions on types of attributions and ways to improve performance (e.g., to use the same strategies or to modify them if necessary in the subsequent learning and performance efforts). Attributing errors or low performance to controllable factors (e.g., such as use of a particular strategy) can sustain student motivation (Zimmerman & Kitsantas, 1997, 1999).

In closing, both instructors of the health and physical education lessons clearly demonstrated to students how to use several key self-regulatory processes and rely on feedback to make adjustments in their learning efforts. The instructors also integrated relevant national standards into instruction (e.g., asked students to develop health messages and communication techniques for specific target audiences such as a family member), and noticeably established connections between the standards and SRL processes (e.g., keeping a diary to monitor and reflect on levels of physical activity and fitness). These teaching practices are in line with research showing that self-regulation is attainable through explicit instructional methods and practice (Bembenutty, Cleary, & Kitsantas, 2013; Zimmerman & Kitsantas, 2005). Future work in this area should further examine the potential benefits of teaching SRL techniques to elementary and middle school students within these settings. Research should also examine the teachers' role in supporting SRL in real classroom settings using both self-report questionnaires and event measures (e.g., microanalytic protocols). In addition, more research is needed on how teachers' personal beliefs influence their decision to explicitly incorporate SRL into their instruction. Such findings might have important implications for the development of teacher professional development programs aimed at preparing teachers to support and promote SRL in the classroom.

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Part VIII
Students with Special Needs (Three Lessons)

Chapter 13
Self-regulated Learning in Action

Leslie Laud, Pooja Patel, Carol Ann Cavanaugh and Terri Lerman

Abstract Building a strong sense of self-efficacy, put more simply as an "I can do it" attitude, enables students to better galvanize and apply their resources, something particularly challenging for students with special needs and those who struggle. In this chapter, three teachers work to cultivate this sense of self-efficacy in their students through nurturing their students' capacity for self-regulated learning. These teachers, each with deep expertise in the Self-Regulated Strategy Development (SRSD) framework, model many of the core practices of SRSD in the lessons featured. Specifically, these lessons show how to use the constructs of modeling, self-instruction, self-monitoring and goal setting to foster the kind of self-regulated learning that culminates in self-efficacy. First, SRSD is overviewed, then how the main elements of SRSD appear in the lessons is presented, and analyzed.

Note: The authors are indebted to Charlene Lussier for the use of her classroom.

L. Laud (✉)
Bank Street College of Education, New York, NY, USA
e-mail: Leslielaud@gmail.com

P. Patel
United Nations International School, New York, NY, USA
e-mail: Ppatel@unis.org

C. A. Cavanaugh
Hopkinton School District, Hopkinton, MA, USA
e-mail: ccavanaugh@hopkinton.k12.ma.us

T. Lerman
Marion, MA, USA
e-mail: terrilerman@verizon.net

M. K. DiBenedetto (ed.), *Connecting Self-regulated Learning and Performance with Instruction Across High School Content Areas*,
https://doi.org/10.1007/978-3-319-90928-8_13

Table 13.1 How do you make this paragraph into an essay? Lesson plan

Teacher: Pooja Patel, MA, English & Humanities Teacher (Gr 7-8)	Grade Level(s): 9th grade, can be adapted for all HS grade levels
School: United Nations International School	Subject: English
City and State: New York, NY	
Instructional Plan Title: How do you make this paragraph into an essay?	
Common Core State Standards: CCSS.ELA-LITERACY.W.9–10.4: Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience CCSS.ELA-LITERACY.W.9–10.5: Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience CCSS.ELA-LITERACY.W.9–10.2: Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content	
Learning Objectives: 1. Students will identify the elements of a pre-existing expository paragraph 2. Students will extend their paragraph writing to an extended essay or response	
Instructional and Learning Materials Needed: Two teacher-created paragraphs (see Table 13.2 at the end of the lesson plan); Anchor charts of mnemonic TIDE and shape of essay (see Table 13.3 and Fig. 13.1 at the end of the lesson plan), Student copy of shape of essay figure; Sample introduction paragraph with checklist of criterial/elements of introduction (see Table 13.4 at the end of the lesson plan); Scoring criteria (see Table 13.5 at the end of the lesson plan); Student portfolios (include various pieces of student work from the year)	
Lesson Duration: This lesson is typically completed in four 50-minute sessions	
Teaching and Learning (Lesson 1)	

Min on this Activity	**Targeted Activity**	**Purpose of Activity**
5	**Orienting Students to Lesson**: • Students enter class and engage in a journaling free write or quick write activity while teacher takes attendance or collects homework • Students will independently identify the elements of a paragraph provided by the teacher and share this in small groups as a review	• The teacher engages students in the lesson by reviewing and activating prior knowledge
2–3	**Motivation**: • The teacher highlights the power of words and voices to make a better, sustainable world • Teacher creates buy-in by making real-life connections between the power of using writing and influencing others	• By making the lesson relevant to students' lives, they become motivated and engaged in learning
10	**Whole Class Instruction**: • Teacher introduces the organization of an essay or extended response using the hourglass image provided	• By introducing new information by making connections to skills previously learned, students deepen their understanding of the whole

(continued)

Table 13.1 (continued)

	on the shape of an essay anchor chart (Fig. 13.1) • Teacher explains similarities and differences between a paragraph and an essay using the previously learned mnemonic TIDE (Table 13.2) • Teachers discuss the versatility of using this framework	context, which in this case is writing. Explicit instruction also enables students to self-regulate better because they will more clearly understand expectations, and therefore be better able to self-regulate how they meet them, as a result
7	**Guided Practice/Providing Feedback**: • Teachers and students overlay elements of the labeled paragraph (Table 13.3) on to the hourglass (Fig. 13.1) • Students practice same activity with different paragraph in pairs	• By practicing new information by making connections to skills previously learned, students deepen their understanding of the whole context, which in this case is writing
10	**Independent Practice**: • Students will begin to revise a previously written paragraph stored in their portfolios. They will choose and deconstruct the elements, overlaying them on the hourglass	• Providing students, the opportunity to make decisions, helps to bolster level of engagement
10	**Evaluation of Learning and Assessments**: • Peer feedback on accurately deconstruction of paragraphs on to the hourglass. Teacher assistance provided as needed	• Students cement their understanding of the new skills when allowed to evaluate other's work and defend decisions
5	**Closing Activities**: • Students answer the following questions: (1) Why is learning about the shape of an essay important?; (2) What do you think we need to learn next to be able to build our own essays?	• Self-reflections allow students to become more goal oriented and strategic to support their learning
Teaching and Learning (Lesson 2)		
Min on this Activity	**Targeted Activity**	**Purpose of Activity**
3	**Orienting Students to Lesson**: • Students enter class and engage in a journaling free write or quick write activity while teacher takes attendance or collects homework • Students will review the shape of an essay by independently labeling an hourglass with elements and predicting the skills they will learn in current lesson after reviewing	• The teacher engages students in the lesson by reviewing and activating prior knowledge

(continued)

Table 13.1 (continued)

	responses from the previous lesson's closing activity	
2	**Motivation**: • The teacher highlights the power of words and voices to make a better, sustainable world • Teacher creates buy-in by making real-life connections between the power of using writing and influencing others	• By making the lesson relevant to students' lives, they become motivated and engaged in learning
15	**Whole Class Instruction**: • Students learn the about an introduction paragraph by locating it on the hourglass image (top inverted triangle), learning the elements of the triangle, analyzing an exemplar and discussing the role of a thesis statement (Table 13.4)	• The teacher explicitly uncovers the criteria to complete the new skill allowing easily students to self-regulate in the future
15	**Guided Practice/Providing Feedback**: • Teacher and students write an introduction paragraph while using the writing process and a graphic organizer highlighting the essential elements	• The teacher explicitly uncovers the processes to complete the new skill allowing easily students to self-regulate in the future
7	**Independent Practice**: • Students evaluate the introduction paragraph using a scale (Table 13.5)	• Students continue to deepen their understanding by evaluating the new introduction and recalling what they learned
3	**Evaluation of Learning and Assessments**: • Exit ticket: students share three elements of an introduction paragraph	• Teacher can then evaluate student learning from this lesson, and help students to self-evaluate this as well so they can set goals
5	**Closing Activities**: • Review homework where students complete Google survey assessing student knowledge of skills taught, allowing teacher to differentiate subsequent lessons	• Teacher invites self-reflection and practice of skill taught to enable data-based differentiation and self-directed goal setting when students evaluate their responses
Teaching and Learning (Lesson 3 & 4)		
Min on this Activity	**Targeted Activity**	**Purpose of Activity**
5	**Orienting Students to Lesson & Whole Class Instruction**: • Students enter class and engage in a journaling free write or quick write activity while teacher takes attendance or collects homework • Lesson 3: Students will review shape of an essay, elements of the	• The teacher engages students in the lesson by reviewing and activating prior knowledge

(continued)

Table 13.1 (continued)

	introduction paragraph and the scoring criteria • Lesson 4: Students will review skills learned from lessons one-three and ask clarifying questions	
2	**Motivation**: • The teacher highlights the power of words and voices to make a better, sustainable world • Teacher creates buy-in by making real-life connections between the power of using writing and influencing others	• By making the lesson relevant to students' lives and giving them a sense of agency in the world, they become motivated and engaged in learning
28	**Guided Practice/Providing Feedback & Independent Practice**: Lesson 3 & 4: The lesson will be differentiated based on students' homework responses: (a) Group 1 will plan and write their introduction; (b) Group 2 will work with the teacher to plan and write a second introduction paragraph	Teacher creates a learning environment where students are learning at their zone of proximal development. Students can only self-regulate what they know how to do, so differentiation is key in providing opportunities for students to self-regulate at levels where they can succeed
10 (or longer)	**Evaluation of Learning and Assessments**: • Lesson 4: Students will evaluate the introduction written with the scale and after receiving additional feedback from a peer and an adult they will set a goal and revise	• With feedback, students can self-direct their learning and strategically improve their work
5	**Closing Activities**: • Lesson 3 & 4: Students will discuss how to transfer this skill in other aspects of their lives	• Students are provided the opportunity to see the significance of the framework
Specific Strategies used to Address Exceptional Students and/or Students for whom English is a Second Language: • Differentiation for all students: re-teach skills, modify scales to enrich or support, provide a variety of graphic organizers, modify goals, use assistive technology to record or type the process • ELL population: providing cloze passages, writing in mother tongue		

Table 13.2 Anchor chart. This figure depicts a sample anchor chart with the TIDE mnemonic to be displayed in the classroom

T: topic introduction ID: important details & detailed examination E: end

Table 13.3 Sample teacher-created paragraph for students to label paragraph elements

The novel Keeping Corner by Kashmira Sheth has many characters. One of the main characters Saviben is progressive. In the novel, a girl named Leela becomes a young widow. In Indian culture, a widow is supposed to stay in the house, mourn, and "keep corner" for a year after the death of her husband. Leela's brother, Kanubhai, pushed to have Leela educated at home during the time that she was "keeping corner" because he wanted to ensure that she did not miss school. Saviben was the modern teacher that came to instruct Leela in skills like reading, thinking, and history. First, Saviben was progressive because she did not let the traditional views of Indian society cloud her judgment in regards to what was right and wrong. Since Leela was a widow, she no longer was allowed to wear beautiful colored saris. Instead she had to wear dull, dark saris made out of cotton that were called chidris. During teaching sessions, Leela would stare at Saviben's beautiful saris. She would even try to wear Saviben's sari by spreading the material on her lap to cover her chidri. Saviben realized what Leela was doing and instead of reprimanding her, she encouraged her to speak about her feelings and allowed her to pretend that the colorful saris belonged to Leela. In fact, she even asked Leela to give suggestions on what she should wear to the next lesson. Someone who is progressive is in favor of change and improvement of things, and will advocate for more liberal ideas that will be fair and will benefit all people, especially those that are disenfranchised. This shows that Saviben is progressive because she did not let the traditional Indian views affect her thinking. Instead, she understood that Leela was doing nothing wrong when she was fantasizing about the colorful saris. Instead of chastising her, she treated her in a fair way and allowed her to enjoy something that was taboo in a safe way. Saviben's thinking was very liberal and her actions of allowing Leela to place the sari on her chidri and pick out her next outfit showed her position for change and how she was trying to advocated for Leela in even the smallest of ways. One can tell that she believes that the idea of wearing dull clothing to symbolize widowhood is unfair and possibly archaic. These women have lost their husbands; there is no need for them to lose the beauty of color in their lives. Saviben, a progressive educator, was really trying to implement modern, fair ideas into Leela's life in big and small ways.

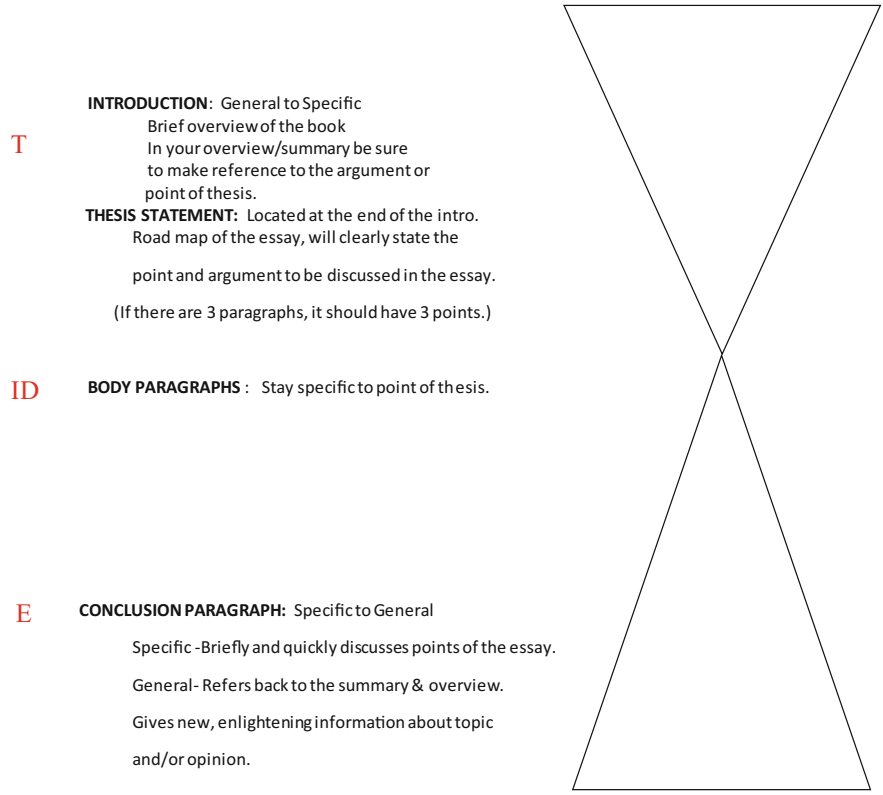

Fig. 13.1 The shape of an essay. This figure illustrates an hourglass to represent the shape of an essay, a visual representation that includes key elements of an essay using the TIDE acronym

Table 13.4 Sample introduction paragraph to be used as an exemplar

Are you healthy? How do you know? What actions do you take to be healthy and in shape? Do you exercise? But, the real question is do you eat well? Leafy greens can be described as foods that are typically used in salads and vegetable side dishes. They consist of spinach, arugula, kale, and various other types of lettuce. Many claim that their flavors are unappealing and that they don't satisfy hunger or cravings. Although, this may be true, the health benefits of leafy greens are immense. Often, school cafeterias don't serve enough healthy food. In fact, a recent poll in Time Magazine showed that less than half of school cafeterias nationwide serve a variety of tasty, leafy greens. Many times cafeteria meals consist of processed or deep fried foods. Not only do I recommend that all people, regardless of age, consume a generous amount of leafy greens, but I think it is important for schools to promote healthier diets by serving more leafy greens. Leafy greens should be an integral part of lunch because they are easy to find, help people have a stronger and longer life, and can be cooked in various ways to improve its flavors.	Beginning with hook. General information about topic moving to more specific. (Title & Author or book if essay is on a piece of text and overview.)

Table 13.5 Sample scoring criteria for the introduction paragraph

Introduction paragraph: elements and criteria	Total	Self	Peer	Adult
Beginning 1 point if a clear topic is included 1 point if the beginning has a hook or flair	2			
General information 1 point if information provided progresses general to specific 1 point if the information is relevant and includes a statistic, title & author, or another piece of key information 1 point if multiple sentences that provide a overview of the topic 1 point if the general information is an appropriate length (not too long, not too short)	4			
Thesis statement 1 point if included 1 point if it restates the topic and the purpose 1 point if it identifies the key points that will be discussed in the essay 1 point if the sentence is clear	4			

13.1 Narrative of the How Do You Make This Paragraph into an Essay? Lesson

The United Nations International School (UNIS) is a K-12 New York City private, international school that strives to provide excellency in education that is truly diverse and inclusive. The school population consists of about 1600 students who speak 90 languages and come from 130 countries. The rigor of the curriculum is more demanding when compared to other public school counterparts. Classrooms consist of 24 students, who often speak more than one language and who fall within a broad range of academic needs.

The lesson plan describes a process to help students extend their paragraph writing to an extended response or an essay. Although the traditional five-paragraph essay is not explicitly visible in the real world, the idea of writing organized, extended responses is a critical skill for future academic success. The five-paragraph essay is one entry point to develop this skill and show how to extend responses. The CCSS build on writing skills, encourage prolific writing experiences to help students' craft logical arguments. Many students, especially those diagnosed with a specific language disorder, find expressing their ideas in writing challenging, so mastery in extended written expression is delayed and may need significant repetition and practice (Table 13.1).

This lesson typically spans over four class periods. Prior to these lessons, students were explicitly taught to write a paragraph using the writing process and the mnemonic TIDE—T: topic introduction, I: important details, D: detailed examination; E: ending (see Table 13.2). Students analyzed exemplar paragraphs (Table 13.3) by color coding or labeling the elements as a class or in small groups. Students then observed the writing process as I modeled the process to plan, organize and write a paragraph; afterwards, we engaged in the writing process collaboratively allowing the covert thinking to become overt, resulting in students writing pieces, while engaging in the writing process, independently. Once students have mastered the organization of a paragraph, I teach the students the shape of an essay. In the four lessons discussed in the lesson plan, each period begins with students engaging in a free or quick write based on a question or theme while I take attendance or collect homework. Students sit in a circle formation in wheeled-desks that can be moved into different configurations for collaborative and independent work.

On the first day, I activate background knowledge by asking students to restate the elements of TIDE and identify them in a new paragraph in small groups as a review. I celebrate their new learned skills in the hopes that it will make them feel successful and, ultimately, encourage self-regulated effort. We set a larger purpose to writing essays and discuss our responsibility and impact on the world when we clearly communicate our viewpoints through writing and uncover that most "real-world" writing is significantly longer than a paragraph.

Then during the whole class instruction, I introduce the essay by presenting and dissecting an image of an hourglass (Fig. 13.1) to show how an essay is TIDE *on repeat*. We make connections to TIDE where I show how the T (topic introduction) is the top, inverted triangle of the hourglass and is called the introduction, the IDs are the body paragraphs or the narrow part of the hourglass, and the E (ending) is the bottom triangle and is called the conclusion. During the guided practice stage, in groups the students will overlay the paragraph labeled for TIDE elements during the review, which is provided to them in sentence strips, onto the hourglass image, while I provide necessary feedback. This process allows students to manipulate and visualize how the paragraph could be extended into an essay. Now, it is their turn to practice the skill independently. CCSS asks that students are afforded the opportunity to plan, revise and rewrite pieces using a new approach. In this example expanding ideas into an essay is the new approach. The students choose a paragraph from their portfolio to revise into an essay and overlay each element of TIDE in the paragraph onto the hourglass. This provides students with an initial, brief outline of their essay. Once completed, students provide peer feedback on their deconstruction

of the paragraph in the essay as a form of evaluation. During the wrap up, students reflect on their new learning, its relevancy, how it will affect their writing skills, and seek out for additional support. I use their responses to guide future lessons.

On the second day, once they have completed their free- or quick- write, I orient the students to the lesson by showing them the image of the hour glass so that they can reviewing the shape of the essay by labeling its parts; after, they discuss the questions from the first day's wrap up. In particular, students generate a list of skills and concepts they will need to be successful at crafting an essay, as I guide them to place initial importance on learning the elements of an introduction paragraph. Once we decide that our next focus is crafting strong introduction paragraphs, we analyze an exemplar and generate a master list of elements to label the exemplar during the whole class instruction (Table 13.4). Students learn how the introduction paragraph generally introduces the topic and continues to hone in on the main point or argument, culminating with the thesis statement. This exemplar is color coded and labeled for key features and becomes a mentor text for students to refer to when needed. During the guided practice, we collaboratively craft an introduction paragraph using a think aloud, allowing students to not only see the writing process on how to craft the paragraph with the elements previously identified in mentor text, but to experience the self-regulation needed to write this paragraph independently. The students and I collaboratively plan by generating all our ideas, organize by using a graphic organizer with all elements listed, and then write the introduction paragraph. I mention the purpose and location of the thesis statement (end of paragraph) and tell students we will learn the criteria in subsequent lessons. This explicit instruction gives students the knowledge and skills they need to then be able to self-regulate when they write essays, independently.

In the independent practice stage, students evaluate the introduction paragraph using quantified scales in pairs (Table 13.5). Since using scales was not new, they do not need instruction on the scoring process and how to use the quantified rubric. The quantified rubrics explicitly identify the specific criteria for each element of the introduction paragraph, allowing students to effectively review, set goals, and revise writing. While students self- and peer- evaluate the introduction paragraph with the provided scale, I give necessary guidance to improve the paragraph to students who need it based on their evaluations and discussions. At the end of the lesson, students fill out an exit ticket to identify three key elements of an introduction paragraph that serve as a formative assessment to help me guide the next lesson. We also discuss the homework: students complete a Google survey that asks them to: (1) label different parts of an introduction and shape of an essay and (2) to pick the skill they would like to practice in the next lesson. This practice allows me to differentiate my lessons taking more student voice into account.

On the third and fourth day of the lessons, the students complete their introduction paragraphs. They are reminded that writing is a communication tool used to share their voices and make change. Overall, these lessons are differentiated based on student performance and student choice during the guided practice stage. However, at the beginning of the lesson during the whole class instruction, the entire class (a) orients themselves to the shape of an essay by reviewing the hour glass, (b) the elements of an introduction paragraph by reviewing the model introduction from the second lesson, and (c) the scoring criteria by sharing the evaluation of the introduction paragraph written collaboratively from the previous day. Then during the guided practice, students break into two groups. The first group independently begins to plan, organize, and write their

paragraphs. The second group works collaboratively with the teacher and engages in another think aloud where the students and teacher plan, organize and write another introduction paragraph as practice before writing another one independently. Students have the flexibility to exit the second group at any time. As a result, some students stay for the planning phase only, while others for either the planning or organizing or until the entire paragraph is written. Other students from the first group choose to enter the end of the collaborative practice and watch the students and me use the outline to write the paragraph. This flexibility allows students to continuously self-reflect throughout the lesson and be provided an opportunity to ask for the appropriate amount of assistance that they need, when they need it. Many students may initially feel they need the support, but with a few initial guiding prompts they quickly ascertain their understanding and can continue independently. A few feel confident to begin initially, but then question next steps as they become more entrenched in the process. Once the students finish drafting their introduction paragraphs, they use the scale from lesson two to self-score their work. After, they work with a peer to receive and provide feedback using the same scale. Finally, based on the self- and peer-evaluation process, or specifically the scores on the scale, the students set a goal for improvement and revise and edit the paragraph. This process, that usually takes two days, allows for students to engage in writing routinely, and provides an explicit system for student to evaluate if information was presented clearly. CCSS grade nine writing standards aim to address both elements.

In subsequent lessons, I instruct students on the elements needed and the process to craft strong thesis statements, effective conclusion paragraph, detailed and cohesive body paragraphs. Students move from one skill to the next at their own pace with guidance from formative assessments, goals, and peer and teacher feedback. The introductory lessons on building an essay helps students learn to craft extended pieces of writing under the contextual framework of writing a paragraph. Students are explicitly taught to see the connections between a paragraph and an essay to deepen their understanding of the structure of expository writing. The imagery of an hourglass helps students to use something visual to imagine the organization and flow of an essay. Students access multi-modal approaches to deepen their understanding and apply it to their own writing practice. It is important to hold firm and continue to work at the paragraph level until students reach mastery on effectively organizing a paragraph. If not, asking students to understand the structure of an essay or extended response may be challenging because clear connections between both will not be readily accessible and will prevent students to meet the CCSS standard that emphasize the importance of students using the writing process to craft well analyzed pieces that are organized. If possible, a co-teacher in the classroom is beneficial to assist with guiding students during the group and independent work sessions. Finally, the students enjoy the direct and explicit, self-reflective, self-guiding, and inquiry aspects of these lessons. The direct and explicit instruction allows students to envision the end goal and the combined approach of using regular self-reflection and think alouds allows them to feel that their ideas—their voices—matter. Ultimately, the students use this approach to deepen their understanding of the writing process and elements of an essay or extended writing piece which ultimately allows them to effectively communicate their ideas—their vision—to the world in the hopes of making a greater impact on something of worthiness to them.

Table 13.6 Using the TRAP strategy to enhance reading comprehension lesson plan

Teacher: Terri A. Lerman, BA, MAT, CAGS Reading License: Massachusetts Reading	**Grade Level(s)**: **High School 9–12**
School: Dighton Middle School	**Subject**: Social Studies
City and State: Dighton, MA	
Instructional Plan Title: Using the TRAP Strategy to Enhance Reading Comprehension	
Common Core State Standards: *Reading Standards for Informational Text* CCSS.ELA-LITERACY.RI.9-10.1 Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text CCSS.ELA-LITERACY.RI.9-10.2 Determine a central idea of a text and analyze its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text CCSS.ELA-LITERACY.RI.9-10.4 Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language of a court opinion differs from that of a newspaper) CCSS.ELA-LITERACY.W.9-10.2 Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content CCSS.ELA-LITERACY.SL.9-10.1.A Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas CCSS.ELA-LITERACY.SL.9-10.1.C Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions	
Learning Objectives: 1. Students will be read nonfiction informational text and apply the TRAP strategy in order to identify and paraphrase the main idea of each paragraph and the whole article 2. Students will demonstrate what they have learned through paraphrased responses to paragraphs within the text and through class discussion	
Instructional and Learning Materials Needed: Goals Organizer (see Table 13.7 at the end of the lesson plan), TRAP Mnemonic (see Table 13.8 at the end of the lesson plan), Student Anecdotal Notes (see Table 13.9 at the end of the lesson plan), Copies of the article entitled "The Struggle for Equal Rights, SMART Board or poster to display the article, reading survey, class reading data	
Lesson Duration: 95 min (or two 40-minute class periods with another 15 min during the third period for wrap-up)	
Teaching and Learning	

Min on this Activity	**Targeted Activity**	**Purpose of Activity**
10	**Orienting Students to Lesson**: • Explain to students that this lesson will help them to better self-direct and self-monitor their own reading comprehension. They will receive a	• Students will have the opportunity to gain a more global and also more specific view of their reading performance as a class and individually so they can eventually

(continued)

Table 13.6 (continued)

	tool, called TRAP, and support for how to use the tool to help them better understand and paraphrase what they read • Students review reading comprehension data for the previous 3–4 weeks (such as scores from standardized testing)	self-monitor their progress. Students need to be able to monitor where they currently are at, so they can set goals and work to meet those goals, in self-regulated ways
15	**Motivation**: • Make it relevant and introduce the topic • Students review types of questions that are included in assessments of reading comprehension and engage in discussion. Concepts for discussion include explicit and implicit, as well as "thick" and "thin" questions • Student interest is captured by looking at their prior scores on reading comprehension tasks. This also makes it relevant to them. We activate background knowledge by discussing what reading comprehension strategies we used	• Students will develop their understanding of the components of reading comprehension and the ways that reading assessments help teachers and students understand learning needs and plan instruction or study
	Whole Class Instruction	• Students will have the opportunity to hear how an adept reader questions the text and places big ideas in his or her own language so as to synthesize important information. This enables students to self-regulate because they gain both the clear ideas as well as the language they can use to support themselves in taking themselves through using those ideas to guide themselves when they read • Students will set a goal so they can then self-monitor their progress toward it
5	• To activate background knowledge, have students formally list strategies they use while reading a passage for homework. As direct instruction, discuss strategies for effective reading comprehension	
5	• At this point, the teacher can ask students to set a personal reading goal and write it down on a goals planning sheet (see Table 13.7)	
5	• Display the TRAP Mnemonic (see Table 13.8) at the front of the room and explains each letter briefly as an overview. Discuss each element of strategy	
5	• Next, hand out the article you will be using to model the strategy. Be sure to emphasize the T for THINK by discussing the title, subtitle, headings, and other text features. Think aloud about what each feature tells you about the article's topic • Next, model the TRAP strategy with the first paragraph of an article that is accessible to students, perhaps grade	

(continued)

Table 13.6 (continued)

	level 4 or 5. One can use "The Struggle for Equal Rights" from Harvey and Goudvis' *Toolkit Texts: Short Nonfiction for Guided and Independent Practice.* The article should contain paragraphs that have fairly main ideas and supporting details. Modeling this strategy entails thinking aloud while reading	
15	**Guided Practice/Providing Feedback**: • After reading the first paragraph and modeling thinking aloud to find and paraphrase the main idea, the teacher asks students to try the next two paragraphs on their own but emphasize that they will check their answers with a partner when they are done, and takes anecdotal notes (Table 13.9) • While students work, the teacher can walk around and check in with each student. When students have had a chance to write, ask them to turn to a partner on the left or right and share their paraphrasing and discuss these then make any changes to their ideas. Discuss the main idea of this paragraph and which words helped students figure this out. Have students reflect on how well they applied TRAP and how TRAP helped them	• Students will have the opportunity to practice using the TRAP strategy and then discussing their conclusions with their partners and then in whole class discussion • Students will also self-monitor how well they apply TRAP
20	**Independent Practice**: • Students continue to paraphrase the article, using the TRAP strategy to paraphrase the main idea of each paragraph. When they have finished, students copy four teacher-selected paragraph paraphrasings (paragraphs are numbered for easy identification) onto the assessment sheet and turn these in for assessment	• Students will demonstrate mastery of the TRAP strategy
	Evaluation of Learning and Assessments: Paraphrasing will be scored using the following criteria. Tell students this serves as a scaffold to help them understand the criteria for strong paraphrasing. This helps monitor learning Scoring Criteria	• Going forward in future use of the TRAP strategy, students will use these criteria to practice assessing partners' work in order to synthesize the TRAP concepts. They will discuss peer models and adjust their own work as a result

(continued)

Table 13.6 (continued)

	4–5 points: Clearly and accurately paraphrased the key idea in the paragraph 2–3 points: Key idea is somewhat included but incomplete or unclear. May include an extra detail or two 0–1 point: Main idea is not stated. Phrase or sentence does not demonstrate comprehension. Too many details included • Students will receive a score with feedback based on the listed criteria. This will partially measure what students learned about the paraphrasing objective of this lesson	
10 5	**Closing Activities**: • The teacher hands back assessment with scores. Review the scoring criteria. Write examples of strong and weak responses on the board and discuss these in terms of the criteria • Have students share in summing up the TRAP ideas briefly one more time and brainstorm briefly the courses and reading materials that would benefit from the TRAP strategy • At this point, the teacher can also ask students to add the TRAP strategy to their goals planning page • In the next lesson, the teacher might ask students to take a quiz on TRAP to show that they remember what each letter in the mnemonic stands for. This would be a baseline quiz. The teacher could then ask students to memorize the mnemonic for homework and be prepared to take another quiz in a day or two	• Students will have the opportunity to review scoring criteria and apply it to examples generated by the teacher • This will help students self-monitor because they will be clearer on the criteria they are working to meet
Specific Strategies used to Address Exceptional Students and/or Students for whom English is a Second Language: • Students who have scored 75% or better on the assessment for this lesson, can work independently to apply the TRAP strategy to another article. These students can also work in pairs or small groups to score each other's' paraphrased ideas • Students who are still struggling with TRAP, will work on another article with the teacher in a small group		

Table 13.7 Goals organizer

Student Week of

Reading/Writing Goal:

Strategies needed to overcome obstacles or challenges that might stand in your way

Monday		
Tuesday		
Wednesday		
Thursday		
Friday		
Weekly Reflection: How did you do this week with your reading/writing goal? What went well? What obstacles stood in your way? What can you do differently next week? Write at least 5-7 sentences.		

1.

2.

3.

Table 13.8 TRAP Mnemonic

TRAP Mnemonic Chart

Use TRAP to read the passage

T Think before you read

Look at bold headings, title, any images, charts and graphs and ask yourself, "What do I know already about this article just from looking at these text features?"

R Read a paragraph

A Ask what is the paragraph mostly about? What is the most important information?

Look again at the first and the last sentences of the paragraph. Do either of these statements contain big ideas rather than details?

Ask yourself, "What one idea does the author most want me to take away from this paragraph?"

P Paraphrase the important information

Write a sentence which states the main idea of the paragraph in your own words.

Table 13.9 Student anecdotal notes

Date_____ Class_____

Student	Student
Student	Student

13.2 Narrative of the Using the TRAP Strategy to Enhance Reading Comprehension Lesson

This lesson works well not only with students who are reading below level and who struggle with executive function, but also supports all students in developing reading strategies. It addresses several key Common Core State Standards, especially Standard RI.9-10.2 in which students determine a central idea and analyze its

development. Finding the main idea in text is the foundation to then understanding the development through explanation and exemplification (Table 13.6).

I teach this lesson early in the school year so students will habitually use it across content areas. Prior to this lesson, I gather information of student reading comprehension and compile the data into a chart to present to students. The chart shows their ability to identify main ideas, recall specific important facts, and answer explicit as well as inferential questions. Anecdotal observations, notes based on what students do during independent reading, are also helpful (Table 13.9).

Upon entering class, students receive this chart of reading comprehension data from the past three to four weeks of school (Table 13.7). Typically, the data will show that students did not fully comprehend the texts. Anecdotal information (teacher observation of student reading behavior) will illustrate that most students do not take notes, highlight nothing at all or highlight too much of the text, and have few strategies at hand when meaning breaks down in general.

We discuss the data and what it shows about students' reading habits and comprehension. At this point, we list students' strategies on the board. We then discuss other strategies that readers use to understand text. These may include annotating for key ideas, asking questions, making predictions, noticing patterns in the text, evaluating text features, rereading when meaning breaks down, looking for word definitions near unknown words, and many others. We also discuss the concept of self-monitoring. Self-monitoring is awareness of the way one's mind works during the reading process. We need to know when meaning breaks down and have strategies that work to help comprehension.

Next, students set personal reading goals on a goals sheet (Table 13.7), then they list strategies they will use to meet each goal, along with how they will track gains toward meeting each goal, such as improved grades. Once students understand the criteria, then set goals to achieve it based on self-monitoring where they stand in relation to those goals, then they can self-regulate how they will meet those. I explain to students that today they will learn a strategy that, if used consistently and practiced, will improve their reading comprehension.

At the front of the classroom, I display a poster of the mnemonic TRAP (Table 13.8). Students also have a readers' notebook, and I hand out a print version that they can paste into their notebook to refer back to, as needed. Next, I explain that TRAP is a strategy that will help students "trap" information, understand it better and retain more information (Mason, Reid, & Hagaman, 2012). It is a tool that must be practiced consistently if students want to improve.

"T" represents "THINKING before reading," This means that students should review text features such as title, subtitles, headings, maps, images, captions and other elements. While THINKING, students should ask themselves, "what can I learn from these text features?" and "Is there any information in these features that help me know what type of writing this is?" The "R" represents READING, and is combined with the "A." The "A" stands for ASK yourself "what is this paragraph mainly about?" For the "R" and "A", students underline phrases or sentences that state the big ideas authors most want them to know and to look at the beginning of the paragraph as well as the end to find this information. For many students, it is easier to underline or highlight supporting details instead and then see which ideas are left. These are usually the main ideas. I explain that "P" is for PARAPHRASING, which is the act of reading a portion of text and then writing the main idea of that text in your own words.

Next, we discuss self-monitoring. Self-monitoring is the process of listening to one's thinking about the text as you read. For example, sometimes we may have questions, make predictions or connections, or simply have an emotional reaction such as surprise. Sometimes we just don't understand the reading or we space out and tune back in later only to find that we need to reread. Noticing all these cognitive behaviors and either increasing their frequency or using strategies to reduce them is critical to improving reading comprehension. I also tell students that paraphrasing main ideas is one strategy that helps increase focus and eliminate tuning out.

I model TRAP so students hear how I talk to myself (self-talk) and can become aware that they too must pay attention to following an inner script (that they write for themselves) while they are reading. Modeling helps students see a path for exactly how they themselves as they do this. I display the article "The Struggle for Equal Rights" ((Harvey & Goudvis, 2007, p. 19) and model my thinking:

> Okay, before I read, I want to think first. Let me read the title. What does the title tell me? Well… this article must be nonfiction because I know that the real equal rights movement took place in the mid-1900 s and it was a struggle for blacks to get equal rights. Also, I can see that there is a black and white photograph showing children in a restaurant and the description of the photo says that these children were protesting. Also, let me look at the headings for each section…okay, I know that the first section is going to introduce me to how unfair the laws were at the time. I know that the second section is going to tell me about the civil rights movement. That is the time when Martin Luther King helped blacks protest segregation. Okay. Now I am going to read.

I model Read, "R", and Ask, "A", reading the first paragraph aloud and modeling my thinking:

> **Montgomery, Alabama is often called the cradle of the civil rights movement……."** ((Harvey & Goudvis, 2007, p. 19) "Hmmmm. This sounds like a big idea already in the first sentence. A "cradle" is where a baby stays at the very beginning of its life. So maybe Montgomery was where the civil rights movement was born or began." "O**n December 1, 1965, a black seamstress named Rosa Parks sparked a quiet revolution when she refused to give up her seat to a white passenger on Montgomery city bus."** "Okay, so the word revolution is a very big idea. That must be important. Also, this woman Rosa Parks did something really brave. So if I put Rosa Parks and revolution together I think I have the big idea. The civil rights movement was born when Rosa Parks decided not to give up her seat on the bus. Maybe that's the big idea of this paragraph. Let me write that down.

I model "P" in TRAP by writing the main idea in my own words then I emphasize that even though there is a topic sentence in the first paragraph, it does not always contain the whole idea the author wants me to know. I had to pull another idea from further on in the paragraph.

Finally, I hand out copies of "The Struggle for Equal Rights" (Harvey & Goudvis, 2007) and ask students to read the next two paragraphs and paraphrase them independently. I remind them that they need to look for big idea words that the author wants them to know and underline or highlight these. While students work on reading the next paragraphs, I circulate. After 5 min, I have students share in pairs what they believe is the main idea of each paragraph, then share with class. Next, students practice the four more paragraphs independently for 10–15 min collaboratively, with my support as needed. After this, students are now ready to work independently to paraphrase the rest of the paragraphs. When they have

completed reading and paraphrasing the entire article, I hand out an assessment sheet onto which they can write their paraphrased ideas and have them submit only those ideas that were attempted independently. I hand back the scored assessments for the TRAP activity and display the scoring criteria on the board. I also display examples of weak and strong responses and engage the class in a discussion about each example and how it meets or does not meet the scoring criteria and why.

The final section of the lesson is done on the next day even though it only takes 15 min. To close the lesson, I have students share in summing up the TRAP ideas briefly one more time. Then students brainstorm some of the courses and reading materials that would benefit from the TRAP strategy. Also, I ask students if they have been noticing "self-talk" more now while reading content in other classes now that they have begun using the TRAP strategy. At this point, students take out their goals planning page. Earlier in the lesson, students wrote down some academic goals for the class. Now students should consider how the TRAP strategy could be used to meet these goals and write it down in the "Steps to meet" column or space. The lesson closes with students engaging in this reflection task and setting goals for next steps. They will set goals for how to improve their use of TRAP and outcome goals for how they hope to see growth in their reading comprehension assessments as well.

This lesson works well across content areas and grade levels. It is especially effective for high school students because even those who are stronger readers often do not engage in active reading. Most do very little self-monitoring and are often not self-aware or thinking about their cognitive process. Some students genuinely struggle with the level of the text they are assigned and do not have a reading strategy toolbox to tackle more difficult text. Most students, however, take reading shortcuts, thinking that they will not be held accountable. The TRAP strategy is a great method for holding all students accountable for their reading process. After teaching the strategy and allowing students to work in pairs, students should be asked to continue to practice with every text they read. Teachers can collect paraphrased paragraph ideas for assessment.

This lesson poses minimal challenges in terms of materials acquisition and time constraints; however teachers may be surprised to find that many students, special and regular education alike, will struggle with finding and paraphrasing the main idea. Some students love to use a highlighter but they highlight too much information and cannot differentiate the main ideas from the details. It can take more practice than we think for students to master this seemingly basic reading strategy and concept.

Once most students have grasped the concept of paraphrasing main ideas, it is powerful to follow up with a lesson on summary writing. This requires that students be able to sum up the main idea of an entire reading in a concise topic sentence and then explain the key ideas that support that main idea. Students will begin to see the connection between strong reading and the writing process. Furthermore, by learning summarizing strategies, students become more aware of the importance of purposefully structuring their writing to express larger ideas.

Table 13.10 Prokaryotes and eukaryotes: practicing close reading and writing to text lesson plan

Teacher: Lesson and Narrative written by Carol Ann Cavanaugh BA, MAT, PhD (K-12 Curriculum Director, Licensed English 9–12, Principal 9–12, Assistant Superintendent, Superintendent) Charlene Lussier BS, MA (Licensed Biology Teacher) Lori Johnson-Kramer (Paraprofessional)	**Grade Level(s)**: 10 Inclusive Science Classroom
School: Uxbridge High School	**Subject**: Biology
City and State: Uxbridge, Massachusetts	
Instructional Plan Title: Prokaryotes and Eukaryotes: Practicing Close Reading and Writing to Text	
Common Core State Standards **Reading Standards for Informational Text 9–10** "Key Ideas and Details" CCSS.ELA-LITERACY.R.9-10.2: Determine a central idea of a text and analyze its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text CCSS.ELA-LITERACY.R.9-10.7. Analyze various accounts of a subject told in different mediums (e.g. a YouTube Video, Class Lecture, and Textbook Reading) Writing Standards 9–10 "Text Types and Purposes" CCSS.ELA-LITERACY.W.9-10.4: Produce clear and coherent writing in which the development, organization, and style are appropriate to the task, purpose, and audience **Next Generation of Science Standards** NGSS Standard: HS-LS4-4. Research and communicate information about key features of viruses and bacteria to explain their ability to adapt and reproduce in a wide variety of environments	
Learning Objectives: 1. Students will write in response to informational text (analysis of a graphic); 2. Students will read a text that uses a comparison contrast text structure, and analyze that text using a graphic organizer	
Instructional and Learning Materials Needed: Short article, highlighters, graphic organizer (see Table 13.11 at the end of the lesson plan), pen or pencil, visual of classification (see Fig. 13.2 at the end of the lesson plan), MEET handout (see Table 13.12 at the end of the lesson plan)	
Lesson Duration: 50 min	
Teaching and Learning	

Min on this Activity	Targeted Activities	Purpose of Activity
5	• **Orienting Students to Lesson**: • Previous night's homework: a video https://www.youtube.com/watch?v=9o6huiw7u5o • As students enter the classroom, they are given this visual (see Fig. 13.2), which appeared in the YouTube video. Students will explain in	• The warm-up serves as an introduction to today's lesson and a review of the previous night's homework • The writing activity helps activate prior knowledge and provides a review of vocabulary on the two cell types

(continued)

Table 13.10 (continued)

	writing why the graphic has been drawn accordingly. (When debriefing, students will examine the compare/contrast text structure used in this graphic)	• Students need to be able to access and analyze complex, informational texts and to recognize how text structures can help us to organize our understanding of written language
5	**Motivation**: • The biology teacher gives a mini-lesson to familiarize students with the vocabulary • Students are engaged through reading a short text passage of information about cells, writing, speaking, and listening	• Prokaryotic and eukaryotic cells are not that motivating. But, students do enjoy being intellectually challenged, as long as the challenge does not stretch too far their zone of proximal development. Typically, when students are *doing*, they are happy
35	**Guided Practice/Providing Feedback**: • Read whole passage about cells for the "gist of it" • Read for text structures and text features • Use topic sentences and signal words • Read to extrapolate similarities and differences • Use highlighters to interact with the text, identifying the criteria for comparison contrast—type of cell, organization, reproduction, and cytoplasm—with a focus on topic sentences • Students complete graphic organizer to organize information about this topic (Table 13.11)	• Turn and talk helps students to both process the learning and enlarge their understanding • Close reading helps students find "signs" that this text is a comparison contrast piece
10	**Independent Practice**: • Eventually, the teachers hand the responsibility over to the students, who are expected to independently identify the criterion for paragraph three (cytoplasm) in the text and complete the "MEET" graphic organizer (Table 13.12)	• Students come to see they can read a comparison contrast text independently. Students practice how to approach this task, under the guidance and supervision of teachers who can offer support as needed so they feel successful
Ongoing	**Evaluation of Learning and Assessments**: • This lesson serves as excellent formative assessment to determine both knowledge of prokaryotic and eukaryotic cells and the skill of engaging in close reading of complex informational texts • Immediate feedback comes throughout	• Students may not have *mastered* objectives • It would be folly to believe that after *one* reading students will be able to dissect all comparison contrast texts • Lesson will spiral throughout the year, as students need to compare and contrast in the science classroom Students have met the objectives if they are able to complete the graphic organizer with varied levels of support

(continued)

Table 13.10 (continued)

	• Students will build upon and eventually be tested on this information	
5	**Closing Activities**: • Recap of learning objectives • Students ensure their graphic organizers match the teacher's model • Students add to their notebooks three things they have learned about comparison contrast texts: look for signal words; use the titles and any headlines or subheadlines; use topic sentences because scientists are *predictable*	• These closing practices move students closer to enduring understandings
Specific Strategies used to Address Exceptional Students and/or Students for whom English is a Second Language: • Scaffolding through the video, the mini-lesson, some reading aloud, the use of the instructional think aloud, peer supports, and the support of teachers and paraprofessionals during the lesson • Differentiation comes when the teachers and paraprofessional offer both academic and emotional support		

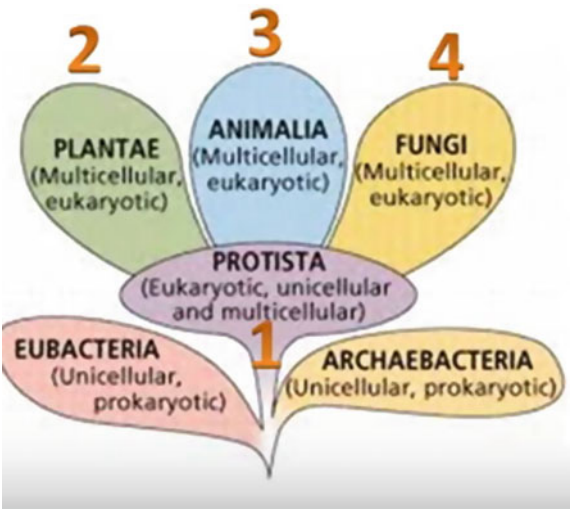

Fig. 13.2 Classification system

Table 13.11 Graphic organizer

PROMPT: Today you will read an article entitled "Prokaryotes and Eukaryotes." You will recognize this text as comparison contrast. You will read this article at least two times; the first time you read it should be for general meaning. The second time you read it will show your very distinct understanding of prokaryotes and eukaryotes. Ultimately, you will take information from the text, showing your understanding of how these two cell types are similar and different. After finishing your second reading, you will make a claim statement, telling why a study of these two cells types is important to life scientists.

Make a Claim:		
Criteria	**PROKARYOTES**	**EUKARYOTES**

Criteria	**PROKARYOTES**	**EUKARYOTES**
Cell Type/Structure	Less structurally advanced; found in bacteria and cyanobacteria	More structurally advanced or more highly evolved; found in animals (including humans)
Cellular Organization		
Reproduction		

Table 13.12 MEET worksheet

The students have an organizer for this kind of writing; they write using an acronym known as MEET (or MEEET) that helps them to "meet" their writing challenges. The district chose this acronym because it uses PARCC language; that is **M**ake a CLAIM, provide **E**VIDENCE and **E**xpand on it, and summarize with a **T**herefore statement. A copy of our writing to text tool is attached.

Make a CLAIM	***Write a claim statement.***	
Evidence & Expansion	**Cite your Evidence** ***The text tells us that*** Either paraphrase or quote directly from the text.	**Expand your thinking:** ***Which means that...*** *Every text, whether fiction or non-fiction, will require you to think beyond what it says explicitly. Using the "which means that sentence frame, interpret the text you put in the box to the left*
Evidence & Expansion	***The text tells us that***	***Which means that...***
THEREFORE, it's important to know this because...		

13.3 Narrative of the Prokaryotes and Eukaryotes: Practicing Close Reading and Writing to Text Lesson

A small public-school district inhabiting the last corner of Massachusetts before crossing the border into Rhode Island, Uxbridge is located along Route 146, between the cities of Worcester and Providence. Once known for its role in the textile industry, Uxbridge, which produced Civil War uniforms and Air Force Blues, no longer has the mill activity that proved lucrative in the 19th century. Today, Uxbridge would best be described as middle class and predominantly White. The new Uxbridge High School, built in 2012, is the district's flagship school, with state of the art technology and a 1-1 iPad initiative.

The lesson takes place in a typical biology classroom, in which students sit at long lab benches facing a whiteboard at the front of the room. The teacher, Mrs. Lussier, will be supported by her paraprofessional and visited, for this lesson only, by the district's curriculum director, a position that affords me the opportunity to act as a literacy coach. While about 25% of the students are on IEPs and another quarter simply aren't fond of school, most will go to two and four year colleges at a rate of about 70%. We are hoping that through this lesson, *all students* will become more familiar with text structures, thereby helping them to recognize comparison

contrast in science texts. In the past, teachers would have simply assigned this as outside reading, and for most of the students in the classroom, the reading would have gone undone when the students encountered the domain specific vocabulary or text complexities.

Charlene and I met a few days prior to the class to discuss the lesson and our individual roles. We talked about meeting both the NGSS and CCSS standards. When the students come into the room on lesson day, they will have already experienced some learning on prokaryotes and eukaryotes. And, they will have watched a 7-minute YouTube video, during which they would see pictures of cells and hear the vocabulary used repeatedly. Some, at this point, might wonder why we would ask the students to *read* similar material when they had previously encountered the information twice. In short: there is no substitute for the active learning of reading, and at some point, these students will need to access text independently and make meaning of comparison contrast passages. Further, PARCC (Partnership for Assessment of Readiness for College and Careers) testing offers students what they label a "research simulation task," which demands that students recognize how three different media—for example, lecture, video, and text—present similar information. Hence, Charlene and I believe firmly in the importance of the reading. Students, even in high school, need explicit instruction in reading.

As students file into the classroom, they are handed the graphic from the previous night's homework (Fig. 13.2), and are asked to engage in a quick write that explains why the graphic has been drawn accordingly. The screenshot exercise serves a couple of purposes: first, the students are reoriented to the study of prokaryotes and eukaryotes—tapping into their prior knowledge. Secondly, and this is quite tricky on the teachers' parts, Charlene and I are exposing the students to a fourth kind of text. When students ranging from grades 2–12 write to text in our district, they respond using an acronym known to them as MEET or MEEET (Table 13.12). Why? Because they need to *meet* all writing challenges! The district chose this acronym because it uses PARCC (Partnership for Assessment of Readiness for College and Careers) language; that is **M**ake a CLAIM, provide **E**VIDENCE and **E**xpand on it, and summarize with a **T**herefore statement. This organizer will be used for students to respond to the graphic during the engagement phase; however, by tenth grade, the district goal is for most students to have assimilated this writing structure as a habit of mind.

After collecting the quick write, Charlene reviews prokaryotes and eukaryotes. Then, she defines the day's objectives: (1) students will practice close reading of a comparison contrast text and self-regulate the use of a graphic organizer (Table 13.11) to extrapolate information from the text; and (2) students will actively identify similarities and differences between prokaryotic and eukaryotic cells. Together we explain how important it is to be able to read science texts. At this point, Charlene moves to the back of the classroom, and I take over. "You have two documents in front of you," I tell them. "Keep the organizer face down right now, but look at the short piece of text on prokaryotes and eukaryotes. Although this is a challenging text, I want you to work your way through it," I say, "just to get the *gist* of what it says. The vocabulary should be pretty familiar to you," I remind the students.

After the first reading, I ask the students to do a 60 s turn and talk. The prompt: "What did you learn from your first reading this text?" Charlene, the paraprofessional, and I circulate through the lab tables to listen to the learning. Students are not wildly excited about prokaryotes and eukaryotes, but Charlene and I engage in a bit of witty banter about how much I *love reading* and how much she *loves cells*! The students feel our excitement for the work we're about to do, and although they know Charlene but don't know me, we think they appreciate our passion and our humor.

After this, we are ready to engage in the second reading, which is the one where students work really hard with the text. I ask students if they see any text features or text structures that will help them to navigate this text. Two students offer answers —the title, they tell me, and they are right. But this isn't much to go on, I remind them. So, I encourage them to move from text features (the title) to text structures, which is challenging. The students are now silent because these tenth graders do not readily know how to identify text structures.

To get started, I ask a student, chosen at random, to read the first sentence of the text. She reads, "Biologists have come to realize that the differences between plants and animals are not as significant as the differences between two basic cellular types —prokaryotic and eukaryotic." I thank the student and ask the whole class what significant word in that sentence helps us to know this is a comparison contrast piece. The students are able to identify "different" as the key word. I ask what other clue might exist in the text to help them see that this is a comparison contrast piece, and another student is able to note that the because there are two cell types in the title, the text may prove to be comparison contrast.

Next, I remind them of how the organizer works—each criterion by which the authors are comparing and contrasting goes on the left; the textual evidence that identifies each cell as either similar or different goes in the boxes. They are familiar with this, and it is a district goal for students to eventually draw this organizer themselves when they encounter comparison contrast texts. I set them to the task of identifying the first criterion in the first paragraph. I ask them to engage with the text and highlight important information. They are told to look up when they *think* they have the criterion and the necessary text. When most students are looking up—this takes only a minute or two—I ask them to *pencil* their idea in the organizer. At this point the paraprofessional, Lori, and the biology teacher, Charlene, can circulate throughout the room and look quickly to see who gets it and who doesn't. Hopefully, the students know that the first criterion should say something like "cell type" or "cell structure."

Although many students may have the right ideas prepared to go into their organizer, I want to ensure that all students know how to do this, so I *model* the process using an instructional think aloud. I put the document under the document reader and "show" the students my interior monologue, so to speak. I tell myself, "Hmmm… it seems like this first paragraph wants me to learn that these cells are very different structurally, so I'm going to write 'cell type/cell structure' in my criterion box." I pause and I write that in. Now, I ask the students to be sure that their first box says something along those lines, and as they do, the teacher and the para again scan the students' papers during a classroom walkaround. I return to my

think aloud and read the rest of the paragraph, starting at "The eukaryotic cell is the structural unit of all modern, or higher, organisms including humans." I say, "Now let me think… I know that I'm not supposed to highlight *everything* so I'm going to choose what I think are the most important words. I'm going to highlight these sections: "higher organisms including humans" and "more advanced stage of evolution." Then I'm going to add these pieces to my organizer.

After we complete the first criterion together, I have the students move to the second paragraph. I ask one student to read the first sentence of the paragraph: "The nature of cellular organization and reproduction in prokaryotic cells is quite different from that of eukaryotic cells." I tell the students I have some *good* news and some *bad* news. The good news is that scientists—especially in their writing—are terrifically predictable. Often, I tell the students, scientists will use a very simple topic sentence that gives away the criteria, and the students recognize at once that the next two criteria in the organizer should be "cellular organization" and "reproduction." The bad news, I tell them, is that this is a dense paragraph, so they may want to use two boxes—one for cellular organization and the other for reproduction. They are now ready to fill in those boxes, and most can do it. Those who need assistance are served by any one of the three adults—Charlene, the paraprofessional, or me—in the classroom. At the end of this paragraph, I ask two students who finish quickly to fill in the boxes as projected on the document reader. We complete this paragraph by checking to ensure that students' organizers look similar to the one projected on the white board.

For the third paragraph, students are paired and work nearly independently. They employ the topic sentence trick and recognize the text structure: namely that the topic sentence reveals the criterion—"cytoplasm"—by which the authors are comparing and contrasting the organisms. The students can readily complete the organizer to show that in eukaryotes, the cytoplasm streams while that does not occur in prokaryotic cells. Now, students are gaining confidence in their ability to discern the text structure of a scientific, complex, informational text that demands comparison contrast. I leave the last two paragraphs to the students, and they can do it independently. Naturally, this won't be the last time we engage students in this kind of reading, but this kind of reading is requisite to being successful in the science classroom.

In conducting such lessons, a major challenge for teachers comes in choosing the right texts; text complexity and length, student abilities, and careful scaffolding, especially around vocabulary, must be carefully considered. Next time, Charlene and I may raise the bar, asking the students to look at paired texts—for example the YouTube video they watched for homework alongside a piece of prose such as what they saw here.

13.4 Using Self-regulated Strategy Development (SRSD) to Promote Learning of Students with Special Needs in Secondary Classrooms

Teachers easily embrace the goal of fostering the kind of self-directed, self-regulating learning in students that lead them to feel self-efficacy, or an "I can do it" attitude. Yet, teachers often wonder where to begin, and how best to do this explicitly, especially for students with special needs who do not self-regulate as naturally or easily as others may. Moreover, in addition to wanting students to self-regulate their actual learning, teachers also want students to self-regulate the emotional side of their experience as learners, equally critical to them developing a belief that they can succeed, and even more challenging as well for students with special needs. With the advent of Common Core, never before has rigor been as high as now. This makes self-regulation all the more essential—of both academic achievement as well as for how students, particularly those with special needs, will manage the inevitable productive struggles they will face emotionally as they tackle increasingly rigorous standards.

The lessons provided in this chapter offer insight into how teachers can support all students in learning to take charge of self-regulating their full learning experience, both in terms of academic achievement and the affective experience they have along the way. These lessons provide an opportunity to listen in on how teachers explicitly weave principles of self-regulated learning theory into actual practice in real classrooms. All of the teachers leading these lessons have deep expertise in Self-Regulated Strategy Development (SRSD). Extensive research deems SRSD as an evidence-based practice (Baker, Chard, Ketterlin-Geller, Apichatabutra, & Doabler, 2009). Over 100 empirical studies on SRSD, show an average weighted effect size for writing quality of 1.75 (McKeow, Brindle, Harris, Graham, Collins & Brown, 2016). In addition, local evidence from schools using the approach with embedded, follow up support from thinkSRSD show an average of 6% gains on state assessments after one year of implementing SRSD (posted at thinkSRSD.com). See DiBenedetto (2018/this volume) for more on self-regulated learning theory, which includes more on the theoretical underpinnings of SRSD.

Of the many self-regulated learning constructs drawn on in the lessons in these lessons, four stand out as particularly central: modeling, self-instruction, goal setting and self-monitoring. While modeling may not be an actual self-regulated learning construct, its role as a key variable in supporting students in becoming self-regulated learners is so substantial that it merited emphasis. Self-efficacy culminates as an outcome of teaching self-regulation through these constructs, then serves as the engine to keep fueling self-regulation.

13.4.1 Modeling

Modeling is essential to teaching self-regulation so students know what to do, and can self-regulate what they know how to do. There are two angles to modeling. First, teachers can show models of exemplary work or, second, can actually model cognitive processes needed to complete a task. First, the importance of showing models that reveal end criteria is emphasized, followed by the importance of cognitive modeling of processes, done by adults or peers.

13.5 Show Models that Help to Reveal Explicit Criteria

Students need to have a sense of what the finish line looks like before they can begin any endeavor. Showing students what a model piece of writing looks like, or what a reading comprehension strategy might look like in text annotations, helps students work more efficiently. The Common Core State Standards (CCSS.ELA.W.2) ask that students include certain parts when writing model informational text such as: topic introduction, supporting details and an ending. Therefore, models we show should include these initial parts. Regarding reading 'models', students can learn strategies such as how to annotate key ideas and details (CCSS Reading Anchor Standards) by seeing models of annotated texts, and learning steps for doing this. At a basic level, models serve as anchors that provide students a picture of essential components. For example, Pooja showed a model paragraph that follows the structure of TIDE: **T**opic introduction, **I**mportant evidence, **D**etailed examination and **E**nd. Giving a lens to understand a model helps students analyze models. TIDE has the additional value of later facilitating self-regulation, as it is a portable tool students can pull up in their mind anytime they need to write. Moreover, Pooja paired TIDE with an hourglass image that shows the shape of an essay. This layers a visual structure over the essay so that students could clearly see and abstract out the parts, enabling them to mimic them more easily as they begin their journey in finding who they are as writers and what their style will be.

Essentially, showing models is not enough. Students need tools to analyze the models, opening the door to a deep understanding and giving them portable tools they can use independently in the future to self-regulate themselves. Regarding reading "tools" or models, Carol showed adult created models when she showed students how she would complete the graphic organizer. She then showed peer models. As students completed their sections, she displayed these on a doc cam so peers could see each other's thinking while they read, and peer models. Allowing students to see a variety of peer models enabled them to see multiple options that all work.

13.6 Model Self-regulated Use of Strategies, not Just Strategies

The lessons not only provide a variety of models and 'tools', but they also modeled self-regulated use of these. Through such cognitive modeling, learners can pattern their thoughts, beliefs and behaviors after those displayed by the adult doing the modeling (Schunk, 1987). This patterning may happen consciously or unconsciously in students, though teachers can facilitate it happening more consciously and quickly by explicitly discussing and modeling self-regulated use of strategies. Moreover, teachers often view modeling as a way to display new skills or strategies, yet modeling affords so much more than this. It also enables teachers to set an affective example for how to cope and respond when a task is challenging, frustrating, uninteresting or confusing.

For example, in Carol's lesson, not only did she model strategies, but Carol also modeled emotion, which is key. She modeled being upbeat and finding what was interesting in the cell topic they studied. Students naturally emulate models they see in the classroom, so even without pointing it out and making them explicitly aware, modeling such contagious enthusiasm has such value. Essentially, modeling can both inform students about what they are to do, as well as motivate them to do it (Schunk, 2003).

Students learn what to do from observing models, but they also feel they can do it when they see models, particularly matched peers, succeed (Schunk, 1987). For modeling to result in actual observational learning, four key processes must be present: attention, retention, production and motivation (Schunk & Zimmerman, 2007). Students must attend to the models, must have a way to retain what they noticed, must practice producing what they learned and must be motivated to care that what they are learning will be useful for them to know. Modeling not only informs by giving strategies for how to cope, but can also motivate (Schunk & Zimmerman, 2007). If students see a model of a person who is frustrated, then uses self-talk to calm down and this works, they may buy in and believe this work for them too. Additionally, students need to see not only adults model processes, but also peer models. As stated, students inspire each other. The more similar the peers are in competence, the greater the gains as well (Braaksma, Rijlaarsdam, & Van den Bergh, 2002).

13.6.1 Self-instruction

In each of these lessons, teachers worked to put students in charge of their learning through giving not only tools, and modeling how to use them, but by offering guided practice in using those tools and helping students develop the inner language needed to use the tools independently. In this way students can develop personalized scripts they can use to self-instruct themselves through the process of reading

or writing. Essentially, we want students to develop an inner script and as one teacher recently put it, "to have the tools they need right there in their brains so they take them anywhere".

However, for students to develop this inner script, they need to be clear about how to use the tools, and how to modify based on their level of proficiency. Essentially, they need to be proficient in directing themselves through using these tools. This is the rigor in self-regulated learning. We must not stop at giving tools, but teach how to use them. Only after tools are given and modeled can students then begin to work on self-instructing themselves in using them in the guided release phase. During guided release, not only is the student work monitored, but how students are self-instructing themselves as they work is also taught, supported, and monitored. This, of course, happens at vastly different paces for different students where some can independently self-instruct far more quickly and with less scaffolds than others.

In Carol's lesson, students watched her model how to identify clue words to help them determine the process on how to both set up a graphic organizer and how to begin to complete it. However, they then had the chance to fill in the next section on their own, directing themselves through the process. Carol allowed students to experience instruction through explicit modeling followed by immediate independent practice. To help students develop an inner script for the language they need to use to direct themselves in using strategies or tools, teachers can have students actually write up a self-instruction plan, a core practice in SRSD. Students write out a plan for exactly how they will self-instruct themselves in using the tools they are given. This might include language cues or even visuals they will use to direct themselves as they use strategies and tools. For example, a student may write that he will read the writing prompt first, identify the question, reflect on their strengths and weaknesses as a writer, and decide on the strategy that will be used, all before actually tackling the writing task or the writing process. After students write up this plan, they can then check it off as they use it.

Students may not realize that learning, in the end, is something students "do for themselves in a proactive way rather than as a covert event that happens to them in reaction to teaching." (Zimmerman, 2002, p. 65). Students need a self-instruction plan for them to take charge in this way. Moreover, students also need to have clear steps ready to guide them at each of the forethought, performance and self-reflection phases (Zimmerman, 2002). In the forethought phase, when they do a task analysis to understand what is needed, they would create their self-instruction plan allowing them to complete assignments with success. They may adjust this as needed in later phases, but this is the start point.

Students write these up so they own them, and can individualize them. Students can actually write these self-regulation plans directly on their work—on their outlines when they write or on a post in the book they are reading. Students then use them like a checklist as they work, checking off each step as they go. As students become more expert at following these, they can adjust them as they go and maintain using them (Schunk & Zimmerman, 2007). It is tempting for teachers to offer pre-made checklists of steps whether for editing or the writing process.

However, checklists are far more powerful if students create them, starting small. As they master using each element, then build in more and more elements to the list of self-instructions they will use as they work. Using strategies, such as reading comprehension strategies, yet self-monitoring their use of them, enables students to perform significantly better than controls on outcome measures (Jitendra, Hoppes, & Zin, 2000).

13.6.2 Self-monitoring

Students self-monitor when they evaluate themselves for whether they have completed a set task, then can record the results. This can include self-monitoring attention or performance (Harris, Graham, MacArthur, Reid, & Mason, 2011). They answer questions such as: *How am I doing?; Did I remember all the steps?; Does this include everything?; How much more do I need to do?*. In order to self-monitor, students need a criteria that they can use to evaluate themselves. Terri provided this as her students scored each of their TRAP summaries. Terri also provided this when she had students reflect on their current STAR data so they could see where they are at currently as readers, and set goals for the areas in which the data shows they can improve. Pooja provided this when she gave her students scales to score their writing. Students could use these as a concrete tool to measure where they are at, but they also refer to them as they write so they can monitor their work as they go and not just when finished.

Self-monitoring includes looking at one's processes such as endurance, rather than just performance. Students set up mini rewards so they can self-reinforce as they work. Some will tell us that after ten minutes of writing, they will take a break, stretch and walk to get water. Students might also graph their gains. This is enormously motivating for students. Many just don't understand their progress when they see their writing or reading comprehension strategies improve, but when they actually graph their gains, they often have an "ah ha" moment and deeply feel their sense of accomplishment. Others set attentional goals such as to not look up every time they hear a noise or they write "keep going" if they face frequent internal distractions. Then they reward themselves with check marks on their page every time they met this goal. The key is to encourage students to self-reflect, investigate their strengths and weaknesses as learners and create systems that will help support their learning through self-monitoring.

When students employ effective self-monitoring to meet their needs, learning and academic achievement improves. Self-monitoring attention increases both story length and quality (Harris, Graham, Reid, McElroy, & Hamby, 1994), lifts quality of academic work in general (Reid & Lienemann, 2006), and quality of reading comprehension (Joseph & Eveleigh, 2000). Often self-monitoring itself is its own reward.

13.6.3 Goal Setting

As students self-monitor their performance, they can set goals, which may be the most motivating aspect of self-regulated learning. A goal can be defined as a "behavior or outcome that one is consciously attempting to perform or attain." (Zimmerman, Schunk, & DiBeneditto, 2015, p. 84). Goal setting refers to establishing a specific outcome, and goals set appropriately can guide student motivation and persistence. (Zimmerman, 2008). By set appropriately, goals should be specific, measurable, and attainable. Students need to set a clear objective that they will reach for when they set goals.

Pooja's lesson modeled how to set goals well. She showed her students model writing pieces, had them evaluate them then had them set individual goals for what they would like to work on, thinking back to previous performance, in a google drive survey. Terry also had students set goals after scoring, and as they reflected on STAR data.

When students self-regulate how they approach a task, this directs attention, effort and action (Zimmerman, 2008). Goals energize and affect persistence. Goals then set the route and final destination for their next journey. They provide students the opportunity to zoom into the area that they need work on. Descriptive feedback further strengthens the value of goals. Descriptive feedback includes constructive criticism and specific suggestions for improvement. Feedback can be received from the student, peers, or an adult. Students can only self-direct and self-regulate their learning using their goals if this type of feedback is provided so that they can continuously adjust them to meet their needs (Locke & Latham, 2002).

Students can set two types of goals to self-regulate their learning: process and product goals. Process goals set up how they will approach and carry out the task creating more strategic learners. Product goals enable students to have a clear focus about their outcome in mind (Graham, Macarthur, Schwartz, & Pagevoth, 1992), as Pooja had her students do. In a replication of this study by Graham et al (just described) done by Patel and Laud (2009), it was found that student writing quality grew when the student set both process and product goals, and he showed greater confidence and self-awareness of his strengths and weaknesses as a writer. Another study found that students who set learning goals and recorded behaviors that moved them toward achieving them, those students scored significantly higher on exams (Fleming, 2002). Moreover, setting more challenging goals results in greater satisfaction (Zimmerman, 2008). Students who set more elaborated goals that included specific additional sub-goals (be clear, use two or more reasons) also score better than students who set general goals such as just to be persuasive (Ferretti, Lewis, & Andres-Weckerly, 2009).

Overall, students can become self-regulated learners with explicit instruction and support. While there may be a "loss" in content teaching time sacrificed to take the time to teach students to be self-regulating, the benefit seems to make this a worthwhile sacrifice.

As recommendations for future research, researchers might consider qualitatively observing teachers who are fostering strong self-directed learning in their students to understand the practical steps they use. Teachers buy into building self-regulation but are always eager for specific examples from colleagues for how best to do this. We have a growing research base on what to do, but more practical examples might help bridge the research to practice. Furthermore, researchers and practitioners agree that time is critical. The more time students have to practice self-regulation, the better they will get at it. How can self-regulation instruction be woven throughout all content areas more effectively so this skill can be intentionally developed throughout the day. Each of these lessons looked at specific skills instruction (TIDE, TRAP, MEET), studies could look at whether applying such skills to projects foster greater growth in self-regulation, or whether frequent opportunities to apply such strategies whenever students read and write short pieces would result in greater gains in both achievement, and self-regulation capacities.

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Part IX
The Flipped Classroom and Social Media to Teach Social Studies (One Comprehensive Lesson)

Chapter 14
Technology Uses in Instruction

Daniel C. Moos and Christopher A. Stewart

Abstract The K-12 educational system has a long tradition of integrating technological advances into the curriculum to enhance student learning. Most recently, the Flipped Classroom Model has been growing in popularity due to its potential for individualizing the learning process. This model deviates from a more traditional approach to teaching by moving content delivery to homework, which is often in the form of a video recorded lecture. This approach offers the opportunity for students to self-pace their learning, unlike learning from a more traditional class lecture. Furthermore, this model enables teachers to use collaborative activities that may not have otherwise be possible in traditional classrooms. Such innovative uses of technology in the classroom have altered the pedagogical choices of teachers and changed how students learn. The autonomy in the learning process and ability to self-pace content offered by many classroom technologies require students to be active participants in their own learning, otherwise termed self-regulated learning. This chapter offers a comprehensive lesson plan that demonstrates how technology (namely Flipped Classrooms and Social Media) can be effectively used to enhance an 11th grade World History class. In the first section, the lead teacher offers a detailed explanation of the lesson plan. In the second section, the scholar offers a commentary and analysis connecting the principles and constructs of self-regulated learning to the lesson.

D. C. Moos (✉)
Department of Education Mattson Hall, Gustavus Adolphus College,
800 West College Avenue, Saint Peter, MN 56082, USA
e-mail: dmoos@gustavus.edu

C. A. Stewart
North Lakes Academy Charter School, Forest Lake, MN, USA
e-mail: cstewart@northlakesacademy.org

M. K. DiBenedetto (ed.), *Connecting Self-regulated Learning and Performance with Instruction Across High School Content Areas*,
https://doi.org/10.1007/978-3-319-90928-8_14

Table 14.1 Practical historical skills in the flipped classroom lesson

Teacher: Christopher A. Stewart, B.A., Social Studies Teaching	**Grade Level(s):** 11th
School: North Lakes Academy Charter School	**Subject:** World History
City and State: Forest Lake, Minnesota	
Instructional Plan Title: Practical Historical Skills (Eliminating Anthropological Bias)	
MN Social Studies Standards-4.1.2: Historical inquiry is a process in which multiple sources and different kinds of historical evidence are analyzed to draw conclusions about how and why things happened in the past **MN Social Studies Standards-4.2.4**: The differences and similarities of cultures around the world are attributable to their diverse origins and histories, and interactions with other cultures throughout time **This lesson occurred early in the curricular year, thus no specific content-oriented benchmarks for World History were addressed**	
Learning Objectives in Class: 1. Students will assess the cultural diversity of subgroup via P-I-G-L-E-T-S method to evaluate personal biases and define ethnographies 2. Students will complete an initial practice session using the P-I-G-L-E-T-S method covering the "Nacirema" case study 3. Students will demonstrate mastery of these learning objectives, following the second part of the lesson: Home (Flipped) Activities" by generating a summative presentation in class after extensive flipped classroom activities	
Instructional and Learning Materials Needed for both in-class and flipped classroom: – P-I-G-L-E-T-S (Power-Ideologies-Language-Economics-Turning Points-Successes and Shortfalls) model (see Table 14.2 at the end of the lesson plan) – Source Analysis Tool to be used for primary source evaluation (see Table 14.3 at the end of lesson plan) – "Nacirema" ethnographic case study, written by Horace Miner in 1956, as published in facingthefuture.org selection (see Table 14.4 at the end of lesson plan) – "Nacirema" Overview (see Table 14.5 at the end of the lesson plan) – "Nacirema" In Class Presentation handout (see Table 14.6 at the end of lesson plan) – Camera to take photographs of artifacts – Internet access to obtain assignments and to interact on Schoology course (Learning Management System)	
Lesson Duration: Approximately 80–120 min of in-class activities, to be organized based on teacher preference and grade level	
Teaching and Learning (Lesson 1, In-class Component)	

Min on this Activity	Targeted Activity	Purpose of Activity
5	**Orienting Students to Lesson:** • Students find their seats, check objectives written on the board, gather resources, and turn in personal devices for later use in line with class policies	• Clear expectation regarding classroom routines and the use of resources are critical when classroom activities are reliant on technology • Expectations/routines are frontloaded, and students are asked to evaluate if objectives are met each day

(continued)

Table 14.1 (continued)

30–40	**Motivation:** • Class objectives are launched via a daily "hook," followed by use of a central resource, and application – Describe the United States to someone who has never heard of or witnessed our way of life – Create a list of the categories students used to describe United States and sort into P-I-G-L-E-T-S – Introduce and launch the P-I-G-L-E-T-S tool to be used for future, unbiased, cultural evaluations. Definitions of key concepts created collaboratively – Use the P-I-G-L-E-T-S chart to objectively describe (eliminating prior bias) United States again – Read the "Nacirema" ethnographic profile, which discreetly describes American bathroom habits, and highlights personal biases that students may carry	• Having learners "sold" on the lesson topic is important so they are interested, engaged, and motivated throughout. Without a desire to achieve the set objectives and share an ownership stake their achievement will yield only temporary buy-in and learning that is difficult to measure • This activity encourages students to begin to step back away from a subculture of which they are a member, and to realize the difficulty in evaluating such a group without bias • Launching the P-I-G-L-E-T-S tool gives them a method by which such analyses can be more authentic • In each aspect of this lesson, a specific historical skill is built and tools are explored collaboratively that they will use more deeply and in complex tasks during flipped classroom portions • In this case, the P-I-G-L-E-T-S chart combined with the "Nacirema" reading prepares bias-free investigations, while highlighting more deeply-help biases about their own culture
30–40	**Whole Class Instruction:** • Equipped with a new tool, students are asked in class to apply their historical skills using artifact analysis with another instructor-created tool for primary sources – Students share their artifacts they were asked to bring into analyze – Explain and implement the Source Analysis chart using their personal artifacts; define content concepts using teacher's personal artifact – Review critical Source Analysis concept of, "Reliability = Usefulness – Bias," model with a student's example of an artifact; students collaborate as needed	• In order to build on their understanding of the anthropological bias-eliminating P-I-G-L-E-T-S tool, students are taught how to extract information in a more detailed way from primary sources via Source Analysis. The guided practice aspect in this lesson emphasizes collaboration. All of these skills will be furthered and built upon in the flipped classroom lesson • The use of the Source Analysis tool builds the historical skills they will need to be able to conduct their flipped classroom evaluations, which stretch far beyond their in-class learning. In this sense, the in-class lesson is foundational whereas the flipped classroom portions access highest skills of Bloom's Taxonomy, specifically evaluating, creating, and analyzing
15–20	**Independent Practice/Closing Activities:** • Provide students with detailed assignment sheet and rubric for aspects of the flipped	• While using the P-I-G-L-E-T-S chart in two different contexts and implementing the Source Analysis

(continued)

Table 14.1 (continued)

	classroom guided practice leading up to the summative project • Brainstorm proposals for the flipped classroom portions of the lesson; students are encouraged to study a "subculture" with which they are very familiar	tool could be used to evaluate their understanding, transferring this knowledge to the study of a subculture of their choice in a flipped classroom format will illustrate all foundational skills learned during this time • In addition, the students are developing technology skills by using the Schoology, experiencing mutual peer and teacher feedback via the technology-centered LMS, and engaging in extensive independent practice
Specific Strategies used to Address Exceptional Students and/or Students for whom English is a Second Language: • The nature of this lesson allows students the flexibility of intentionally deciding the complexity of learning. The skill of teasing out inherent biases, gathering physical evidence to draw conclusions, and the use of the artifacts helps students who are more visual learners and those who learn when using hands-on materials • The built-in personalization of independently defining the P-I-G-L-E-T-S chart's terminology and the leveled-questions proposed within the Source Analysis tool also provide room for increasing or decreasing the level of difficulty for the students		• Allowing students to make decisions and choices in their learning helps create a connection between the content and the learner. This helps students personalize the content and assists in deeper processing • The handouts created by the teacher foster leveled learning which is helpful to those who struggle with verbal skills or for whom English is a second language
Teaching and Learning (Lesson 2, Flipped Classroom Component)		
Learning Objectives for <u>at Home:</u> 1. Students will assess the cultural diversity of personal subgroup via P-I-G-L-E-T-S method by conducting independent observations and will turn in their structured observation notes during three different flipped classroom LMS discussion boards 2. Students will evaluate the role of personal bias in the observation of various cultures through direct contact and reflection thereon and discuss the role of the Hawthorne Effect, researched outside of class, on their aforementioned observations 3. Students will utilize skills built during in-class activities to collaboratively evaluate narratives communicated by chosen subgroup's artifacts using P-I-G-L-E-T-S 4. Students will summatively appraise their subculture of choice's greatest cultural contribution and subtraction to its dominant culture and provide notes on final observations of their subculture in addition to reflect on its importance via the LMS discussion board		
Instructional and Learning Materials Needed: See materials listed under Lesson 1 above		

(continued)

Table 14.1 (continued)

Lesson Duration: Approximately 2 weeks of class time following the in-class portions described above (may vary)		
Teaching and Learning		
Min on this Activity	**Targeted Activity**	**Purpose of Activity**
Done in advance	**Orienting Students to Lesson:** • The independent practice and closing activities from Lesson 1 should be reiterated and provided to students on the LMS central hub, complete with an assignment sheet, links to discussion boards, and a rubric for flipped classroom aspects for the summative project	• The purpose of this aspect is to frontload all requirements for the students so the flipped classroom portion of this lesson can effectively be conducted without compromising the required independence to complete these "flipped" aspects. Students should have access to all resources they may need at all times
Done in advance	**Motivation:** • In initial descriptions on the final summative presentation that will be the only portion of this lesson shared in-class, models from previous years should be shared and a general description of the phases should be provided	• To ensure that students are not overwhelmed by the amount of steps required to complete the "flipped" aspects, each segment will be issued in phases and perhaps even intermixed with in-class portions from Lesson 1. Significant more direct in-class instructional time would be required without using strategy
60–90 min for each aspect	**Independent Practice:** • The "flipped" elements allow students to practice skills, add new levels of learning, and demonstrate mastery • Conduct observations on subculture; report on Power and Politics and Ideologies and Influence, and study/reflect on Hawthorne Effect independently • Conduct observations to report on Geography, Language and Communication, provide info on subculture artifact, and evaluate another's on LMS • Conduct observations on Economics and Turning Points, as well as evaluating the holistic Successes and Shortfalls of their subculture of choice	• The use of Schoology as a tech-based LMS will provide the venue for all the independent practice and expansion to creating, evaluating, and analyzing. Each phase builds on existing skills, asking students to personalize the information • Phases—highlighted with separate discussion boards with separate threads and due dates—will not only encourage students to conduct extensive observations of their subculture, but also prevent students from feeling overwhelmed by the amount of work they're being asked to complete independently. The Hawthorne Effect can be defined as an observer's inherent impact, and thus change in behavior, on the observed • All phases are summative in nature, but students who are most able to self-regulate can discuss with

(continued)

Table 14.1 (continued)

		instructor and classmates on the LMS to improve their initial responses and their grade
3–4 days to create	**Evaluation of Learning and Assessments:** • The students will be asked to generate a summary of all of their observations, discussions, artifact collection, and overall analysis of their subculture through the lens of the P-I-G-L-E-T-S chart to be presented to their classmates. In particular, the most unique conclusions they drew from their observations or their LMS discussion board interactions should be highlighted	• This evaluation is not weighted as heavily as the phases described above, but is an essential step for students to collaborate and differentiate the conclusions they drew about various subcultures from those of their classmates. However, because the "flipped classroom" model demanded that the non-foundational and authentic learning occurred away from the classroom, this is an appropriate conclusion to the mini-unit

Specific Strategies used to Address Exceptional Students and/or Students for whom English is a Second Language:

- Throughout this lesson that utilizes social media and/or flipped classroom mechanisms which targets different learning styles
- Breaking down the assignments into smaller chunks helps it not feel overwhelming to all students
- The rubrics used to evaluate allow for a wide variety of students to meet all of the content expectations
- Collaboration with peers and the teacher provide support and scaffolding to students who need help
- The Learning Management System provides a clear outlet for students who struggle with language or processing difficulties

Table 14.2 PIGLETS tool

P	Power: The ability to influence world events depending upon the context (military, resource, population, technology, etc.) Politics: Critical functions, structure, laws, forms of leadership, good intentions, and actions of people's government.	**E**	Economics: The manner in which we value scarce (high demand but low supply) resources, and the processes by which we ration/distribute them.
I	Ideologies: Set, structured systems of beliefs, myths, institutions (not only religious groups) Influences: The tangible sources of impact that change our worldview about ideologies and our worldview generally (media, society).	**T**	Turning Points: Critical points in time that plot a new course for history, carry a great deal of significance, and directly impact a PIGLETS element.
G	Geography: Layout & orientations of physical landmarks, political boundaries, land masses, climate, topography, & relative location.	**S**	Successes: Triumphs that create pride of place for a society, establish an identity for that civilization, teach lessons, and mark their global impact. Shortfalls: Failures that can teach the rest of the world a lesson and demand a response/change in the society's approach to similar issues.
L	Language & Communication: The way in which groups interact and exchange ideas (written, verbal, body language, media, etc.).		

Table 14.3 Source analysis tool

SOURCE ANALYSIS GUIDING QUESTION		
AUTHOR/CREATOR Who wrote, filmed, or drew this source? Professionals? Did they come from within or outside of the culture?	**AUDIENCE** Who was it created for, and for what purpose? How did this impact the way info is communicated?	**DATE** When was it created? How might you be able to tell? Was it after/before the time to which the source refers?
PRIMARY/SECONDARY Was it a direct or indirect source of information? What evidence could lead you to this conclusion?	**MEDIUM** In what form/material was the info communicated? What are some clues we could use to determine this?	**NARRATIVE/CONTEXT** What other information did we learn about the events? What information would allow for better analysis?
USEFULNESS What specific details does the source provide? What key information is most relevant to remember?	**BIAS** Did the author's opinions affect the message? Did they create the source to convince, or just inform?	**RELIABILITY** Does the historical information outweigh the opinions? **RELIABILITY = USEFULNESS - BIAS**

Table 14.4 Nacirema case study

BODY RITUAL AMONG THE NACIREMA

Revised from "Body Ritual Among the Nacirema" by Horace Miner, *American Anthropologist Magazine* 58(3), 1956, pp. 503–7

The ritual of the Nacirema was first brought to the attention of anthropologists twenty years ago, but the culture of this people is still very poorly understood. They are a North American group living in the territory between the Canadian Cree, the Yaqui and Tarahumara of Mexico, and the Carib and Arawak of the Antilles. Little is known of their origin, although tradition states that they came from the east.

Nacirema culture is characterized by a highly developed market economy, which has evolved in a rich natural habitat. While much of the people's time is devoted to economic pursuits, a considerable portion of their day is spent in ritual activity. The focus of this activity is the human body, the appearance and health of which appear as a major concern in the people's belief. While such a concern is certainly not unusual, its ceremonial aspects and associated philosophy are unique.

The main belief underlying this ritual activity appears to be that the human body is ugly and that its natural tendency is to weakness and disease. Captive in such a body, man's only hope to avert these characteristics is through the use of ritual and ceremony. Every household has one or more shrines devoted to this purpose. The more powerful individuals in the society have several shrines in their houses and, in fact, the grandeur of a house is often referred to in terms of the number of such ritual centers it possesses.

The focal point of the shrine is a box or chest, which is built into the wall. In this chest are kept the many charms and magical potions without which no native believes he or she could live. These preparations are obtained from a variety of specialized practitioners. The most powerful of these are the medicine men, whose help must be rewarded with large gifts. However, the medicine men do not provide the potions for their clients, but decide what the ingredients should be and then write them down in an ancient and secret language. This writing is understood only by the medicine men and by the herbalists who, for another gift, provide the required charm.

Beneath the charm-box is a small font. Each day every member of the family enters the shrine room, bows his or her head before the charm-box, mingles different sorts of holy water in the font, and proceeds with a brief rite of cleansing. The holy waters are secured from the Water Temple of the community, where the priests conduct elaborate ceremonies to make the liquid ritually pure.

The medicine men have an imposing temple, or *latipso*, in every community of any size. The more elaborate ceremonies required to treat very sick patients can only be performed at this temple. These ceremonies involve not only the miracle-worker, but also a group of assistants who move quietly about the temple chambers in distinctive costume and headdress. The *latipso* ceremonies are so harsh that a fair proportion of the really sick natives who enter the temple never recover. Despite this fact, sick adults are not only willing, but eager to undergo the long and drawn-out ritual purification, if they can afford to do so. No matter how ill or how grave the emergency, the guardians of many temples will not admit a client if he or she cannot offer a rich gift.

The Nacirema have an unrealistic horror of and fascination with the mouth, the condition of which is believed to have a supernatural influence on all social relationships. Were it not for the rituals of the mouth, they believe that their teeth would fall out, their gums bleed, their jaws shrink, and their friends desert them. They also believe that there is a strong relationship between oral and moral characteristics. For example, there is a ritual cleansing of the mouth for children, which is supposed to improve their moral character.

The daily body ritual includes a mouth-rite. This rite involves a practice which strikes the unfamiliar stranger as revolting. It was reported to me that the ritual consists of inserting a small bundle of hog hairs into the mouth, along with certain magical pastes, and then moving the bundle in a highly formalized series of gestures.

In addition to the private mouth-rite, the people seek out a *holy-mouth-man* once or twice a year. These practitioners have an impressive set of tools, consisting of a variety of augers, awls, probes, and prods. The use of these items in removing the evils of the mouth involves almost unbelievable ritual torture of the client. The holy-mouth-man opens the client's mouth and, using the above-mentioned tools, enlarges any holes which decay may have created in the teeth. Magical materials are put into these holes. If there are no naturally occurring holes in the teeth, large sections of one or more teeth are gouged out so that the supernatural substance can be applied. In the Nacirema's view, the purpose of these religious functions is to arrest decay and to draw friends.

Our review of the ritual life of the Nacirema has certainly shown them to be a magic-ridden people. It is hard to understand how they have managed to exist so long under the burdens which they have imposed upon themselves.

WHO ARE THE NACIREMA?

Table 14.5 Ethnography overview

NORTH LAKES ACADEMY HUSKIES
FOREST LAKE, MINNESOTA

"WRITING A P-I-G-L-E-T-S ETHNOGRAPHY" OVERVIEW

Your Name: _____ Block: _____

Your Ethnography's Subject: _____

GENERAL PROJECT OVERVIEW

Throughout this first unit of this course, we have worked on the skills we will use to study another culture **ethnographically**. Remember that an ethnography is defined as ***"the scientific description of the customs of individual peoples and cultures based on fact and observation."*** This final assessment will give me my first chance to see you use these skills in action, and will be framed around P-I-G-L-E-T-S and Source Analysis. You will be expected to meet the following standards after selecting a subculture:

1) Demonstrate your ability to conduct observations as a neutral observer to collect facts
2) Sort available data and document conclusions using P-I-G-L-E-T-S to guide your path
3) Identify critical sources that are important to them and analyze them via Source Analysis
4) Evaluate/draw conclusions about the mainstream "identity" of the subculture and its members
5) Explain how your role/position in this subculture may affect your conclusions (Hawthorne Effect)

Keep in mind that during World History, the extensive amount of content is important, but there is just too much of it. Instead, I expect that you can catalogue distinct differences between civilizations using P-I-G-L-E-T-S, and find ways to explain how their history has brought them to where they are today. Also remember that while we need to identify our ethnocentric biases, we don't have to completely eliminate them, but be aware of them and leave them out in an ethnography.

PROJECT REQUIREMENTS

Your projects will be presented over the period of about three weeks as we work on National History Day together in class. This first aspect will require that you conduct six hours of observation outside of class and uncover artifacts for your subculture. You will then respond in some detail with observation notes, pictures of those artifacts complete with a Source Analysis, and a thought question on three Schoology discussion boards. Each board will be released across those weeks, and why they are not due until the final in-class presentation is due, it is in your best interest to stay on top of these requirements!

Final in-class presentations will add to this research, and can take the form of a "mockumentary," a radio program, Nacirema-esque profile, or any other creative format you can think of. More requirements will be provided on this portion when the time comes. For now, the general standards for this project

1) Evidence of Research: I would encourage you to use the P-I-G-L-E-T-S format for extensive note taking (on the reverse side). Be sure to pay attention to your subjects AND their surroundings (context).

2) Meaningful Visuals: Whether you choose to write a paper or film a video, symbols, images, concepts, and ideas that impact or otherwise help your audience understand your subjects is a crucial element to your project. You can download these if your subject is fictional. Take pictures otherwise.

3) Accuracy of Information: Be certain to not skip over any of the elements of P-I-G-L-E-T-S. I don't want to hear that they "didn't exist," or that it was "too hard to find." They're all there, I promise! Schoology will be your guide.

4) Presentation Component: As a group, we'll draw for an order to present these to class. As with National History Day however, your project should be engaging and use meaningful visuals (artifacts) as the centerpiece. You will get 10 minutes or less to walk us through your work and share some of the coolest aspects you uncovered.

Table 14.6 Ethnography in-class presentation

NORTH LAKES ACADEMY HUSKIES
FOREST LAKE, MINNESOTA

"P-I-G-L-E-T-S ETHNOGRAPHY" IN-CLASS PRESENTATION

Your Ethnography Subculture: _____

IN-CLASS PRESENTATION OVERVIEW

Throughout this first unit of this course, we have worked on the skills we will use to study another culture **ethnographically**. Remember that an ethnography is defined as ***"the scientific description of the customs of individual peoples and cultures based on fact and observation."*** This final in-class presentation will give me my first chance to see what conclusions you drew about a studied subculture.

1) Demonstrate your ability to conduct observations as a neutral observer to collect facts
2) Sort available data and document conclusions using P-I-G-L-E-T-S to guide your path
3) Identify critical sources that are important to them and analyze them via Source Analysis
4) Evaluate/draw conclusions about the mainstream "identity" of the subculture and its members
5) Explain how your role/position in this subculture may affect your conclusions (Hawthorne Effect)

IN-CLASS PRESENTATION REQUIREMENTS

The final aspect of P-I-G-L-E-T-S, we have the "S." This stands for the SUCCESSES and SHORTFALLS of your subculture, using the following working definitions. A **Success** is a triumph that creates pride of place for a society. They go a long way to establish an identity for that civilization, teach lessons, and mark their larger impact. A **Shortfall** is a failure that can teach the rest of the world a lesson and demand a response or change in the society's approach to similar issues. While often negative, shortfalls make a group's identity even more concrete than successes do. This information helps us to understand the identity of your subculture on the whole and are much more evaluative.

MORE SPECIFIC REQUIREMENTS

Your in-class presentation will include three aspects.

1) Brief PIGLETS Summary: Without getting into too much detail from your observation notes, provide a 25-word or less summary of each of the PIGLETS area in the context of your subculture's identity.

2) Focusing on the Artifacts: Your artifacts will tell the story for you. You already have three from the Observation Discussion Board from Schoology. Discuss the significance of each of these during your presentation. Focus on the **narrative** aspect of the Source Analysis Chart. **You will then also choose a fourth artifact that relates to the Successes or Shortfalls of your ethnography and do the same.**

BE CREATIVE!

Final presentations can take the form of a "mockumentary," a radio program, Nacirema-esque profile, or any other creative format you can think of. What are less impactful (and thus appropriate) are PowerPoints or simple 2-3 page papers (standard formatting). **I am very open to cool ideas, so don't stifle your creative energies if they spur a neat idea!** If you want feedback, I'll happily provide it.

14.1 Narrative of the Practical Historical Skills in the Flipped Classroom Lesson

North Lakes Academy (NLA) is a public charter school located in a rural/suburban environment approximately 20 miles north of the Minneapolis-St. Paul metropolitan area (MN, USA). NLA is a mission and vision-based liberal arts institution, which strives to provide college and career training for students who can benefit from smaller class sizes and more one-on-one instructional time. The total enrollment for grades 5–12 is approximately 405 students, 92% of which are of White (Non-Hispanic) origin. The bimodal population consists of a mixture of rural low-income families with below average education and post-secondary degree-attainment levels, and middle-income commuter families with above average education and post-secondary degree-attainment levels. According to 2014 data from the Minnesota Department of Education, the student population is composed of 26.2% Free/Reduced Priced Lunch students, 18.3% students who qualify for and receive Special Education services, and no students who receive ELL services. NLA maintains a 77.1% graduation rate annually.

The lessons in this chapter were developed for a classroom of 30 students (separated into two sections) with 11th grade credit standing. Of the 30 students, twelve students are on an Individualized Education Programs (IEPs) and four additional students have 504 Plans. Each session, held every other school day, is organized into 80-min "block" periods.

As an adapted world civilizations course, the historical world timeline is studied one region at a time, as opposed to chronologically. The lessons described in this section focus on the content area of World History and are split into two distinct portions (see Table 14.1 part 1 and part 2). Both lessons address the same two benchmarks from the Minnesota K-12 Academic Standards in Social Studies, and examine foundational skills opposed to typical World History content. In particular, the standards mentioned in the lesson plan highlights the importance of analyzing different sources of evidence and the diversity of cultures around the world. The lesson plan focuses on these standards, but through a different lens. While numerous sources of evidence are evaluated (direct observations, online research, artifact analysis, and peer collaboration), the lesson plan focuses on small subgroups as opposed to large civilizations throughout history.

The preliminary in-class lesson focuses on the skill-building aspects through the introduction of the P-I-G-L-E-T-S chart (see Table 14.2) and the Source Analysis tool (see Table 14.3). The use of these tools allows students to target personal biases and draw conclusions about societies as historians. I designed both of these tools for the study of different cultures and subcultures. I introduce them in Lesson 1 so students will be prepared to analyze a chosen subculture in Lesson 2, the "flipped classroom" lesson, which represents more than 75% of the required learning.

The objectives of Lesson 1 before flipping the model are threefold, including to (1) develop the need and purpose for the P-I-G-L-E-T-S tool to eliminate personal biases; (2) practice the use of the Source Analysis tool by collaborating on personal artifacts, and; (3) establish the structure for the flipped classroom portion. I begin the lesson by asking the students to describe the United States to an individual who has neither witnessed nor heard of its mainstream culture. This activity creates a wide variety of answers, usually saturated with personal bias and comprehensive in only a few areas of a cultural study. It is at this point that I introduce the P-I-G-L-E-T-S tool, which illustrates how to create a clear ethnography (cultural study). I created the P-I-G-L-E-T-S tool to encourage students to collect complete and unbiased data[1] on any subculture throughout the units of study. This tool assists students in avoiding erroneous assumptions by helping them identify gaps in their perception. The students use this new tool in Lesson 1 to properly profile the United States more thoroughly.

The next step is for students to more closely examine personal biases and methods to eliminate these biases. These steps are completed through the reading of the "Body Ritual of the Nacirema," an ethnographic study of Americans and their bathroom habits written from the perspective of a neutral third party without bias. This part of the lesson plan requires a great deal of "selling" the activity on my part because the effectiveness of the activity is undermined if students discover that "Nacirema" is simply "American" spelled backwards. I assign the reading as a challenge for them to profile a different civilization as a way to "test" the P-I-G-L-E-T-S method on a different society. This activity reveals that our own traditions as a society can appear foreign when described ethnographically without bias, which offers an opportunity for students to carefully examine their personal biases.

The students are then provided scaffolding for the use of the Source Analysis chart, which was developed through my collaboration with an International Baccalaureate World History educator in southern Spain. This tool allows students to isolate various aspects of sources they use to make evaluations by highlighting how the reliability of any source can be defined through weighing its usefulness (data extracted) against the bias (assumptions or subjective authorship). The tool also provides an analysis of the source's author, date, time, primary/secondary nature, medium, and contribution to the "story" communicated by the artifact. I model this tool first by analyzing my own artifact without identifying the source to the students. Students are then asked to complete an analysis of their own artifact, and are provided with additional example artifacts as needed for guided practice. The "artifacts" in this lesson plan can be generally defined as primary sources that carry personal significance to the student. I encourage the students to choose

[1]The data examines the following areas: Power and Politics, Ideologies and Influences, Geography, Language and Communication, Economics, Turning Points, and Successes and Shortfalls.

personalized artifacts because they are more likely to accomplish the end-goal of telling something about the owner without revealing the identity. Example artifacts from the students include newspaper clippings of their accomplishments, items from collectible sets, souvenirs from trips, childhood items, and family heirlooms. This step in the lesson plan highlights the importance of critically analyzing the reliability of one source to draw conclusions and the need to directly interact with members of a subculture in order to actually profile them successfully. After these foundational skills are explained, the students are ready to move to the "flipped classroom" and social media aspects of the plan found in Lesson 2.

The most authentic and complex learning occurs during Lesson Plan 2, and represents the bulk of the unit's content studied through the Learning Management System (LMS), Schoology. In this lesson—which represents more than 75% of the ethnographic study unit—students are required to interact with both me and their classmates via the LMS, conduct extensive ethnographic observations (at least 6 h), submit numerous formative and summative assessments, and prepare for a final component in which they will reveal their ethnographic findings at unit's end to their classmates. Thus, Lesson 1 prepares students with the skills and tools required to navigate their own learning experience outside of class, which may take between 2–3 weeks depending on ability level. The diversity of learning opportunities is substantially increased for any group of students through the use of the flipped classroom model and social media outlets.

The objectives of Lesson 2 sequence asks students to study a subculture of their choice using the P-I-G-L-E-T-S method as a guide. The only stipulation is that the students must be a member or be able to directly observe this subculture, leading many students to choose families, sports teams, religious organizations, or extracurricular associations. The objectives include conducting 6–12 h of observations on their subculture based on the P-I-G-L-E-T-S format, and answering a series of discussion questions that lead to interaction with classmates and more extensive learning on the LMS. As the instructor, I moderate these LMS posts by frequently providing formative feedback, creating conversational threads between students, and posting additional requirements. This approach relies on technology to promote collaboration and interaction between student and teacher outside of the class and provide additional content, which is a learning opportunity that may not otherwise be possible in a more traditional classroom setting.

The first "flipped classroom" aspect that students complete include studying and reflecting on the Hawthorne Effect while conducting their initial observations. As described in the provided lesson plan, the Hawthorne Effect can be loosely defined as the inherent impact of the observer on those being behavior. To measure this impact—an analogue for the cultural interaction that occurs in a global community in the study of World History—students must complete at least 2 h of observation on the Power/Politics (P) and Ideologies/Influences (I) aspects of P-I-G-L-E-T-S and submit their observation notes on the LMS discussion board. They then answer

a series of questions on the Hawthorne Effect (with a hyperlinked definition), including measurement of their impact on their subculture, how often they were noticed, and how expectations for the subculture affect their observations. Students are encouraged to ask questions of their classmates on the discussion board, and I prompt for additional information as needed to evaluate their skill development.

The second "flipped" aspect follows an additional 2 h of targeted observation on the Geography (G) and Language/Communication (L) aspects of P-I-G-L-E-T-S. As stated previously, breaking down these observations allows for more authentic and focused work. Students are required to choose an artifact that they have discovered, which carries significance in completing an ethnography study for their subgroup of choice. Using the Source Analysis tool from Lesson 1, students complete all but the "Reliability = Usefulness − Bias" for their own artifact and attach an image of their artifact on the LMS discussion board. The third step is for each student to comment on at least one of their classmate's artifacts by ethnographically evaluating how much that artifact reveals about the subculture. In other words, they are asked to complete the "Reliability = Usefulness − Bias" section for another student. These tiered activities allow for extensive differentiated learning.

Finally, the third "flipped" aspect located in Lesson 2 includes an additional two hours of observations and notes posted to the LMS for Economics (E) and Turning Points (T), and a summative evaluation of their subculture's contributions and detractions from their home culture. This is in the format of Successes/Shortfalls (S), and students are asked to reflect on what they perceive to be the most important triumph for their subculture that has established identity and has made an impact. Additionally, they must also highlight a failure of their society that could teach other societies a lesson and/or promote change within their subculture. All of these questions directly relate to significant content themes required in the study of World History.

As soon as they have finished the LMS-based "flipped" activities, the students are directed to begin their preparation for their in-class presentation that highlights what they learned through their P-I-G-L-E-T-S analysis process in an interactive, visually stimulating presentation. The intent of this assignment is greater than simply recapping the content that has already been assessed. Instead, it provides students with a broader experience of ethnographic studies as they may have chosen to interact primarily with just one other classmate's observations and data on the LMS. In this final requirement, students are exposed to a wide variety of ethnographies, which enables them to draw broader conclusions and develop meaningful skills for the more traditional World History content that is explored in the following weeks of the course.

The vast majority of my curriculum for this course has been created from the ground-up in the past 5 years. I am the only Social Studies instructor for this area in my small learning environment at North Lakes Academy, which allows me to have a tremendous amount of freedom in how I create and pace my lessons. This flexibility also permits me to develop more creative lesson structures, like this

combination of traditional and flipped classroom methods that promote social media interaction. However, this lesson plan comes with challenges.

First and foremost, "flipped classroom" lessons require a tremendous amount of buy-in for the content to encourage active student engagement. Meaningful interaction is unlikely to occur if the students were not motivated throughout the lesson. To remedy this potential issue, I intentionally promoted student autonomy. I allowed them to select the subgroup for their own ethnographic focus, provided them a window of time to complete each of the required tasks, and encouraged them to interact with their classmates' work as often as needed to check their own understanding. I also provided them with extensive instructions to guide them through the process, but consistently (about once a day) monitored the ongoing discussions occurring on the LMS to ensure that students were interacting appropriately and were properly applying what they were learning. As needed, I directly commented on students' posts when it appeared as if their comprehension during the "flipped classroom" portion was incomplete.

Additionally, my "flipped classroom" lesson demanded a tremendous amount of differentiation to accommodate my students with IEPs and 504 Plans. In particular, the students who struggled the most with task-oriented assignments required a significant amount of support to be successful. Students who face challenges regulating, scheduling, and organizing their learning in more traditional classrooms will most likely encounter increased difficulties with the approach outlined in the lesson plan. For example, I worked with one student receiving Special Education services to assign more specific due dates for the "flipped classroom" requirements on the LMS, as the self-guided practice was too overwhelming for him. In my experience, having the social media outlet for students to ask questions, interact with their classmates, and refer back to additional resources helped tremendously in this differentiation process. In fact, many of the accommodations required in IEPs and 504s are inherently included in the design of my lessons.

In the future, adaptations and changes to this lesson could improve its effectiveness. In particular, providing additional resources on the Hawthorne Effect for the students, such as videos or additional links, could have been useful. When I implement this plan again, I may also ask the students to interact even more on the LMS, as it was the aspect through which I documented the most meaningful and tangible learning. Interaction was a consistent requirement within the "flipped classroom" lesson, and although many students elected to ask questions of one another and comment on other posts throughout the process, more guided requirements could improve the chances that all students feel comfortable commenting. In general, I would recommend implementing more regular use of the "flipped classroom" model and social media throughout the course. Many of the issues I encountered were a result of students simply having limited experience with this pedagogical approach in their other classrooms.

14.2 Scholar Analysis of Self-regulated Learning in the Flipped Classroom

14.2.1 Overview of Classroom Technology and Self-regulated Learning

Our educational system has a long tradition of integrating technological advances into the curriculum. Enhancing the student learning experience and creating innovative solutions to common challenges faced by teachers are often the goals of classroom technology integration. As an example, effective instructional pacing is a common challenge faced by teachers of all developmental groups, and particularly for teachers who rely on direct instruction in their lesson planning. Pacing, defined as the rate at which a teacher presents information, is a critical factor in student learning. An appropriately paced lesson plan is a delicate balancing act. Information that is presented too quickly in a lecture can have negative affective and cognitive effects (Knight & Wood, 2005), while information that is presented too slowly can lead to boredom and classroom management issues. A number of pacing strategies have been identified, including the provision of clear expectations and goals, embedding smooth transitions between topics and activities, and preparing materials beforehand. These strategies, however, may not sufficiently address the individual needs of students in terms of motivation orientations and level of prior domain knowledge. Pacing that is too fast for one student may be perceived as too slow for another student. Developing an appropriately paced lesson that meets the needs of all students is a daunting task, yet one that is prevalent in traditional classrooms that rely on direct instruction. Innovative uses of technology offer potential solutions to these challenges.

The Flipped Classroom model, for example, provides an opportunity to more highly individualize the learning experience. Jonathen Bergmann and Aaron Sams, high school Chemistry teachers who coined "flipping a classroom", described this pedagogical approach as what is, "…traditionally done in class is now done at home, and that which is traditionally done as home is now completed in class" (Bergmann & Sams, 2012, p. 13). Flipped Classrooms move content that traditionally is delivered during class to homework, which is usually in the form of a video recorded lecture. This approach offers the opportunity for students to self-pace their learning, an opportunity that is less likely in a more traditional class lecture (Mazur, 2009). Furthermore, this model potentially allows teachers more flexibility in how they structure class time by increasing the opportunities for collaborative discussions and other interactive activities. In addition to altering how educators teach, such innovative uses of instruction have also affected student learning (Berrett, 2012). The inherent design of classroom technologies requires students to assume a more active role in the learning process. Videos designed to be used in Flipped Classrooms, for example, enables students to self-pace instruction while they complete homework. Students who have mastered the material can spend less time viewing the video, while students who are struggling with the

content can pause and replay video as many times as necessary. This autonomy in the learning process requires students to monitor comprehension and use repair strategies when comprehension breaks down (Azevedo, 2014; Shapiro, 2008). These processes, which are critical in learning with classroom technology, have been characterized as self-regulated learning (Azevedo et al., 2010; Schunk & Zimmerman, 2013; Winne & Perry, 2000; Zimmerman, 2006, 2008).

The lesson plan described by the teacher illustrates how to effectively implement technology and highlights the critical role self-regulation during learning with technology. The teacher leverages technology in the tradition of a Flipped Classroom model by redistributing class time to focus on collaborative activities and utilizing the Learning Management System outside of class. In addition to employing the philosophy underlying this classroom model, the teacher effectively engages student collaboration through Social Media to further enhance the learning experience. This innovative use of technology is not without challenges, however, as it introduces the need for students to self-regulate learning. This section of the chapter uses the theoretical framework of self-regulated learning to analyze the teacher's use of the Flipped Classroom model and Social Media in the comprehensive lesson plan.

14.2.2 Self-regulated Learning Theory: Information Process Theory

Theoretical perspectives of self-regulation share fundamental assumptions that explain how students actively participate in the learning process (Winnne & Hadwin, 1998; Zimmerman, 2006). First, students are proactive in a constructive process of learning that is a product of goal-directed behavior. Furthermore, it is assumed that students can potentially modify behavior to achieve a desired goal. Students set idiosyncratic goals for their learning, monitor their progress towards these goals, and then adapt and regulate their behavior, cognition, and motivation to reach those goals. Lastly, most models assume that self-regulatory behavior is a mediator between (a) an individual's performance, (b) contextual factors, and (c) personal characteristics. While these assumptions frame predominant SRL theories, the field consists of many camps and perspectives that focus on different constructs (Zimmerman & Schunk, 2001). Winne and Hadwin's (1998) Information Processing Theory of self-regulated learning (see DiBenedetto, 2018/this volume) has been widely used to explain the role of self-regulation in classroom technology. This model proposes the following four phases of self-regulated learning: (1) Understanding the task; (2) Goal-setting and planning how to reach the goal(s); (3) Enacting strategies, and (4) Metacognitively adapting studying. According to this theory, a self-regulated student constructs a perception of the learning task during the first phase. This perception is derived from *task conditions*, which is information about the task such as explicit learning goals. Perceptions are also a

function of *cognitive conditions,* which reflect task-related information retrieved from long-term memory. The student develops idiosyncratic goals and plans to reach these goals during the second phase of self-regulated learning. The use of learning strategies, which facilitates in the construction of knowledge, constitutes the third phase. Finally, phase four includes cognitive evaluations and monitoring activities that reveal potential discrepancies between learning goals and current domain knowledge. Metacognitive monitoring enables students to adapt their planning and/or strategies to more effectively meet the learning goal (Butler & Winne, 1995; Winne, 2001, 2005).

14.2.3 Self-regulated Learning Theory: Social Cognitive Theory

Another theoretical framework that has been used to explain learning within technology is the widely cited Social-Cognitive Theory of self-regulated learning (Schunk & Mullen, 2012; Schunk & Usher, 2012; Zimmerman, 2006). According to this theory, self-regulation is comprised of three interactive phases: *forethought, performance control,* and *self-reflection* (see DiBenedetto, 2018/ this volume). Similar to the Information Processing framework, the first phase entails an analysis of the learning task and subsequent creation of goals, processes that are framed by motivation orientations (e.g., self-efficacy, task value, intrinsic motivation, and control beliefs). These motivation orientations influence the next phase of self-regulated learning, the *performance phase.* The use of strategies during this phase, such as attention focusing and self-instruction, taking notes, and summarizing, facilitate performance. This SRL theory assumes that metacognitive monitoring is a critical self-regulated learning process because it reveals potential discrepancies between current knowledge state and the learning task goal. The feedback generated by metacognitive monitoring activities facilitates regulation and task execution. Judgments on performance constitute the final phase of self-regulation, *self-reflection*. These two specific SRL theories offer a framework to examine how instructional technology is used in the lesson provided by the teacher in the first section of this chapter.

14.2.4 Applying Self-regulated Learning to the Flipped Classroom Learning Environments

The orientating activities demonstrated in the lesson plan aligns with the core theoretical assumptions regarding the planning phase of self-regulated learning. The Information Processing Theory approach, for example, assumes that students first develop an understanding of this task. In the absence of explicit and clear learning

goals, a student's idiosyncratic goal can become misaligned with intended goal of the learning task. Thus, it is critical for teachers to provide explicit goals so students can create an accurate understanding of the learning task, which will set the stage for effective self-regulation during learning and minimize unnecessary challenges. The lesson plan offers an excellent example of how to support this phase of self-regulated learning, particularly given the overall learning goals. The goals for the lesson plan, which align with the Minnesota Social Studies Standards 4.1.2 and 4.2.4, focuses on foundational skills in historical inquiry. Analyzing multiple sources to draw justifiable conclusions and understanding the diversity of cultures require students to engage in a number of self-regulatory processes. The use of the P-I-G-L-E-T tool during the opening activity supports students' understanding of their own potential biases towards cultures. The teacher successfully supports students' understanding of the task and enables them to effectively self-regulate learning in subsequent activities through the use of this tool in the opening activity.

In addition to task understanding, motivation orientations also play a role in the planning phase of self-regulated learning. Academic motivation is generally defined as physiological processes involved in the vigor, persistence and direction of behavior (Guay et al. 2010). This broad conceptualization is shared by distinct theories of motivation, which tend to focus beliefs, goals, and values. The Information Processing Theory assumes that students' beliefs, dispositions, and other motivational orientation affect task understanding and goals. Similarly, the Social Cognitive framework of self-regulated learning also assumes that motivation orientations affect students' planning and subsequent engagement during learning (Schunk & Zimmerman, 2013). For example, students will be more likely to engage in the task and persist in the face of difficulty if they believe the task is relevant. These theoretical assumptions regarding the relationship between motivation orientations and engagement during learning have been supported a robust body of research for many years (Wigfield, 1994). Notably, the positive relationship between motivation orientations at the beginning of the learning task and self-regulatory processes during a learning task has been replicated with other developmental groups (Duffy & Azevedo, 2015; Moos & Azevedo, 2009; Moos & Stewart, 2013; Moos, 2014; Sperling et al. 2005; Vadergrift 2005). These lines of research demonstrate the importance of attending to students' motivation throughout the learning task.

The teacher successfully supports student motivation throughout the lesson plan through a variety of strategies. For example, the teacher frames attainable goals and introductory "hooks" at the beginning of each lesson. Furthermore, the teacher expertly designed the progression of the activities to foster self-efficacy. The activities in the lesson plan, which require students to engage in historical inquiry, are challenging and could lead to student frustration and low self-efficacy in the absence of appropriate support. The initial guided practice with the P-I-G-L-E-T-S tool provides the students with the necessary scaffolding in class so they can effectively engage in historical inquiry during subsequent activities.

The second phase of SRL includes both cognitive and metacognitive processes, both of which are supported in the lesson plan. "P-I-G-L-E-T-S" was designed to

support students' unbiased cultural evaluations. These evaluations offer students an opportunity to develop conceptually rich views of cultures and enable students to challenge existing views. The key to maximizing this strategy's effectiveness resides in the timing of its introduction. The first lesson plan begins with the students describing the United States to an individual who has not experienced its culture. This part of the lesson plan creates a safe and nonthreatening learning space for understanding the role of biases in developing views and the need for a systematic approach to understanding gaps in knowledge.

As a result, the lesson plan explicitly supports metacognitive processes because it assists students in identifying gaps in knowledge and challenges personal biases in evaluating various cultures. The need for explicit SRL support is particularly important when students are asked to learn with classroom technology (Azevedo et al. 2010). Research has demonstrated that students of all ages benefit from some type of support (Azevedo et al. 2011; Feyzi-Behnag et al. 2014; Trevors, Duffy, and Azevedo 2014) or prompt (Moos & Bonde, 2015) when learning with technology. In the absence of support specifically designed to enhance self-regulation, students may not engage in metacognitive activities and/or their perceptions of learning may be poorly calibrated. In the lesson plan, the teacher provides the necessary support by moderating student posts and providing formative feedback in the Learning Management System posts. In doing so, the teacher facilitates social interaction afforded by technology while also externally monitoring students' evolving comprehension.

The final phase of self-regulation, self-reflection, is also supported in several ways throughout the lesson. The provision of clear, explicit goals at the beginning of lesson offers students an opportunity to create accurate perceptions of the task during the planning phase of self-regulated learning. The teacher then supports students' reflection of their learning by explicitly challenging them at the end of class as to whether they met the daily objectives. Explicit strategies, such as revisiting daily learning objectives and engaging students in a form of self-assessment, promote self-reflection and can potentially enhance metacognitive accuracy.

14.2.5 Recommendations and Future Directions

The lesson offered by this teacher represents an innovative approach in leveraging technology to enhance student learning. The lesson provides intentional support for self-regulated learning with classroom technology. This integration of technology into the curriculum offers guidelines for other teachers who are interested in utilizing flipped classrooms and the Learning Management System. Research generally demonstrates that Learning Management Systems enable collaborations outside the classroom, which deepen student learning and enhance interactions during class (Bender, 2005; Chanchary, Haque, & Khalid, 2008; McGee, Carmean, & Jafari, 2005). However, the use of these instructional technologies does not guarantee high

quality collaboration outside the classroom, as evidenced by prior research. Dougiamas and Taylor (2003), for example, examined their teaching and effect of a Learning Management System on student collaboration. During the first year of the study, the teachers provided little scaffolding on how to collaborate and engage in online discussions. The lack of scaffolding was evident in the messages posted by students. The messages tended to be superficial and did not promote deep reflection or discussion. In the second year, the instructors employed a variety of scaffolds and prompts, such as peer-rating scales for posted messages, model question and responses provided by the teachers, and explicit prompts for discussion. This intentional scaffolding enhanced meaningful discussions between students and highlights the importance of providing students with additional support when using platforms such as the Learning Management System.

In addition to collaboration skills, technology platforms require implementation that supports adaptive help-seeking outside the class. Students of all ages often give up prematurely when faced with tasks they perceive as challenging. This passive reaction to academic difficulty reflects the complex processes involved in adaptive help-seeking (Newman, 2008). Acknowledging task difficulty and/or misunderstandings, engaging teachers or peers for assistance, and identifying a socially acceptable request for assistance is complex and often perceived as daunting. Learning how to engage in the adaptive help-seeking process is a skill that has been linked to positive outcomes, such as maintaining task involvement and supporting student autonomy (Skinner & Wellborn, 1994). Teachers can support adaptive help-seeking in the classroom, including establishing a relationship that facilitates student-teacher communication, provision of autonomous goals during learning, and explicit support of questioning skills (Newman, 2008).

The classroom conditions that support adaptive help-seeking can be challenging to replicate in technologies such as the Learning Management System and in the Flipped Classroom model. In a more traditional classroom, content instruction occurs in class and thus students have direct access to teachers and the opportunity to engage in adaptive help-seeking. Curriculums that utilize technology as the primary avenue for content delivery need to ensure that students have adequate access to teachers or experts. The lesson plan reflects this point, as evidenced by the teacher's regular provision of formative feedback during the students' posts with the Learning Management System. Examining how adaptive help-seeking can be supported in these technologies is a promising and needed area for future research.

Finally, the lesson plan offered by the teacher highlights an important consideration for future research and current high school History teachers. The teacher employs the Source Analysis tool, which is specifically designed for teaching History. Recently, evidence has emerged suggesting that a subset of SRL processes may be domain-specific and thus require strategies that are unique to the domain of study. As an example, Poitras and Lajoie (2013) offer a theoretical perspective of learning related to complex historical events. According to this framework, comprehension of historical events is affected by an understanding of their root causes. A breakdown in comprehension reflects an uncertain understanding of related historical events. Domain-specific metacognitive and cognitive strategies facilitate

the repair of these comprehension breakdowns. A small but growing body of empirical research supports this theoretical assumption regarding the domain-specificity of learning within the history domain. Greene et al. (2015), for example, examined how students self-regulated their learning within the across domains of study. Results indicated that while some SRL strategies were similarly predictive of learning outcomes across domains, significant differences surfaced. These emerging lines of research support the pedagogical choice provided in the lesson plan. Supporting students' self-regulation in the context of learning history with technology may require disciplinary-specific support, such as the Source Analysis tool.

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Part X
Homework and Alternate Learning Centers (One Comprehensive Lesson)

Chapter 15
The Triumph of Homework Completion: Instructional Approaches Promoting Self-regulation of Learning and Performance Among High School Learners

Héfer Bembenutty and Andre Hayes

Abstract Research has uncovered that to be successful in homework completion learners need to be self-regulated by setting goals, delaying gratification, selecting appropriate learning strategies, maintaining a high degree of self-efficacy, as well as self-monitoring and self-reflecting on homework outcomes. However, less is known how high school teachers impart instruction and assign tasks that enhance students' high quality of homework completion. Using Zimmerman's cyclical model of self-regulation of learning as a theoretical framework, the chapter begins with a description of a teacher's journey integrating instructional approaches intended to promote self-regulation of learning and performance among high school learners. Then, a research scholar reflects about the teacher's journey, which reveals positive relationships between homework and self-regulation, self-efficacy, culturally proactive pedagogy, and delay of gratification. The chapter concludes with implications for instructional practice and future research and proposes that a positive relationship between homework and a range of self-regulation skills exists that facilitates academic achievement and performance.

H. Bembenutty (✉)
Queens College of the City University of New York, New York City, USA
e-mail: hefer.bembenutty@qc.cuny.edu

A. Hayes
Alternate Learning Center, New York City, USA
e-mail: ahayesleader@gmail.com

M. K. DiBenedetto (ed.), *Connecting Self-regulated Learning and Performance with Instruction Across High School Content Areas*,
https://doi.org/10.1007/978-3-319-90928-8_15

Table 15.1 The meaning of love lesson plan

Teacher: Andre Hayes, B. S. Adolescence Ed., M.S. TESOL	**Grade Level(s)**: 9th–12th Grades
School: Alternate Learning Center	**Subject**: Literacy
City and State: New York, NY	
Instructional Plan Title: The Meaning of Love	
Common Core State Standards: CCSS.HS.RL.1. Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text CCSS.HS.W.2. Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content	
Learning Objectives: 1. Students will use the Read, Envision, Analyze, and Discuss (R.E.A.D.) strategy to closely read, study, and discuss texts, exemplifying understandings in annotations and speech 2. Students will write informative/explanatory reflections on texts, using the Topic sentence, Knowledge and support, and Overall statement (TKO) method, in order to display thoughts and understandings of texts 3. Students will use the Student's Lesson Self-Monitoring Form to keep track of their goals, beliefs, behavior, and progress on the assignments. Students will write their personal goals for this lesson on their notebook (goal setting). Students identify a strategy they will use in order to complete their goal (learning strategy). Students will assess how confident they are that they can complete their goals(self-efficacy)	
Instructional and Learning Materials Needed: • Smartboard, R.E.A.D. Slide presentation, loose-leaf paper, pens and pencils, Dictionaries, *Collections* textbook, (2015);: *Love's Vocabulary*, an essay by Diane Ackerman from the *Collections* textbook, 1 Corinthians 13: 4–8 (Love According to Paul of Tarsus), Teacher's own poem and video, Video from youtube.com on *My Shakespeare, by Kate Tempest;* Student's Lesson Self-Monitoring Form (see Table 15.2), Homework Log (see Table 15.3)	
Lesson Duration: This lesson typically spans over two 50-min class periods with time in-between for homework completion	

Teaching and Learning (Lesson 1)

Min on this Activity	**Targeted Activity**	**Purpose of Activity**
5	**Orienting Students to Lesson**: • Upon entering the room, students obtain copies of the Self-monitoring Form (see Table 15.2) • Teacher reviews the learning objectives for the lesson and how to complete the Self-monitoring Form • Do Now: Discussion—What is love?	• Reminding students on how to complete the Self-monitoring Form activates their prior knowledge and sets the stage for learning • Reviewing the learning objectives sets the framework for the lesson • Students begin to think about what love is and what it means to them. This helps prepare them for how love will be discussed in the lesson texts
5	**Motivation**: • Read Aloud and Discuss: *1 Corinthians* 13.4–8 (Love According to Apostle Paul) • Ask students the following questions:	• Students begin to reflect on how love looks within the context of their individual lives • They begin to see symbols and images of love as they reflect on

(continued)

Table 15.1 (continued)

	1. Can you relate to this idea of love? 2. Whom can you connect those characteristics to? 3. Are they loved ones? 4. Does anyone have an experience of such love to share with the class? • Teacher shares a personal experience of love	listed characteristics of love, as listed by Apostle Paul
10	**Whole Class Instruction**: • R.E.A.D. slideshow presentation • Explain: Students use the R.E.A.D. strategy to closely read *Love's Vocabulary*, by Diane Ackerman • R.E.A.D. the first paragraph aloud, asking students to follow along. Show dictionary use for unfamiliar words, and how to make annotations	• Students are introduced to the R.E.A.D. strategy • Students use this strategy to closely read the texts of this unit
10	**Guided Practice/Providing Feedback**: • Teacher and students read paragraphs 2–3 together, annotating the text and looking up unfamiliar words. This is student led and teacher guided • Teacher circulates around the room to observe students' notations	• Students practice use of the R.E.A.D. strategy, while guided by and receiving feedback from the teacher • This gives students the opportunity to get comfortable with using this close reading strategy and the teacher scaffolds where needed
10	**Independent Practice**: • Students are given the task of independently answering, on loose-leaf paper questions 1 and 2, on page 170 of the *Collections* (2015) textbook • Students use inference skills to determine the meaning of Ackerman's statement, "Love is the great intangible." • Teacher circulates around the classroom observing students' progress • Students work on the Self-Monitoring Form	• Students are given the opportunity to work alone and display their individual understanding • This provides the teacher with feedback on learning as well • Self-monitoring helps students become aware of their learning strategies and competency beliefs • Students self-monitor their progress by identifying the effectiveness of their selected learning strategy while completing this task. Students will assess their self-efficacy beliefs by rating how confident they are that they can complete their goal while completing this task.

(continued)

Table 15.1 (continued)

Prep-Period	**Evaluation of Learning and Assessments**: • Students' answers to questions 1 and 2, on page 170 of the *Collections* (2015) textbook provide the teacher with information on who understood the text • Students will complete the Self-Monitoring Form, which will be used to provide them feedback about their progress	• This provides the teacher with evidence of individual student learning • Self-monitoring provides students with their own feedback on their learning • Students will assess their level of self-satisfaction at the completion of today's task. Students will self-evaluate how well they completed the task. Students will identify the cause of the success (or difficulty) in completing today's task, which assesses their attribution.
10	**Closing Activities**: • Have two students share aloud their answers to questions 1 and 2 • Discuss making Connections: *1 Corinthians 13.4–8* and *Love's Vocabulary* Lines 28–33. How do these connect in idea? • Discuss Homework	• Students are provided the chance to verbalize their understandings of the text • This discussion also provides students with the opportunity to gain further understanding of the text, as their classmates discuss their opinions

Homework:
- Purpose: In the 3rd paragraph of *Love's Vocabulary*, Diane Ackerman praises Love's strength through personifications, in lines 28–33. Take one of these personifications and elaborate in the form of a short, short story, short poem, quick artwork, or short essay (1 paragraph). Due next class
- Students are encouraged to use the Homework Log to self-track their progress. Prior to completing the Homework Log, students are given specific strategies on how to engage in self-regulation and delay of gratification in order to secure a successful completion of the homework (e.g., Write the homework on your weekly planner; Turn off your cell phone, internet, and TV while working on the homework)
- The goal is for the students to go deeper into thinking about the ideas of love Ackerman shares with her readers. Students will work with the text, expounding on ideas shared in the text. This will prepare them for further studies of the text

Teaching and Learning (Lesson 2)

Min on this Activity	Targeted Activity	Purpose of Activity
10	**Orienting Students to Lesson**: • Review students of the learning objectives and the purpose of the homework • Discuss the benefits of using the Homework Log to self-track progress and to improve literacy skills and ask students to share their Homework Logs (see Table 15.3)	• Reminder helps keep students focused • Assessing students' understanding of the assignment provides the teacher with insight into level of learning • Checking for completion of the Homework Log emphasizes value and importance of using this monitoring log

(continued)

Table 15.1 (continued)

	• Students present their homework • Discuss personifications in the form of short story, poem, artwork, or essay • Students record their personal lesson goals in the Self-Monitoring Form. Students will write their personal goal for this lesson on their notebook (goal setting). Students identify a strategy they will use in order to complete their goals (learning strategy). Students will assess how confident they are that they can complete their goals (self-efficacy)	• Sets the stage for learning about Shakespeare • Continued use of the Self-Monitoring Form allows students opportunities to practice using the form
5	**Motivation**: • Do Now: To grab the students' attention do a review of one of the videos on youtube.com on *My Shakespeare, by Kate Tempest* • Ask students: What did you all think about the poem and the video? • Introduce students to the task of creating their own videos, in which they will recite self-written poems that express appreciation and love for someone or something • Teacher shows students a video of him reading his own poem: *Spoken Word*, by A. W. Hayes: *Revelation of the Streets* • Ask students the following questions: 1. Teacher asks: "What did you think about the poem? 2. What do you think about the gestures I made and movements I did?	• Students will begin to think of who William Shakespeare is • This will prepare students for further reading about and written by William Shakespeare • Students will watch and listen as the teacher performs one of his poems • The purpose is to excite the student about the task of writing and performing their own poems
10	**Whole Class Instruction**: P.O.E.M. PowerPoint presentation 1. This is a poem writing strategy—a tool that assists students in creating their own poems 2. Teacher re-recites his *Revelation of the Streets* piece, and students are then asked to connect the pieces of the P.O.E.M. writing strategy to this piece	• Students are introduced to the P.O.E.M. writing strategy. Students will use this strategy to write poems • Students see the teacher's model of poetry and application of the strategy

(continued)

Table 15.1 (continued)

10	**Guided Practice/Providing Feedback**: • Teacher and students write a four-line poem (quatrain), using the P.O.E.M. strategy as a rubric for creation • Teacher circulates the room to observe students' writings and notations	• Students will practice use of the P.O.E.M. strategy, while receiving guidance and feedback from the teacher. This gives students the opportunity to get a lot more comfortable with using this strategy, and the teacher provides scaffolding where needed
10	**Independent Practice**: • Students are given the task of independently writing a poem, using the P.O.E.M. strategy. The theme of the poem is love and appreciation • Teacher circulates the classroom observing students' progress • Students complete these self-assessments by using the Lesson Self-Monitoring Form, which is used to provide them feedback about their progress	• Students are given the opportunity to work alone and display their individual understandings • This provides the teacher with evidence of learning as well • Self-Monitoring Form helps students be more aware of their beliefs and behavior • Students self-monitor their progress by identifying the effectiveness of their selected learning strategy while completing this task. Students will assess their self-efficacy beliefs by rating how confident they are that they can complete their goal while completing this task.
Prep-Period	**Evaluation of Learning and Assessments**: • Students' poems provide teacher with data as to who understood the task and the use of the P.O.E.M. strategy • Students complete the Lesson Self-Monitoring Form	• This provides the teacher with evidence of individual student learning • Teacher provides students with specific feedback on the lesson and the Self-Monitoring Form • Students will assess their level of self-satisfaction at the completion of today's task. Students will self-evaluate how well they completed the task. Students will identify the cause of the success (or difficulty) in completing today's task, which assesses their attribution.
	Closing Activities: Teacher discusses: • Students' poems. Have a few recite their poems aloud • Poems and video-shoot ideas • Homework	• Students are provided the chance to verbalize their understanding of the text • This discussion also provides students with the opportunity to gain further understanding of the text, as their classmates speak on their findings

(continued)

Table 15.1 (continued)

Homework:
- Purpose: To use the P.O.E.M. strategy to write a poem about someone or something you deeply consider
- Students were encouraged to use the Homework Log to self-tracking their progress:

1. Students will be given specific cognitive, motivational or behavioral strategies about how to engage in self-regulation and delay of gratification in order secure a successful completion of the homework (e.g., Write the homework on your weekly planner; Turn off your cell phone, internet, and TV while working on the homework)

- The goal is for the students to become poets that can express appreciation for the work of others, through creative writings

Specific Strategies used to Address Exceptional Students and/or Students for whom English is a Second Language:
- Students are provided dictionaries (Internet and Printed)
- Group work scaffolding—making connections, using the P.O.E.M. strategy, read aloud and discussions
- Group work and dictionaries help to appease the fear of the unknown

Table 15.2 Lesson self-monitoring form

Student Name:_____ Date:_____

1. My goal for today is…	Set a goal for today's work.
2. My strategy for learning is…	What learning strategy will you use in completing today's task?
3. My confidence level for today is…	Indicate your confidence level by circling a number between 1 (not confident at all) to 10 (very confident) 1 2 3 4 5 6 7 8 9 10
4. I am monitoring my learning by…	How are you monitoring your learning?
5. My confidence level now is…	Indicate your confidence level, at this time, by circling a number between 1 (not confident at all) to 10 (very confident) 1 2 3 4 5 6 7 8 9 10
6. My level of satisfaction with my work is…	Indicate your level of satisfaction with your work by circling a number between 1 (not satisfied at all) to 10 (very satisfied) 1 2 3 4 5 6 7 8 9 10
7. The quality of my work today is…	Indicate the quality of your work by circling a number between 1 (very low quality) to 10 (very high quality) 1 2 3 4 5 6 7 8 9 10
8. To complete my work today, I did…	What did you do to complete your work today?

Table 15.3 Homework log

Homework Cycle	Self-regulatory Processes	Students' Logs
Complete this section BEFORE working on the homework.	What is your homework assignment?	
	What do you want to complete? Identify a specific and realistic goal?	
	What do you need to do to accomplish your goal?	
	How confident are you that you can complete the homework?	
	How important is this homework to you?	
Complete this section WHILE/DURING you are completing the homework.	Now, how confident are you that you can complete the homework?	
	Do you have distractions? What are the distractions? What do you do with the distractions?	
	Is there something else more pleasurable than the homework that you want to do now?	
Complete this section AFTER you have completed the homework.	Now, how confident are you that you have completed the homework at the target level?	
	How satisfied are you with the homework completed?	
	Why do you think you completed the homework successfully (or unsuccessfully)?	
In this space, please write your reflection about the homework assignment. Share your thoughts, feelings, emotions, beliefs, and anything else you would like to share.		

15.1 Narrative of the Meaning of Love Lesson

An Alternative Learning Center (ALC) is a school populated by students from various middle and high schools (Herndon & Bembenutty, 2014, 2017; Herndon, Bembenutty, Gill, 2015). The student population consists of students who are

serving superintendent suspensions of 10–180 days; there is no other teacher in the classroom. Based on the infraction, students are required to attend hearings, and, if found guilty, students are sentenced to suspension terms during which students must attend school away from their home schools, at an ALC.

In the class are Jamaican, African American, Trinidadian, White American, Hispanic, and Indian students, both male and female students. This group also consists of general education students, special education students, and students for whom English is a second language. Though each student speaks English well enough to convey and understand messages, some students have difficulty in the area of literacy. Some of the students read at 3rd grade, 6th grade, and 7th grade levels. Some of the goals of the Individual Education Plans of the special education students are as follows: "Student will read and annotate a full text that is just above his reading level." "Student will write a paragraph in which he explains his understanding of a text he has read." "Student will discuss a text he has read, verbally expressing his understanding of the text." My motto is that as long as these students can reach their goals, there is hope. When students know that their teacher has invested much time and effort into the creation of a lesson, the value the teacher places on learning is shared. Students begin to value hard work and dynamic presentation. This motivates students to work hard during class and even more during their private moments while they are doing their homework.

In this lesson, the learning objectives come from the Common Core Standards (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010). The learning objectives are created to help students meet those standards. It is important that these standards and objectives are discussed between the teacher and students at the beginning of the unit and now and then, just to remind the students of the standards and objectives they must meet by the end of the unit. In my class, students are asked to read aloud each of the learning standards and objectives. I ask the students to express their understandings verbally. Once I am sure that my students have grasped the concepts of the standards and objectives I can then move on to the actual lesson (Table 15.1).

Before the lesson, I teach students how to use the Lesson Self-Monitoring Form (see Table 15.2), which is a tool that helps them track and self-monitor their success through each lesson and record their goals, self-efficacy, and reflect on their learning process during each lesson. As students enter the classroom, they collect this tool and fill it out throughout the lesson. Thus, students are asked to identify their personal goals, a strategy for reaching their goals, and to assess their self-efficacy to complete their goals, which they record on the form.

The Do Now is simply an opening point. This is where the topic of discussion is introduced. For this lesson, the topic is *Love*. I ask the students, what they believe love to be. The students' responses often include, "Love is something that is shared amongst family members and friends," "Love is something people fall in and out of," and "Love is a feeling you feel for people you care about." As the students respond, I assure them, through eye contact, head nods, and smiles, that I am fully engaged in what they are saying. Students are then thanked for their responses, and

asked if their ideas about love could be taken deeper and possibly changed. I await verbal responses, and I know that they are up for the challenge of this lesson.

It is important to motivate the students before diving into the mini-lesson. To motivate my students for this lesson, I read a short passage on what love is, from a letter Paul of Tarsus wrote (1 Corinthians, 13.4–8). In this passage, Paul answers the same question I asked the students: "What is love?"

After reading this passage aloud, I post it on the board, and I ask the students a series of questions to help them connect with any of the ideas on love that Paul shared. Many of the students usually say that they can relate, so I follow-up by asking them to share experiences in which they believe an idea Paul shared was evident. Students are excited to share a piece of their lives with the class. I ask them to be brief as they share their stories.

During the whole class instruction, I teach my students something new. I inform the students that we will be reading a text by Diane Ackerman (Collections, 2015), *Love's Vocabulary*. I tell them that we will be giving the text a close read and that they are going to be equipped with a dynamic close reading strategy that I created. Then, enthusiastically, I present them, through PowerPoint, a close reading strategy that guides students through steps which help them to produce annotations, generate questions, and discussion of their thoughts and understanding. I call it the Read, Envision, Analyze, and Discuss (R.E.A.D.) strategy.

As I present this strategy, I circulate the room looking my students in the eyes, watching for head nods and other gestures of understanding. It is essential that they remain engaged and understand the strategy. This is another strategy they can pull out of the bag in their private studies, during homework, or even in future classes. My students listen closely. The students often ask no questions. I ask the students to read aloud each step as I hand each of them a chart with the steps of the strategy spelled out for them.

Next, I model the use of the strategy by R.E.A.D.ing a passage of the *Love's Vocabulary*. I ask students to observe, listen, and copy my every move as I go through the steps. When I have finished modeling the use of the strategy, I move on to the guided practice. In the meantime, students keep using the form as a tool that helps them in tracking and monitoring their success through each lesson.

Guided practices are conducted with the purpose of assessment. This is where students are asked to practice the newly learned strategy as the teacher guides them toward successful use. I guide my students in practice of the R.E.A.D. strategy, asking them to carefully read a small passage from *Love's Vocabulary*. I circulate the room as students read the passage. I check for accuracy of use and help students make changes when needed. I make sure annotations are thoughtful, questions generated are appropriate, and I discuss a bit of the passage with a few of the students. Then as a whole class, we read the passage, and I allow students to speak on the annotations, questions, and ideas they come up with while using the R.E.A.D. strategy. Once I know my students understand the use of the strategy, I move on to the independent practice.

Typically, an independent practice would be used to see how well students would do in using the strategy the teacher just taught them. I want to be sure that the students

comprehend the text through the use of the strategy, so I have them answer critical thinking questions based on the passage of the text we just read during the guided practice. I do this to be completely sure that the students can extract ideas from the text through the use of the R.E.A.D. strategy. I inform the students of the questions they will be answering, and I tell them that they will have to present evidence from the text in their answers. I circulate the room to make sure every student is on task. I do not give any help at this point. I simply want to know if students grasp entirely the ideas that are expressed in the passage from *Love's Vocabulary*. On the Lesson Self-Monitoring Form, students then identify the effectiveness of their selected learning strategy while completing this task and assess how self-efficacious they are that they can achieve their goal while completing this task. When the students finish the task, I move on to the assessment part of the lesson.

The Evaluation of Learning and Assessments/Closing Activity section is where I collect data on student progress. This is where I engage students in a class discussion of the questions and the text. Students are allowed to read aloud their answers and explanations, and they are asked to express their thoughts on the use of the R.E.A.D. strategy. I also ask the students to make connections between the passage of the *Love's Vocabulary* and *1 Corinthians 13.4–8*. While this takes place, I make notes of who understood the text and the strategy. I also collect the students' work to look it over at a later time and to collect more data, especially on those who are not as verbal during the discussion. At this point, students assess their level of satisfaction at the completion of today's task, evaluate how well they did, and identify the cause of the success (or difficulty) in completing today's task on the Lesson Self-Monitoring Form.

Homework is used to assess students' progress in the use of learning strategies that are taught to them during class lessons. Can these students use the R.E.A.D. strategy for study and product creation? My students, for this lesson, are assigned a small passage of *Love's Vocabulary* for homework. They are asked to extract an idea about love from the text and to elaborate on that idea in the form of a poem, short story, artwork, or short essay. The choices give students the opportunity to complete the task in the most comfortable manner possible. The purpose of this homework assignment is to get students to think deeper about the ideas Diane Ackerman shared in her text. The students are tasked to express their understandings of those ideas creatively.

While completing this task, students are asked that they complete the Homework Log (see Table 15.3), in which they set goals and note progress, indicate their self-efficacy beliefs, distractions, and steps toward homework completion. Specifically, before starting the homework, they write in the log the specific material/task that they will study; what they will need to do to accomplish their goals; how self-efficacious they are to be able to complete the homework; and how important the homework is for them. Then, they indicate how self-efficacious they are while completing the homework and describe the presence of any distractions during the study time and what they do with the distractions. Actually, I help them to assess their level of self-regulation and their ability to delay gratification. In the log, they record their reflection after completing the homework by writing how efficacious they are

that have completed the homework at the targeted level; they indicate how satisfied they are with the homework completed; and explain why they completed the homework successfully (or unsuccessfully). They complete a log for each lesson. They should spend, at the minimum, 1½ h in completing this task homework. This assignment helps to prepare my students for the following class as well. My students typically return to class the following day, with excitement in their voices as they speak about the work they did for homework. The assignment helps to keep the text fresh in their minds, and they return to school with new ideas to share.

The second lesson is a follow-up lesson with time in between for homework completion outside of the classroom. The lesson objectives are the same as the first lesson's and this lesson begins with a reminder of these learning objectives, the Homework Log, and a discussion of the homework, which was to read the 3rd paragraph of *Love's Vocabulary*, where Diane Ackerman praises Love's strength through personifications, in lines 28–33. Students discuss personifications in the form of short story, poem, artwork, or essay and the benefits of using the Homework Log to self-tracking their academic progress. The discussion of the *Love's Vocabulary* enhances their English literacy by providing them opportunities to express vocabulary and reflection through multiple forms of literacies. This homework connects Lesson 1 with Lesson 2 with the reading of the first Corinthians and the R.E.A.D. strategy. The learning objectives for Lesson 2 indicate that students will use the Read, Envision, Analyze, and Discuss (R.E.A.D.) strategy to carefully read, study, and discuss texts, exemplifying understanding in annotations and speech and they will write explanatory reflections on texts, using the Topic sentence, Knowledge and support, and Overall statement (TKO) method, in order to display thoughts and understanding of texts. Students then write their own learning goals in the current lesson in the Lesson Self-Monitoring Form, and I collect the Homework Logs to provide students with feedback. They are not graded on the Homework Logs.

During the Do Now, I try to grab the students' attention by reviewing the video of My *Shakespeare* by Kate Tempest. We then discuss what students think of the video. I introduce students to the task of creating their videos in which they will recite self-written poems that express appreciation and love for someone or something. Students work on videos of their own, in which they recite self-written poems that express appreciation and love for someone or something. I share with the students a video of the poem I wrote, called *Spoken Word; Revelation of the Streets* and follow this up with questions asking students to critique my video and poem.

During the whole class instruction, I present a PowerPoint presentation on P.O.E.M., a poem writing strategy that can be used as a tool to assist students in creating their poems. Students connect the pieces of the P.O.E.M. writing strategy to their writing. I also re-recite the *Revelation of the Streets* piece and ask students to connect the pieces of the P.O.E.M. writing strategy to my poem.

Teacher and students then write a four-line poem (quatrain), using the P.O.E.M. strategy during the guided practice. This poem serves as a rubric for future poetry creations. Then, students independently write a poem, using the P.O.E.M. strategy with the theme of being love and appreciation. As they are writing, I circulate and provide scaffolding as needed. Students continue to write in their Lesson Self-Monitoring

Forms at this time. The form helps students monitor their progress and to get them thinking about their confidence in completing the task to reach their goals.

The evaluation of learning and assessments is used to collect data as to who understood the task and the use of the P.O.E.M. strategy. Students complete the remaining items on their Self-Monitoring Forms for which I will provide them with feedback. As part of the closing activities, we discuss students' poems by having a few of them recited aloud. We also discuss video-shoot ideas and the homework. For homework, students are assigned to use the P.O.E.M. strategy to write a poem about someone or something they deeply consider.

The second day of this lesson typically goes well. I convey to students the important role that homework plays in learning. As a teacher, I share the exciting and exemplary work the students do. Homework helps my students in this alternative learning center to focus on learning and homework rather than fighting, bullying, defiance of authority, and insubordination.

One of the most significant challenges in assigning homework is getting completed homework assignments from students. For various reasons, many students have a hard time with homework. Often, students tend to be unmotivated to do homework. Nevertheless, I receive a lot of completed homework assignments from my students. As intended, most of my students return to class ready to learn and to share new insights concerning the text. My students are motivated to do more at home and are prepared to do more in class after completing their homework assignments. The motivation starts in class, as my students complete the Self-Monitoring Form. That motivation carries over into the completion of their homework assignment by using the Homework Log, which keeps the motivation alive for class the next day. It is a step toward becoming life-long-learners. I am now a more effective educator than ever before. Teaching English literature is essential and facilitates learning English grammar, literature, composition, literacy, and writing. My students come to my class with serious personal and academic challenges, but they learn in my study strategies that they should have received at home, in previous classrooms, and in our society at large. Many of my students have never systematically planned anything before, methodologically set short-and long-term goals, monitored performance or engaged in self-reflection, but after leaving my classroom to return to their regular classes, they are empowered with beliefs that I hope will remain with them for the rest of their lives. They now know that there are ways to triumph over homework.

15.2 Scholar Analysis: Reflection of an Instructional Approach Enhancing Homework Self-regulation

In this section, readers will find a reflection about a homework self-regulated empowerment program with learners enrolled in an alternative learning center. The reflection considers the experiences of a teacher who shared his passion for teaching

and approaches to triumph over homework among learners who initially were indifferent or resistant to homework and his transformation through the cyclical process of self-regulation (see DiBenedetto, 2018/this volume).

One of the teachers' primary responsibilities is to empower learners to make choices and decisions about their own learning and to be self-directed learners (Bembenutty & White, 2013; DiBenedetto, 2018/this volume; Schunk & Bursuck, 2016; Zimmerman, Bonner, & Kovach, 1996; Zimmerman, Schunk, & DiBenedetto, 2015). This process requires teachers who have empowered themselves with knowledge, skills, and positive dispositions to impart content knowledge and teach self-regulated learning skills to learners under their care (Bembenutty, 2013b; White, 2011; White & Bembenutty, 2013). Although homework is often a challenge for most teachers, this is especially the case for some teachers teaching in alternative learning schools (Herndon & Bembenutty, 2014; Herndon, Bembenutty, & Gill, 2015; Zimmerman & Schunk, 2011).

In his now classic work, Dembo (2001) observed that learning to teach is not enough, future teachers also need to learn how to learn. Effective learning encompasses acquiring and effectively using self-regulatory skills and sustaining an appropriate level of self-belief. Derived from Dembo's work is that in this era of accountability, high-stakes teaching, and curriculum standards (Gurl et al., 2016) teachers cannot be exclusively focused on content and pedagogy (Bembenutty, White, & Velez, 2015; White & DiBenedetto, 2015). Similarly, learners cannot be exclusively focused on mastery standards and completing assessment tools. Instead, both teachers and learners need to acquire self-regulatory skills. Teachers and students need to be self-regulated, proactive, self-directed, and self-motivated (Bembenutty, 2018). The task of empowered teachers with self-regulation is to help their students to pursue educational and professional goals, to monitor, and to reflect about their thoughts, behaviors, and beliefs while engaged in instruction and homework tasks (Bembenutty, 2013a; Zimmerman & Schunk, 2011).

15.2.1 Cyclical Self-regulation of Learning and Cyclical Self-regulation of Instruction

Self-regulation is a cyclical process (see DiBenedetto, 2018/this volume; Zimmerman, 2000, 2013; Zimmerman, Schunk, & DiBenedetto, 2015) with three phases. The *forethought phase* involves planning, selection of strategies, and assessing motivational beliefs; the *performance phase* consists of monitoring implementation of tasks; and the *self-reflection phase* involves a self-assessment of task completion. Through the cyclical feedback loop, learners start the process again at any necessary point. As Bembenutty (2013b) suggested, teachers who have adopted the cyclical approach of self-regulation would be ones who would teach a lesson in a consistent nature of the cyclical phases of self-regulation (see Table 15.4).

Table 15.4 Cyclical phases of self-regulation aligned with self-regulation processes and lesson components

Self-regulation phase	Self-regulatory process	Lesson component
Forethought phase	• Goal setting • Learning strategy • Self-efficacy	• Lesson Objectives • Instructional and Learning Materials • Orienting Students to Lesson (Do Now) • Motivation
Performance phase	• Self-monitoring • Self-efficacy	• Whole Class Instruction • Guided Practice/Providing Feedback • Independent Practice
Self-reflection phase	• Self-satisfaction • Self-evaluation • Attribution	• Evaluation of Learning and Assessments • Closing Activities • Homework

While identifying Lesson Objectives, Instructional and Learning Materials, Orienting Students to Lesson (Do Now), and Motivation, teachers consider the lesson to be *the lesson's forethought phase* in which students are invited to set goals, select strategies, and assess self-efficacy beliefs. Self-regulated teachers, while delivering the Whole Class Instruction, and Guided Practice/Providing Feedback approach these parts of the lesson as *the lesson's performance phase* in which they involve students in self-monitoring and continued assessment of their self-efficacy. During Evaluation of Learning and Assessments, Closing Activities, and Homework, they involve students in assessing their self-satisfaction, self-evaluation, and attribution of the performance; and this is considered the *lesson's self-reflection phase* (Bembenutty, 2013b). Through the cyclical feedback loop, teachers start the process again at any necessary point of instruction (see DiBenedetto, 2018/this volume; Cleary, Callan, & Zimmerman, 2012).

Bembenutty's (2013b) three cyclical phases of instructing self-regulation constitutes a new pedagogical era focused on self-regulation and motivation in which the teachers and the students interact and concomitantly influence each other's pursuit of goals. These three cyclical phases of instruction parallel the three cyclical phases of learning delineated by Zimmerman (2000), Zimmerman, Schunk, and DiBenedetto (2015), which could serve to enhance triumph over homework completion. The next section contains a reflection of Mr. Hayes's instructional approaches promoting self-regulation of learning and performance among high school learners based on observation of his class, an interview with him, and analysis of his lesson plans and his students' academic work.

15.2.2 Enhancement of Homework Self-regulation

Mr. Hayes is a charismatic and passionate teacher with a few years of full-time teaching experience. He uses his background in music performance to instill in his students' motivation, self-efficacy, and interest to the class' subject matters.

Mr. Hayes's students can identify with him because he conveys an understanding of their backgrounds. He can relate to students on their level, and to help them reach instructional goals they may have never thought they could accomplish. He maintains rapport with his students while sustaining high expectations and demand for quality work and maintaining effective classroom management. Mr. Hayes' valuing of self-regulation of learning started by observing his educators during his teaching training who served as social models to him and helped him to set short and long-term goals for learning (Bembenutty, White, & Velez, 2015). His college teachers implanted in him the self-efficacy beliefs for learning by reassuring him that with self-regulation, "he can do it" (White, 2011; White & Bembenutty, 2013). As his narrative suggests, his journey and passion for teaching reflect his understanding of the importance of self-regulation of learning and self-efficacy of teaching. The next section will focus on reflecting on his specific teaching approaches.

15.2.3 Self-regulation During the Lesson Implementation

Mr. Hayes' students are adolescents experiencing challenges, conflict with parents, teachers or peers, and some of them have had encounters with the law for engaging in risky behavior. Consistent with Herndon and Bembenutty (2014), Herndon, Bembenutty, and Gill (2015), he believes that teaching self-regulation of learning to his students can buffer their academic challenges. He is aware that substance use, confrontation with the law, and violent behavior are problems that interfere with learning and academic achievement but that an appropriate learning environment can help to ameliorate those negative effects and prevent dropping out of the educational system entirely. Thus, while imparting instruction, he concomitantly ingrains in his instruction elements of self-regulation. In his lesson, he focuses particularly on goal setting, learning strategy, self-efficacy, self-monitoring, self-satisfaction, self-evaluation, and attribution as seven self-regulatory processes.

After providing the instructional goals, Mr. Hayes asked his students to write their personal goal for the lesson on their Lesson Self-Monitoring Form, which reflects the self-regulation process of goal setting. Students write specific, realistic, and short-term goals (Zimmerman, Schunk, & DiBenedetto, 2015), such as, "I will write a poem." During the observation of his class, it was obvious how serious the students took this task. It is also obvious that the positive relationship he maintains with his students made possible this process. He exercises authority over the students but he is not authoritarian. He also asks students to identify at least one learning strategy to reach the goal they have established. Then he asks, "Identify a strategy you will use to complete your goal." It is impressive to observe that in spite of the fact that these students came to his classroom with serious personal and academic problems, the reading level of some of them is precarious and that some of them have problems with authority figures, they respond to his expectations with content. Of course, it does not happen initially, but he builds the trust that will facilitate learning by giving them autonomy, opportunities to express their opinions, and by respecting their views.

One of the most impressive transformations of his students is their development of self-efficacy for learning. The students came to his class with low motivation, confidence, or hope. Nevertheless, he asked them to assess how self-efficacious confident they are that they can complete their goal, which will indicate their level of self-efficacy. Self-efficacy is built little by little up to the point that on a scale from 1 to 10 with 10 meaning high confidence, most of the students ended indicating 10, which is calibrated with their academic performance (Chen, 2002; Chen & Zimmerman, 2007). During a class observation, at least two students were heard stating that they preferred to continue learning in the alternative learning school rather than returning to the regular classroom to continue learning in Mr. Hayes's class. Students expressed that with the self-regulatory tools they are learning, they could pass major classroom tests and regretted that they did not learn in that way in previous classrooms.

During instruction, Mr. Hayes instills in the students the importance of assessing the effectiveness of their selected learning strategy while completing the task, which reflects self-monitoring. Students are asked to assess how efficacious they are that they can achieve their goal while completing the task (self-efficacy).

Toward the end of the instruction, Mr. Hayes asked students to assess their level of satisfaction with the completed task (self-satisfaction) and to evaluate how well they did the task (self-evaluation). Students are also invited to identify the cause of the success or difficulty in completing the task (attribution). It is true that the environment of schools can foster a difficult time for many high school students due to a myriad of factors, but when committed educators provide self-regulatory tools to their students, this enhances their academic performance and helps the development of self-regulated learning skills. During class observation, Mr. Hayes provided feedback and instills the belief that they can achieve academically. Obviously, his students know that he cares about them.

15.2.4 Self-regulation of Homework Assignments

Mr. Hayes's mission to promote self-regulation among his students does not end when the class is over. That is why he dedicates time to assign homework assignments that are effective, and that will promote learning and self-regulation. He creates homework assignments that are consistent with the principles of meaningful homework delineated by Alleman and his associates (Alleman et al., 2010; see also Bembenutty, 2011). At the same time, he triangulates his homework assignments with the National Council of Teachers of English/International Reading Association (NCTE/IRA) Standards for English Language Arts (National Governors Association Center for Best Practices & Council of Chief State School Officers (2010) and the self-regulation of learning processes (see Table 15.5). To illustrate, in his

Table 15.5 Homework examples reflecting standards for the english language arts and principles of meaningful homework

NCTE/IRA standards for the english language arts	Principle of meaningful homework	Homework/Instructional example	SRL process
Students read a wide range of print and non-print texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world…	Personalizing the curriculum and reflecting on the here and now	Take one of the personifications in *Love's Vocabulary*, and elaborate in the form of a short story, short poem, quick artwork, or short essay	Goal setting
Students read a wide range of literature from many periods in many genres to build an understanding of the many dimensions… of human experience	Keeping the curriculum up-to-date	Students will review *My Shakespeare* by Kate Tempest	Self-monitoring
Students apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts…	Exploring learning opportunities that are not cost-effective on school time	Students will write a poem, using the P.O.E.M. strategy. The theme of the poem will be love and appreciation	Learning strategy
Students adjust their use of spoken, written, and visual language…to communicate effectively with a variety of audiences and for different purposes	Providing for expanded meaningfulness and life application of school learning	The author of *Love's Vocabulary* speaks about those who were bold enough to take on the challenge of expressing love creatively; creatively express your love for someone through a poem, paragraph, song, picture, or art	Goal setting
Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes	Extending education to the home and community by engaging adults in interesting and responsible ways	Use the P.O.E.M. strategy to write a poem about someone or something you deeply consider	Learning strategy
Students apply knowledge of language structure, language conventions…, media techniques, figurative language, and genre to create, critique, and discuss print and non-print texts	Taking advantage of the students' diversity by using it as a learning resource	Students will analyze and evaluate the text to determine what Ackerman is saying both explicitly and figuratively	Self-evaluation

(continued)

Table 15.5 (continued)

NCTE/IRA standards for the english language arts	Principle of meaningful homework	Homework/Instructional example	SRL process
Students conduct research on issues and interests by generating ideas and questions, and by posing problems…	Keeping the curriculum up-to-date	Students will use the R.E. A.D. strategy to closely read the text, from *Love's Vocabulary* by Diane Ackerman	Self-monitoring
Students use a variety of technological and information resources… to gather and synthesize information and to create and communicate knowledge	Constructing meaning in natural ways and expanding a sense of self-efficacy	Students will use inference skills to determine the meaning of Ackerman's statement, "Love is the great intangible."	Self-efficacy
Students whose first language is not English make use of their first language to develop competency in the English language arts and to develop understanding of content across the curriculum	Taking advantage of the students' diversity by using it as a learning resource	Students will read *Spoken Word, Revelation of the Streets* by A. Hayes and they will write poems and be recorded reciting them	Attribution
Students participate as knowledgeable, reflective, creative, and critical members of a variety of literacy communities	Extending education to the home and community by engaging adults in interesting and responsible ways	Write a poem that praises the work of someone else who has provided great life experiences for others. That person can be an artist, rapper, singer, actor, doctor, nurse, construction worker, politician, or, best of all, teacher	Self-satisfaction
Students use spoken, written, and visual language to accomplish their own purposes…	Constructing meaning in natural ways and expanding a sense of self-efficacy	The author of *Love's Vocabulary* speaks about "the majesty of love," and that "Love also has many fashions…." Creatively come up with a song, poem, picture, paragraph, story, etc., in which the following question is answered: How does your love dress?	Self-efficacy

homework, students are asked to "Read a wide range of print and non-print texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world…" (Standard 1). To fulfill this goal, he provides homework assignments that personalize the curriculum and reflect on the here and now with an assignment such as "Take one of the personifications in *Love's Vocabulary*, and elaborate in the form of a short story, short poem, quick artwork, or short essay." Among others, a self-regulatory process involved here is goal setting.

Mr. Hayes keeps the homework assignments and the curriculum up-to-date, thus aligning it with the Standard 2: "Students read a wide range of literature from many periods in many genres to build an understanding of the many dimensions (e.g., philosophical, ethical, aesthetic) of human experience." With his goal in mind, he assigned as homework that students review *My Shakespeare*, by Kate Tempest, which could reflect the self-regulatory process of self-monitoring. His homework assignments also invite students to explore learning opportunities that are not cost-effective on school time with an assignment such as, "Students will write a poem, using the P.O.E.M. strategy. The theme of the poem will be love and appreciation." This kind of homework assignment reflects Standard 3: "Students apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)."

His homework assignments also provide for expanded meaningfulness and life application of school learning with an assignment such as, "The author of *Love's Vocabulary* speaks about those who were bold enough to take on the challenge of expressing love creatively; creatively express your love for someone through a poem, paragraph, song, picture, or art." This assignment reflects goal setting and is consistent with Standard 4: "Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes."

To enhance the self-regulation of quality homework, Mr. Hayes gave to his students a homework log, which was consistent with the one developed by Zimmerman, Bonner, and Kovach (1996) and used by Bembenutty and White (2013). He decided to give homework logs to his class because his students were having trouble with completing homework, and therefore, they were ill prepared for class. Students were expected to use the homework log as a self-monitoring tool where they were to record their assignments and report their self-efficacy, homework goals, intrinsic interest, and the presence of distractions. In the log, they also reported their level of self-satisfaction, self-evaluation, and attribution to homework completed. Once he started including homework logs as part of his instructional tools, he started to see a change in the frequency and quality of homework completed. Of course, students initially were not motivated to complete the logs, sometimes forgetting to return

them, and put up initial resistance, but with perseverance and by creating attractive homework assignments, students significantly improved homework log completion and displayed a different perspective about the value of the homework logs.

15.2.5 *Effective Teaching that Promotes Self-regulation of Homework Completion*

Mr. Hayes is an emerging self-regulated teacher on the road toward becoming a master teacher. This reflection about Mr. Hayes's instructional approach conducive to effective homework completion is facilitated by the classic work of Wilbert (Bill) J. McKeachie, considered the teacher of teachers (Bembenutty, 2008). McKeachie, one of the first scholars at the vanguard of self-regulation of learning, considers effective homework to require planning, knowledge of the students, having the up-to-date content knowledge, and having value for the teaching profession (Svinicki & McKeachie, 2013).

Consistent with and influenced by the teaching of McKeachie, Buskist (2004) proposed 10 Principle of Effective Teaching which Mr. Hayes displayed during instruction as an emerging master teacher (see Table 15.6). To illustrate, Principle 1 indicates that "Master teachers focus on thinking processes and problem-solving skills rather than mere facts and figures," which reflects Mr. Hayes focuses on deepening knowledge rather than on lecturing to promote effective homework completion and self-evaluation. Buskist suggests that master teachers keep the content of their courses current which is observed when Mr. Hayes assigned homework introducing current literature by reviewing *My Shakespeare* by Kate Tempest.

According to Buskist (2004), master teachers are enthusiastic about their subject matter, teaching, and students. Mr. Hayes is a motivational speaker in class and keeps students attuned to the instruction at all the time, and he motivated his students with his writings (e.g., *Spoken Word, by A. W. Hayes: Revelation of the Streets*). Master teachers make learning fun but not necessarily entertaining, which is another characteristic that Mr. Hayes displayed when he connected instruction to an everyday situation (e.g., Come up with a song, poem, picture, paragraph, story, etc., in which the following question is answered: How does your love dress?).

As an emerging master teacher with a focus on self-regulation and self-efficacy, Mr. Hayes provides inspiring lessons in which students could construct their knowledge and critical thinking. He uses various types of self-regulated instructional practices, such as modeling, scaffolding, and technological tools. When assigning homework, he is aware of students' diverse backgrounds, cultural differences, and interests.

Table 15.6 Self-regulatory instructional approaches: on the road to becoming a master teacher

Principle of effective teaching	Instructional approach conducive to effective homework completion	SRL process
1. Master teachers focus on thinking processes and problem-solving skills rather than merely facts and figures	Focuses on deepening knowledge rather than on lecturing	Self-evaluation; Self-monitoring
2. Master teachers keep the content of their courses current	Introduces current literature by reviewing *My Shakespeare* by Kate Tempest	Goal setting
3. Master teachers are enthusiastic about their subject matter, teaching, and students	Motivates students with his own writings (e.g., *Spoken Word, Revelation of the Streets* by A. W. Hayes)	Self-efficacy
4. Master teachers make learning fun, but not necessarily entertaining	Connects instruction to everyday situation (e.g., come up with a song, poem, picture, paragraph, story, etc., in which the following question is answered: How does your love dress?	Learning strategies
5. Master teachers are high in self-monitoring	Guides students to identify the effectiveness of their selected learning strategy while completing this task.	Self-monitoring
6. Master teachers show a genuine concern for their students' academic welfare	Invites students to assess how confident they are that they can complete their goal while completing this task	Self-efficacy; Attribution
7. Master teachers view teaching as an experimental endeavor that naturally entails risk	Takes challenges in his teaching approaches (e.g., invites students to determine the meaning of "Love is the great intangible.")	Self-monitoring
8. Master teachers use tests for both evaluative and instructional purposes	Assesses students by engaging them in analysis and interpretation of information (e.g., Does love always feel good?)	Self-evaluation; Attribution
9. Master teachers establish high academic standards	Requires homework with specific deadlines (e.g., Turn in your homework by the end of today. You can hand it to me no later than 1:50 PM or email it to me no later than 10 PM tonight.)	Goal setting
10. Master teachers possess a deep sense of humanity and a capacity for caring about others	Shares a great sense of humanity (e.g., Write a poem that praises the work of someone else who has provided great life experiences- for others.)	Self-efficacy; Self-satisfaction

15.3 Implications for Instructional Practice and Future Research

While the effectiveness of the lessons was obvious, I offer three recommendations on how the lessons could be further improved to enhance SRL in the future. First, students need more training on identifying goals and objectives. Following the Bloom taxonomy, teachers could help students to set objectives that are at different levels of cognitive demand. These objectives should include immediate objectives to be reached during the lesson, but they should also include objectives of what students will reach at home while completing homework assignments. Second, teachers could train students to engage in self- assessment of myriad of beliefs such as interest, goal orientation, outcome expectancy, self-concept, and self-esteem that are known to be associated with academic performance and successful homework completion (Bembenutty, 2010) and not only assessing their self-efficacy. Third, teachers could help students to create graphic representations between their objectives, self-assessment of performance, and teachers' graded tasks or feedback. Displaying these outcomes in a table or a graph could help a student to develop a high level of calibration between their beliefs, objectives, and their performance (Chen, & Zimmerman, 2007).

It is important to highlight different types of instruction that foster learners' self-control of homework and facilitate the learning process. Nevertheless, many areas of research remain unexplored.

Homework logs and self-monitoring forms. Homework is one of the most important school experiences affecting teachers and students alike. Research shows a wide variety of benefits of homework for learning (Bembenutty, 2010; Cooper, 2015). Nevertheless, teachers continue hearing from students' statements such as, "I hate homework. My dog ate my homework. Why do I have to do homework?" As an instructional technique, the research shows that homework provides an opportunity for learning outside the classroom setting (Cooper, 2015). In high school, homework produces an effect size of a gain of up to 0.64. The quality of homework completion could be buffered by providing learners with homework logs to be completed outside of instructional time and to provide self-monitoring forms to be completed by students during in-class instruction. Future research should investigate effective ways teachers could design effective homework logs that provide benefits for learners. Similarly, teachers could administer self-monitoring forms for students to track their learning during instruction. Teachers' efforts to triumph over homework challenges could be enhanced by involving parents, to a limited degree, on the homework process; by clearly delineating the purposes and outcomes of homework; by providing effective feedback to homework completed; and by varying the formats of homework assignments.

Self-regulated culturally proactive pedagogy. Another issue involves considering a new conceptualization of the role of culture in homework instruction and future investigation. A hallmark in the teaching experience described above is that students' quality of homework completion does not depend solely on the teachers'

effective way of implementing standards; rather, teachers need to adopt self-regulated culturally proactive pedagogy. White and Bembenutty (2014, 2016) have proposed that instruction is enhanced when both students and teachers adopt a self-regulated culturally proactive pedagogy that is integrated systematically and daily into all classroom instruction (Bembenutty, 2017). White and Bembenutty called for teachers to be culturally proactive agents through cycles of self-regulation. A *culturally responsible pedagogy* needs to be expanded to be sufficient to promote homework self-regulation. To be culturally *responsive* (Gay, 2000, 2002; Ladson-Billings, 1995) should not be the teachers' approach; the time is here when both teachers and students adopt and ingrain a culturally proactive approach. Future research could examine how teachers could ingrain in the curriculum a self-regulated culturally proactive pedagogy that could result in students' self-regulation of homework assignments.

Autonomy. For students to develop the necessary skills for self-regulation and production of a high quality of homework, they need to have an awareness of who they are as learners and learn to construct their knowledge with diminished teaching assistants . Learners need to be given opportunities for autonomous tasks by providing them opportunities to choose what homework they could do and how these tasks could be done. That flexibility offers opportunities to learners to enhance their self-regulatory skills and to increase their self-efficacy. Future research in classroom settings could assist teachers and students to explore which alternative formats of self-directed homework assignments are more effective to a particular group of students.

Self-efficacy. Approaching homework tasks with an appropriate degree of self-efficacy beliefs should enhance academic learning and performance. Self-efficacy would drive students to be persistent when challenges or distractions arise. Self-efficacious students would be able to put a necessary amount of effort in, and there is a chance that they would find that their beliefs are calibrated with their performance (Chen, 2002; Chen & Zimmerman, 2007). Future research could assist teachers and students in developing assessment tools that help teachers to assess their students' level of calibration accuracy and biases and for the students to self-assess their calibration (Schunk & DiBenedetto, 2014, 2015; Zimmerman, Schunk, & DiBenedetto, 2017).

Academic delay of gratification. The integration of academic delay of gratification in homework instruction and future investigation is also important. High school students need to value the importance of academic delay of gratification if they want to be successful in completing high-quality homework assignments (Bembenutty, 2010; Bembenutty & Karabenick, 1998, 2004). Teachers need to encourage students to wait for things they want right away during a regular class time, such as controlling the use of cell phones, checking multimedia during class, chatting with friends, reading popular magazines, or requesting unnecessary bathroom passes. The practice of delaying gratification during regular instruction could transfer to students' choice between non-valuable activities and rewards for the sake of completing important homework assignments. Postponing immediate gratification is a competence that could have a long-term positive effect on learners

(Mischel, 2014). The ability to delay gratification predicts outcomes later in life that could be inferenced from to the ways students approach homework assignments. Students' willingness to delay gratification would depend to some degree to their social trust. Students need to trust that their efforts to complete homework assignments would be rewarded and recognized (Michaelson & Munakata, 2016; Mischel, 2014). The ability to delay gratification is learned (Mischel, 2014). Future research should consider school classroom interventions that could explore what are the best ways teachers could provide opportunities for students that would result in effective self-regulation of homework completion. In a consistent vein, Zimmerman (2013) observed that deficiencies in performance had been attributed to insufficient self-control or self-discipline and these deficiencies "are managed through conscious efforts, such as delay of gratification and resisting detrimental temptations" (p. 146).

15.4 Conclusion: Homework Self-regulation Among All Learners

Teachers who are empowered with self-regulatory skills can transform their curriculum, focus on thinking processes, know the content of their respective disciplines, are enthusiastic about teaching, and self-monitor their instructions and students' learning. Still, a significant trademark of these teachers is their ability to understand the processes that make their students proactive agents of their learning through cycles of self-regulation. Their transformation is guided by self-efficacy beliefs, willingness to delay gratification, and by adopting a self-regulated culturally proactive pedagogy. Throughout their curriculum, self-regulation is promoted, and it is highlighted by the ways they alter students' beliefs about homework assignments when teaching students that homework assignments provide opportunities to enhance self-regulation of learning.

In the present chapter, it was perceptible that in a teacher's journey toward becoming a master teacher, the teacher was able to skillfully convey to his students that forethought, self-control of performance, and self-reflection of the homework process produce self-satisfaction and important educational outcomes. The teaching approaches discussed here are consistent with Zimmerman's (2013) cyclical phases and subprocesses of self-regulation (see DiBenedetto, 2018/this volume). The teacher and his students understood that it is possible to triumph over homework by adopting self-regulation of learning and performance among both the teachers and the high school learners. Their triumph of homework completion should be the triumph that all high school teachers and learners should experience by adopting cyclical properties of self-regulation.

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Closing Commentary

Advances in psychological science require three complementary models. The first is a valid *theoretical model*. It provides the guiding principles for achieving individual and social change. The second is a *translational and implementational model*. It converts theoretical principles into fruitful practice. It does so by specifying the content, strategies of change, and their mode of implementation. We often do not profit from our theoretical successes because we fail to translate our theories into effective operational practices. The third component is a *social diffusion model* for widespread adoption of proven programs.

At the theory level, Barry Zimmerman and Dale Schunk provided the theoretical and analytic framework for understanding the capacity for self-regulated learning. This insightful work laid the foundation for educational applications.

In her splendid book, Maria DiBenedetto addresses the second model in psychological advancement—applications of the knowledge on self-directed learning. In this thoughtfully assembled volume, DiBenedetto brings together creative instructors in the educational field, who offer innovative applications of self-directed learning. The volume is uniquely broad in scope covering virtually every significant subject matter in the high-school curriculum. With this extensive generalizability, this book is an invaluable guide to anyone enabling students to become self-directed learners.

Albert Bandura
Department of Psychology
Emeritus Faculty, Academic Council
Stanford University
Stanford, California 94305-2130
bandura@stanford.edu

M. K. DiBenedetto (ed.), *Connecting Self-regulated Learning and Performance with Instruction Across High School Content Areas*,
https://doi.org/10.1007/978-3-319-90928-8