Reforming Teaching and Teacher Education

Bright Prospects for Active Schools

Eija Kimonen and
Raimo Nevalainen (Eds.)

SensePublishers

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SENSE PUBLISHERS
ROTTERDAM / BOSTON / TAIPEI

A C.I.P. record for this book is available from the Library of Congress.

ISBN 978-94-6300-915-7 (paperback)
ISBN 978-94-6300-916-4 (hardback)
ISBN 978-94-6300-917-1 (e-book)

Published by: Sense Publishers,
P.O. Box 21858,
3001 AW Rotterdam,
The Netherlands
https://www.sensepublishers.com/

All chapters in this book have undergone peer review.

Cover photographs by Raimo Nevalainen

Printed on acid-free paper

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FOREWORD

UNDERSTANDING REFORMS IN TEACHING AND TEACHER EDUCATION

Education in Transition

As more countries move from the industrial to the information age, they are exploring ways of reforming their educational systems to best respond to this complex challenge. Globalization, new technologies, and changing demands both at work and elsewhere present individuals, communities, and societies with problems that can only be resolved by reforming systems of education and schooling (Ng & Renshaw, 2009). That is why reforms have become the normal course of events in world education development. As we all know, the ability to participate in lifelong learning, the core of which is active learning, is one of the most necessary competences for people living such a period characterized by rapid and total changes. Consequently, more and more countries have been reforming their education, especially their schooling, since the beginning of this century for the purpose of building active schools and promoting active learning. This is taking place globally, even if the reform policies or strategies differ with respect to national contexts and situations.

As the subtitle of this enlightening book shows, its main topic is active schools. In fact, the active learning that takes place at such schools has long been the focus of the two editors' research. This book consists of three parts and nine chapters. Its first part is devoted to reforms in teacher education. The second and third parts, a total of seven chapters, approach teaching reforms for active learning from the two dimensions of school pedagogics and school culture. We stress the importance of pointing out that most of the chapters in the second part focus on pedagogical reforms in such areas as craft education, home economics, and drama education. These areas are important for active learning, but they have rarely received attention by researchers.

The age we are living in is not only one of education reforms, but also one of teacher education reforms. Teacher education reform in many countries constitutes a crucial part of a broader educational reform intended to improve teaching practice and student performance. The underlying assumption is that teacher quality is the key to the success of education reforms, and that teacher education is a major factor in improving teaching quality. Teacher education reform has thus become an international trend (Bates, 2008; Garm & Karlsen, 2004), which, different national contexts and traditions notwithstanding, shares a set of similar expectations, foci, and even policy interventions (Loomis, Rodriguez, & Tillman, 2008). The first part of

this book consists of two chapters. It deals with innovative teacher education reforms in the United States based on case studies. It illustrates not only the commonalities but also the complexities of teacher education reforms in that country.

We are living in an age full of great uncertainty about the future and global problems. Exchange and cooperation among different nation-states or organizations seem more important and necessary than ever before. International studies of teaching and teacher education reforms are essential elements of these valuable exchanges. As comparative education and teacher education researchers, we are very pleased to see this unique book published because it deals with issues such as teaching and teacher education reforms from an international perspective. The book is based on intensive and informative studies covering several countries and offers an insightful account of teaching and teacher education reforms.

We have known the two editors, Eija Kimonen and Raimo Nevalainen, since 2010. They have paid several teaching visits to us in China, and we have visited them in Finland. We have also met at international conferences elsewhere. Additionally, one of us, Congman Rao, has the experience of cooperating with Eija Kimonen and Raimo Nevalainen in contributing a book chapter for their edited volume *Transforming Teachers' Work Globally: In Search of a Better Way for Schools and Their Communities* (2013). In the process of exchange and cooperation, we are extremely impressed by their enthusiasm for research on educational reforms, as well as by their in-depth insights into education in general, and teacher education and comparative education in particular. We are greatly honored to be part of this project. We firmly believe that this book will be warmly received by specialists in education, particularly those interested in reforming teaching and teacher education.

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PREFACE

THE IMPORTANCE OF EDUCATIONAL REFORM

Toward Active Schools

The school as an institution has been criticized throughout the twentieth century. According to this criticism, the school isolates itself from the rest of the culture, thus forgetting its function as educator of future citizens. This critique gained further support at the beginning of the twenty-first century. Then globalization was considered to confront the national school systems with a wide range of serious and intertwined problems, these including commercialization, competition, the brain drain, cultural diversity, inequality, social exclusion, and loss of resources (see, e.g., Neubauer, 2007, pp. 36–48). Kubow and Fossum (2007) stated that among many other responsibilities, an important challenge for a schooling system is "to help students understand cultural, economic, political, and social convergence and divergence in a globalizing environment" (p. 295).

This book argues that the central function of teacher education and education in general is to respond to the challenges brought on by the twenty-first century. According to this approach, the competencies and skills needed in the future are not merely a new addition to school activities, but rather something requiring a comprehensive reform of school culture encompassing teacher education, curricula, and teaching methods. Such a fundamental process of change in the action and thinking models used by schools would be an effort to achieve a complete transformation, the result of which would be schools developing into organizations that are both creative and imbued with a strong sense of community. A central attribute is that the creation of new knowledge is not just restricted to the classroom but also takes place in out-of-school environments. This would link learning to its natural context, this eventually leading to an ideal instruction that is actively problem oriented, holistic, and life centered.

OVERVIEW

What are the prerequisites for reforming education, and how can these reforms be seen in school development and culture? How should teacher education support this reform process? What are the principles and practices underlying the functioning of the schools of tomorrow? These questions are examined in this three-part volume. Its first part focuses on the reform processes in teacher education, its second part on the

reforms of pedagogics at schools and teacher education institutions, and its third part on the processes of reculturing schools. The individual chapters discuss new prospects for active schools in the United States and Europe, as well as in Japan and China. Some of the highlights of the contributions are presented in the following summaries.

Part One is devoted to reform in teacher education. Its chapters show that reforming teacher education needs a comprehensive re-conceptualization of a traditional university program. The authors discuss how to develop new learner-centered and field-based models for teacher education. The first chapter, *Transforming Teacher Education in the United States: A Clinically-Based Developmental Approach*, by Susan K. Johnsen, Krystal K. Goree, and Tracey N. Sulak, addresses the transformation of a traditional course-based, candidate-centered university program into a field-based, learner-centered program. Beginning with a description of the external pressures influencing the change effort, the authors examine specific details within each of the stages used in the actual redesign process. These include an initial faculty retreat focusing on teacher education standards, assessments, and challenges; the development of an infrastructure and timeline; and the creation of design teams and professional development schools. The authors conclude that while the clinical model created a new set of challenges, specifically among faculty who found themselves in unfamiliar roles and among university administrators with their own agendas, it also had positive effects on students in their future teaching roles.

Chapter 2, *The Seven Principles of Learner-Centered Professional Education Programs: Teacher Education for Students with Exceptionalities in Texas, U.S.A.*, by Tracey N. Sulak, Rachel Renbarger, Robin D. Wilson, and Rebecca J. Odajima, presents the seven tenets of a pre-service teacher education program that focuses specifically on teaching children with exceptionalities. Within each principle, the authors include conceptual foundations and empirical research along with aligned current practices. Details are given such as the history and organization of the program, field-based requirements, assessment techniques, and methods of instruction. The chapter concludes with a comprehensive summary of the principles and benchmarks to highlight how this learner-centered professional education program was restructured and now incorporates the new National Council for the Accreditation of Teacher Education (NCATE) standards.

Part Two explores educational reforms on the basis of a unique collection of pedagogical innovations in schools and teacher education institutions from an international perspective. The section begins with an introductory chapter, presenting us with the ideas of student-centered science instruction in out-of-school environments. In this chapter, *Children Experiencing the Outdoors: A Natural Setting for Science Learning in the United States*, Sarah J. Carrier and Kathryn Stevenson provide an overview of outdoor education research, identifying past and current calls for reform that support connecting natural settings to student learning about the natural world. The authors examine various learning designs and settings for outdoor education, including various modalities and authentic settings. Furthermore, they discuss challenges that limit outdoor education, opportunities for diverse audiences

as well as the role played by social factors in outdoor learning. The discussion summarizes the potential for outdoor education to capitalize on children's curiosity about the natural world and its impact on student development.

The last four chapters of Part Two continue the focus on alternative forms of active-learning pedagogy with respect to science education, craft education, home economics, and drama education. The countries treated are, respectively, Finland, Romania, Latvia, Japan, and Norway. These learning processes may take place within or outside of the school. In Chapter 4, *Inquiry and Creativity Approaches in Early-Years Science Education: A Comparative Analysis of Finland and Romania*, Sari Havu-Nuutinen, Dan Sporea, and Adelina Sporea examine the perceptions of teachers concerning the use of inquiry-based science education and the role of creativity in two countries, Finland and Romania. Their study treats the teachers' own viewpoint as documented by a detailed survey across the two countries. It also utilizes observations and interviews to analyze the teaching approaches used to determine whether and how students' inquiry skills and creativity are fostered in science education. Attention is further focused on the emergence of appropriate learning outcomes, including student interest.

Chapter 5, *Future-Oriented Reform of Craft Education: The Cases of Finland and Latvia*, by Sinikka Pöllänen and Māra Urdziņa-Deruma, analyzes craft education in Finland and Latvia, countries with differing educational and cultural histories. In both countries, craft education has had a permanent place, either as a separate school subject or in combination with other subjects. In this chapter, craft education in the two countries will be described from three perspectives: current craft education and science-based craft teacher education, the challenges craft education will face in the future, and the possibilities offered by two future-oriented pedagogical models. Additionally, some examples that may reform craft education are examined.

Chapter 6, *Pedagogics in Home Economics Meet Everyday Life: Crossing Boundaries and Developing Insight in Finland and Japan*, by Anna-Liisa Elorinne, Noriko Arai, and Minna Autio, reveals that home economics as a school subject has a history dating from the late nineteenth century in both Finland and Japan. However, home economics as an independent academic discipline has been developing in both countries since the 1980s. The research tradition in home economics focuses on the everyday life and welfare of homes and households. Yet, the pedagogical approach in the field has been insufficiently discussed. Modern pedagogy stresses authentic and inquiry-based learning, this being important for the further development of both home economics as a discipline and of learning by doing as pedagogical practice. The purpose of this chapter is to discuss the nature of home economics as a science, offering insight into pedagogical solutions in students' learning in a home economics context.

In Chapter 7, *Drama Boreale – Perspectives on Drama Education in Finland and Norway: Struggling for a Place in the Educational System*, Anna-Lena Østern, Tapio Toivanen, and Tuija Leena Viirret provide an overview of the extensive attempts carried out for the purpose of establishing a knowledge base for drama and theatre

education throughout the school system in two Nordic countries, Finland and Norway. The authors have chosen to study contemporary history from the perspective of both countries. They ask how drama education has been incorporated into education in these two countries from the 1970s until 2016. They describe the ups and downs in the struggle to obtain a place for this art subject and its esthetic work forms. The authors discuss how this knowledge base is constructed through supporting reforms aiming at including the subject in curricula, through practice and research, through associations for drama and theatre education, and, finally, through the development of study programs and curricula.

Part Three discusses the processes of reculturing schools in the framework of curriculum change and active learning. This part begins with a chapter looking at the educational change process in the context of national curricula reforms. Chapter 8, *Educational Change and School Culture: Curriculum Change in the Finnish School System*, by Raimo Nevalainen, Eija Kimonen, and Thomas L. Alsbury, gives a contextual outline of curricula in the Finnish comprehensive school, and of the changes made in them during the past four decades. It examines educational change from the standpoint of curriculum change, particularly focusing on the implications of the changes for different dimensions of school culture. The study considers the manner in which the changes in the Finnish national curricula for the comprehensive school can be seen in school pedagogy and teachers' work. The features of curricula as well as of their implementations are also evaluated and commented on in the light of previous qualitative research projects.

In the final chapter, *Active Learning for Educational Change: Finnish Students and Teachers as Active Learners*, Eija Kimonen, Raimo Nevalainen, and La Tefy Schoen discuss the process of active learning in the context of changing school culture. The findings reported in this chapter form part of a wider comparative research project investigating the active learning of students and teachers in the educational practices of eight countries. It aims to describe the manner in which the process of change is seen in the activities of students and teachers in one small Finnish school. The chapter focuses on the process of active learning: its goals, activities, information, outcomes, and assessment. The data allows for an analysis of the teacher's transformative learning process within the changing school culture.

ACKNOWLEDGMENTS

We would like to express our gratitude to all those who in one way or another contributed to the realization of this book. Our special appreciation is due to our co-authors for their inspiring and creative contributions.

The editing process was carried out at the Universities of Eastern Finland and Jyväskylä. We would like to take this opportunity to extend our sincerest thanks particularly to Professor Pertti Väisänen, Professor Tuula Keinonen, Dr. Timo Tossavainen, and Dr. Ritva Rouvinen from the University of Eastern Finland and Dr. Pekka Ruuskanen from the University of Jyväskylä for their encouragement

during all phases of the work. We express our warmest thanks to Dr. Elizabeth Hammerman for her support and encouragement in this project. We gratefully acknowledge the cooperation of Professor Congman Rao and Associate Professor Xin Chen of Northeast Normal University. We are thankful to the reviewers who kindly commented on the chapters of this volume providing constructive feedback. We are also indebted to Mr. Eugene Holman of the University of Helsinki for his invaluable contribution editing the entire text, and to Ms. Niina Pohjola of the Central Finland Graphic Design Agency for her work preparing the graphic layout. We express our sincerest appreciation to Publishing Director Michel Lokhorst and Managing Director Peter de Liefde for making the publication of this book possible.

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PART ONE

REFORMING TEACHER EDUCATION

SUSAN K. JOHNSEN, KRYSTAL K. GOREE, & TRACEY N. SULAK

1. TRANSFORMING TEACHER EDUCATION IN THE UNITED STATES

A Clinically-Based Developmental Approach

In the United States, teacher education programs have been under increasing pressure to focus more on outputs such as their candidates' effects on student performance on state, national, and international tests rather than on inputs such as content described in course syllabi or the number of hours of field experiences. To address these external pressures and increase their focus on outputs, a university faculty transformed a traditional course-based, candidate-centered university program into a field-based, learner-centered program. This teacher education program eventually became a model for other universities because of its intensive clinical experiences and its positive effects on students (NCATE, 2010, p. 14).

The transformation process was systematic and advanced through multiple stages that incorporated many of the principles important to effecting change (Fullan, 2009; 2010; Hall & Hord, 2015). First, high-quality people were involved at all levels in the School of Education. Beginning with an initial faculty retreat that examined standards, assessments, and possible challenges through the implementation of the new program, administrators and faculty at both the university and K–12 school levels participated in the plan and its adoption. Second, the change focused on specific outcomes, guided by a conceptual framework and delineated by assessment benchmarks, where each individual had specific roles that worked together to form a comprehensive, cohesive program. Third, a Professional Development School (PDS) where university and school faculty formed a learning community had been piloted over a period of seven years and provided a successful model for other newly formed PDS and partner schools to emulate. Fourth, a financial model was developed and supported by the university that reduced class sizes and allowed for more field supervision, collaboration, and support. Finally, an evaluation system was built to examine and address challenges. This chapter will elaborate this systematic redesign process that led to the transformation and the development of a successful teacher education model.

E. Kimonen & R. Nevalainen (Eds.), Reforming Teaching and Teacher Education: Bright Prospects for Active Schools, 3–33.

RATIONALE FOR TRANSFORMING TEACHER EDUCATION

Teacher education as a field faced unprecedented external forces in the late 1990s and 2000s, such as commodification of the field, new federal accountability guidelines, and demands for more collaboration with local education agencies (Zeichner, 2010). The push for a "new teacher education" began with the passage of the *Higher Education Amendments of 1998*, which tied not only the reporting of results of teacher education programs to state funding and grants but also allowed funding for certification routes outside the typical university setting (Cochran-Smith, 2005a; see DoEd, 1998). In addition, comparisons between nations on international exams such as the Third International Math and Science Study (TIMSS) and the National Assessment of Educational Progress (NAEP) led to the development of standards and highlighted the need for teacher education and school reform in the United States (Rampey, Dion, & Donahue, 2009).

Commodification

Commodification describes a process where a commodity is created out of something that was not available for trade previously. This commodification or market approach to education has exposed traditional teacher education programs at universities to competition from external entities offering alternative certification routes (Cochran-Smith, 2005a). Various metaphors have compared this exposure to "the cleansing waters of competition" (Hess, 2001, p. 22) or the "discipline of the market" (Ballou & Podgursky, 1999, p. 67), language which underscores a movement from a humanist view of education to a market-based philosophy (Cochran-Smith, 2005b). New external teacher preparation programs in the United States have included non-profit agencies such as school districts, regional service centers, and state agencies, as well as for-profit institutions that often pander canned interventions and curricula aimed to meet federal U.S. standards (Morey, 2001). To remain competitive, traditional university teacher education programs must now be able to demonstrate their impact on candidates and the students they teach, which has encouraged a movement toward more school-based settings. Moreover, university teacher education programs, which are often expensive, must now show the value added by their programs and respond to economic concerns (Sleeter, 2008). They are expected not only to prepare future educators but also to assume a larger role in society's response to fundamental questions about the purpose of schooling and how this purpose impacts the nation's workforce (Helsby, 1999; Smyth & Shacklock, 1998; Zeichner, 2010).

Accountability

The current wave of transformation in teacher education in the United States originates from movements in the 1960s, which led to greater accountability

through accreditation, and in the 1980s, which initiated reforms to close educational achievement gaps between races and ethnicities (Cochran-Smith, 2005b). The transformation through accountability can be reduced to two connected issues: professionalization through regulation and teaching as a policy problem.

Before the advent of accreditation bodies like the National Council for Accreditation of Teacher Education (NCATE) in the 1950s, teacher education in the United States was grounded in field-based practice in local schools, which meant the teacher preparation programs differed in content, clinical components, and duration (Whitford & Villaume, 2014). This local control combined with the deregulation of teaching created concerns over the meaning of certification and the ability of accreditation bodies to oversee the quality of schools of education (Cochran-Smith, 2005a). To address inconsistencies in quality, the United States turned to a context of standards and professionalization, which created the need for regulatory bodies like NCATE – now called the Council for the Accreditation of Educator Preparation (CAEP) (Grimmett & Chinnery, 2009). As the professionalism of teaching increased through accreditation by national associations, states began to monitor university education programs to determine if they were meeting educator preparation standards. While initially, these professional standards focused more on inputs – what was being taught in courses – eventually the focus changed to outputs – what effects were teacher education candidates having on student progress in school classrooms. As a response to the new emphasis on outputs, NCATE (2002) and now CAEP (2015) identified standards related to the accreditation of educator preparation programs that included factors that are "likely to have the strongest effects on outcomes for students: content knowledge, field experience, and the quality of teacher candidates" (p. 2). To be nationally accredited, therefore, teacher preparation programs need not only to show that they have selected quality candidates who have acquired the knowledge, skills, and dispositions indicated in professional standards but also that their candidates' performance in the classroom influences the achievement of students, particularly those from diverse backgrounds who are struggling academically and showing gaps in performance (e.g., students of different races, ethnicities, and socio-economic classes). Student achievement is now measured by state tests, which are related to state or national curriculum standards. While these state-mandated tests reduce local control over what is taught, they create a more efficient system for accountability with standardized tests to measure student progress. As control over the curriculum has become more centralized, the content in education programs has had to change to meet educator preparation standards as assessed by professional and national accreditation associations and curriculum standards as assessed by state and nationally-designed tests that measure overall student progress as well as progress for each subgroup of students.

Teacher education framed as a policy problem rose in popularity as the federal government's role in matters of education expanded (Cochran-Smith, 2005a). The premise was that better policy would produce better teachers who would then produce better outcomes in students and possibly reduce the achievement gap created by a

teacher education system that did not address issues of diversity in the field. Legal pressures from *No Child Left Behind Act of 2001* (NCLB) emphasized a change in the federal government's role in education, which moved from a primarily financial role to a regulatory role in instruction, teacher education, and teacher quality (Cochran-Smith, 2005b; see DoEd, 2002). NCLB's sweeping reforms included a mandate to close achievement gap for all subgroups by 2014 and more stringent evaluation procedures for teachers and students (Apple, 2005).

Collaboration

Traditionally, teacher education programs operated almost independently from the schools by front-loading coursework and then supplying a short field-based assignment at the end of all the courses (Darling-Hammond, 2014). In 2010, the NCATE published the Blue Ribbon Panel Report on teacher preparation, which emphasized the need to move teacher education out of the university laboratory schools and into the public school setting. To be effective at changing practices and attitudes of teacher candidates, field-experiences needed to be embedded in school contexts with instruction and feedback on performance that is developmental, purposeful, and well-articulated (Futrell, 2010; Griffin, 1987). In addition, teacher education programs were encouraged to form partnerships with local schools where all constituents share the responsibility for training a new generation of teachers (Larson & Kyle, 2014). The emphasis on shared responsibility and rights to the teacher education programs prompted the creation of professional development schools organized around five guiding principles:

1. The school is a learning community.
2. All stakeholders agree to use accountability to ensure the quality of the program.
3. The school and university collaborate on decision-making.
4. Equity and diversity are included in measurements of achievement, opportunities, and conversations.
5. The partnership creates structures, shares resources, and defines roles of each constituent (NCATE, 2001).

These NCATE principles provide teacher candidates with a realistic experience by encouraging active practice in the schools and shared responsibility between the university and the school district. Professional development schools act as laboratories for teacher candidate training, research, and professional development (Whitford & Villaume, 2014). By experiencing the complex interplay between theory and practice in PDS schools, teacher candidates are able to connect learning at the university and theory with fieldwork and practice (Conroy, Hulme, & Menter, 2014).

Movement to a clinical model of teacher preparation provided answers to some of the external pressures on teacher education – commodification, accountability, and collaboration. Baylor University is one of the programs highlighted as a model in NCATE's 2010 *Blue Ribbon Panel Report*. Its partnership "provides an intensive

clinical experience for prospective teachers in an urban setting. … Results from a pilot study show that students with multiple exposures to Baylor University interns perform better than students that have no exposure to the teacher candidates in the clinical preparation program" (NCATE, 2010, p. 14). The remainder of this chapter will describe how this program was transformed from a traditional university program to a clinical model of teacher preparation.

BAYLOR UNIVERSITY'S TRADITIONAL EDUCATION PROGRAM

Baylor University is located in Waco, Texas, U.S.A. Chartered in 1845 by the Republic of Texas, it is a private Christian university and a nationally recognized research institution. Its total enrollment is 16,787 with 14,189 undergraduate and 2,598 graduate students (Baylor University, 2016, Discussion section, para. 1, "Fall 2015 Enrollment," para. 6).

The School of Education (SOE) is one of thirteen academic units with approximately 450 undergraduate students (i.e., candidates) who are in the teacher education program. Founded in 1919, the SOE currently has three departments: Curriculum and Instruction (C&I), Educational Administration (EDA), and Educational Psychology (EDP) (SOE, 2015a, "SOE at a Glance," para. 1). The C&I and EDP Departments are primarily involved with the undergraduate teacher education program, with C&I focusing on the preparation of candidates who will teach mainly general education students, and EDP on those candidates who will teach mainly special education students (e.g., those with disabilities, as well as the gifted and talented).

Until 2001, the School of Education offered a more traditional program to prepare most of its teachers. This program offered foundational courses in the history of education, educational psychology, assessment, and exceptionalities beginning in the sophomore or second year of college. Depending on the pre-service teachers' interests, they would then major in elementary (grades K–8), secondary (grades 6–12), or special education (grades PK–12). If they majored in elementary or secondary education, they would enroll in methods courses in the content areas they would be teaching (e.g., science, mathematics, social studies, language arts, and/or the visual and performing arts). For the most part, all of these courses were offered on the university campus with the exception of student teaching during the last semester of their senior year. During this semester, they would teach in a general education classroom with a cooperating teacher and be supervised by a faculty member who would observe them teaching two or three times.

If they majored in special education, they would enroll in courses beginning in their sophomore or second year of college that were more specialized and field based. In this program, most of the candidates' courses had a classroom component that was closely supervised. Candidates were placed in a variety of school settings (e.g., special schools, self-contained classrooms, resource rooms, general education classrooms) so that they would have opportunities to teach students with the full range of disabilities.

Beginning in 1993, the School of Education decided to partner with the Waco Independent School District (ISD) in creating its first Professional Development School (PDS). The school known as Hillcrest PDS was an elementary magnet school – all students within the Waco ISD were eligible to enroll in the school – and focused on serving all students within inclusive environments. An important characteristic of the school was the involvement of teachers, parents, community representatives, University faculty, and the school principal in decisions ranging from budget allocations to curriculum. When challenges arose, clusters of professionals and parents worked together to identify solutions to present to the whole school. Within each pair of classrooms, there was a special education teacher, a gifted education teacher, two special reading teachers, and two general education teachers. These learning environments provided extensive supervised experiences for candidates beginning in their sophomore year in classrooms that modeled effective practices with diverse learners. Working together, novice and experienced teachers identified and addressed the diverse learning needs of children resulting in high levels of performance among all participants – candidates and students. Keys to the success of the school were a spirit of collaboration, individualization, and extended classroom experiences for candidates (Proctor, 2001; Yinger, 2001).

Given the field-based success of the special education field-based program and of the Hillcrest PDS, the new dean of the SOE wanted to expand these types of experiences to all teacher candidates. Yinger (2001, p. 3) envisioned:

> [A] network of approximately a dozen Professional Development Schools with three to five partner schools connected to each. ... Much of our professional instruction will be conducted in these schools during the Teaching Internship year (senior year) and the Teaching Associate year (junior year). Accomplished teachers will be appointed as lead teacher mentors and as clinical faculty to provide continuous, on-site mentoring, supervision, and instruction. Campus-based faculty will work side-by-side with these teachers to provide an integrated academic and professional curriculum that is committed to putting knowledge into practice.

REDESIGN PROCESS

Stage 1: Initial Faculty Retreat

Using the infrastructure of preparing candidates in professional development schools, the dean scheduled a faculty retreat in 1999 to focus on the characteristics of the new program, which included national and state standards in teacher education programs, assessments to measure progress, and possible challenges.

Teacher Education Standards

National and state standards were used to define the teacher education curriculum. These standards, similar but now revised since 1999, included NCATE's Unit

Standards (now CAEP, see CAEP, 2015), program standards for each Specialized Professional Association such as science, English, mathematics, social studies, special education (see CAEP, n.d.), the InTASC Model Core Teaching Standards (CCSSO, 2011), the Professional Development Schools Standards (NCATE, 2001), and the Texas Teacher Educator Standards (TEA SBEC, 2014, "Approved Educator Standards," para. 2). The standards were to be used to define the desired knowledge and skills that would be developed in the candidates. These standards included both pedagogy and content knowledge in specific teaching fields, the characteristics of the teacher education faculty, and the quality of the teaching environments (e.g., the classroom and the teacher).

Assessments

As the standards were reviewed and aligned with one another, the faculty also considered how the effectiveness of the teacher education program would be measured. Some of these questions were generated:

1. How do we screen candidates' strengths and weaknesses?
2. How do we assess the candidates' knowledge and skills?
3. How might the assessments adapt to candidates' changes in knowledge and skills?
4. How will we assess the quality of the field-based teaching environment?
5. How will the assessments accommodate diversity and respond to local needs?
6. How will we assess the overall effectiveness of the program – its strengths and weaknesses?

Some specific instruments considered during the discussion of assessments included grade point averages, structured interviews, critical thinking tests, writing samples, portfolios, and classroom observation instruments such as those currently used by faculty and the Texas Beginning Educator Support System (TxBESS) (Texas SBEC, 2005).

Possible Challenges

The faculty also identified these challenges (or possibilities) that might influence the transformation of the teacher education program from a more traditional delivery of courses to a more field-based approach:

1. How might we develop a cohesive program with Arts and Sciences and strengthen the core academic areas by assessing students' understanding of major concepts and generalizations?
2. How might we assess pre-service students so that we can develop instructional plans, individually or in cohorts, and design a cohesive sequence of field-based experiences that match their proficiency levels? Should we raise entry-level standards? Should we have teaching experiences before the senior or intern year?

3. How might we make our courses more performance-driven rather than time or course-driven? What performance benchmarks might we use?
4. How might students build portfolios that include evidence of their progress in what they know and are able to do? How do we build time for critical reflections?
5. How might student reflections and their collaborations with others during their field experiences stimulate and lead to problem-based learning and action research?

Stage 2a: Develop Administrative Infrastructure and Timeline

The faculty retreat became the impetus for the next stage of the redesign process. This stage included the creation of a university-wide Teacher Education Faculty (TEF), which eventually included an Executive Committee (TEFX). The development of this infrastructure was important so that all faculty and those involved in teacher education felt that they had a voice in the redesign process.

Teacher Education Faculty

During the 2000–2001 school year, the SOE faculty had initial conversations with the Arts and Sciences faculty about ways of preparing teachers in science, mathematics, English, foreign languages, and other subject areas These positive interactions led to a proposal for developing an all-university Teacher Education Faculty (TEF) that would facilitate discourse and actions needed to address problems facing the educational system. The purpose of the TEF was to create a forum and a means for coordinated action in teacher education across the School of Education as well as other departments in the university. It would be responsible for the design, decision-making, and implementation of teacher education programs at Baylor. The TEF faculty would be responsible for planning and overseeing all aspects of teacher education, including program and curriculum design, instruction, admissions, advising, and assessment. The TEF would also approve all course and curriculum proposals or changes. Appointments to the TEF were based on assigned teaching responsibilities in the Baylor teacher education program and on demonstrated professional interests and scholarly activity in teacher education. In addition, school partners were eventually added to the TEF to ensure a seamless communication with the involved professional development schools and school districts.

Given the size of the All-University Teacher Education Faculty that included members not only from other administrative units within Baylor University but also outside of Baylor, an executive committee was formed during 2003–2004 (i.e., the Teacher Education Faculty Executive Committee – TEFX) to ensure that each group had a representative voice. The purpose of TEFX was to serve as a coordinator, catalyst, and interpreter in improving and enhancing the teacher education program. The Executive Committee also made recommendations to the TEF for changes

in the teacher education program. The TEFX was comprised of the chair of the Teacher Education Faculty, the director of the Office of Professional Practice, the Professional Development School and school district liaisons, and coordinators of certificate levels and special programs (EC–4, 4–8, 8–12, special education, ESL, and the gifted and talented). The Teacher Education Faculty Executive Committee:

1. coordinated curriculum implementation across certificate levels and program specialties;
2. assessed the need and the coordination of faculty assignments across certificate levels and program specialties;
3. represented the faculty in identifying and discussing important issues that need to be examined within the teacher education program;
4. recommended action plans that address important issues;
5. reviewed and made decisions regarding proposals for new or revised programs within the teacher education program;
6. reviewed and made recommendations regarding administrative areas such as scheduling of courses, sequencing courses, and handbooks;
7. coordinated evaluation and research across PDS and partner schools;
8. established meeting agendas for the Executive Committee and the Teacher Education Faculty; and
9. met regularly to address adequately the concerns of the teacher education faculty and ensure the overall quality of the undergraduate teacher education program.

Timeline

To ensure that students who were in the traditional program had opportunities to complete their degrees within a four-year period, a calendar was developed. The calendar included a number of courses that were being phased out over a two-year period and important components that needed to be developed simultaneously and sequentially. This helped coordinate the activities of the assessment, course, and professional development school design teams.

Overall students who graduated prior to September 1, 2002 finished under the old program, those graduating before September 1, 2004 finished under the old program with a mix of old and new courses, and those graduating after September 1, 2004 finished under the new program requirements.

Stage 2b: Creation of Design Teams

Concurrently with the development of the administrative infrastructure and decision-making body, design teams were formed to develop the conceptual framework for the School of Education, assessments, courses, and professional development/ partner schools. As faculty collaborated in creating its various components, they were reviewed by the TEF, revised, resubmitted, and eventually approved by TEF

or eventually TEFX. Using this cyclical process, faculty began implementing components of the teacher education program in the fall of 2002. They continue to use this infrastructure to review and evaluate components on a regular basis.

Design of the Conceptual Framework

A conceptual framework, Learner-Centered Professional Education Programs, was developed to describe the important components of the overall teacher education program (see Figure 1). The conceptual framework was based on seven principles of learner-centered instruction that were aligned to the national teacher education standards (Borko & Putnam, 1996; Bransford, Brown, & Cocking, 1999; Darling-Hammond, 1998; Feiman-Nemser & Remillard, 1996; Shulman, 1990):

1. *Classrooms and schools must be learner centered creating a positive environment for learning*. At the conceptual framework's core is the PK–12 student (Bransford, Brown, & Cocking, 1999). The teacher candidates' primary focus must be on learner progress. School of Education faculty are

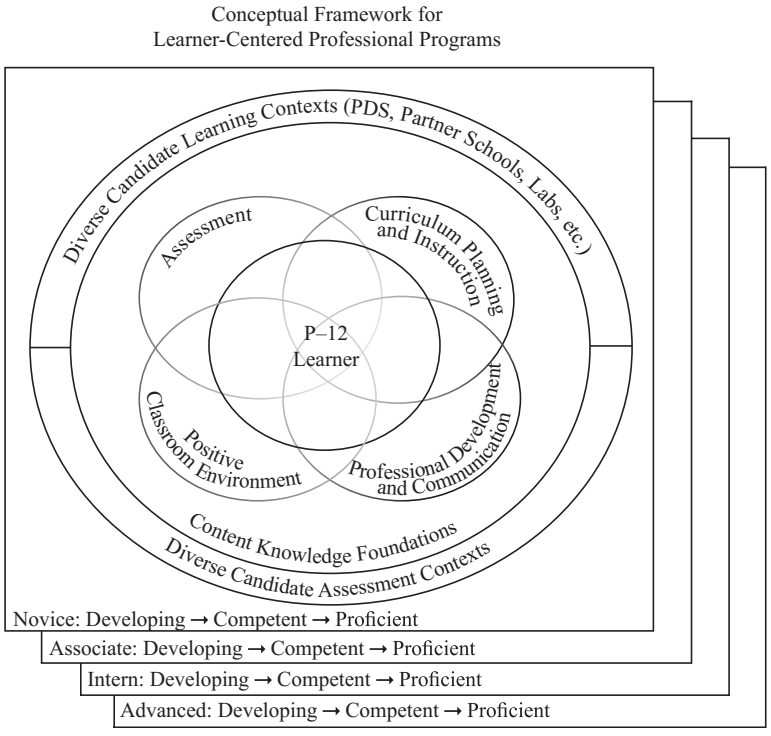

Figure 1. Conceptual Framework: Learner-Centered Professional Educator

also learner-focused with each candidate providing evidence of their progress. The faculty and the candidate's mentors use this information in planning the candidate's experiences.

2. *Formative assessment provides information about the student and assists in designing and adapting instruction*. Knowing that each student is different, the teacher candidates must identify these differences to be effective. Student differences may occur in these areas: what is to be learned, how it is to be learned, how quickly it can be learned, and how the new learning is to be shared. Formative assessment, which includes assessment that occurs in planning prior to teaching and assessment that occurs during instruction, must address these areas of student differences. Assessment is therefore broad based and relies on multiple sources and strategies. These strategies may include performances, products, process-focused observations, and traditional paper-pencil assessments (McTighe & Ferrara, 1998).
3. *A deep foundation of factual knowledge must be organized conceptually to facilitate its retrieval, application, and transfer*. Pedagogical skills are built on a strong foundation of subject matter in the teacher candidates' fields of study. While the organization of curriculum varies, a firm grasp of the declarative, procedural, and strategic knowledge in a particular field or discipline is needed to design learning activities for instruction. For example, the teacher candidate may identify more complex concepts, combining multiple disciplines, or the teacher candidate may analyze tasks in a single discipline for easier acquisition. This understanding of the knowledge base is particularly important for the teacher when organizing larger units of study around major concepts, principles, and theories. Once the candidates' knowledge is firm, they need to provide the conditions that will increase the likelihood that each student will learn efficiently and effectively (Darling-Hammond, 1998; Shulman, 1990). Specifically, as teacher candidates are taking courses in the Baylor Interdisciplinary Core, liberal arts, and in specific academic disciplines, they are learning how to organize their knowledge for retrieval, application, and transfer within the professional studies strand. Transfer is an extremely important principle for those students who must be taught directly the similarities across contexts. This principle, a foundation of knowledge, emerges from the research comparing experts to novices (Donavan, Bransford, & Pellegrino, 1999). Experts always draw on a rich knowledge base and have a deeper conceptual understanding of the field of study. At the same time that the teacher candidates are learning the major concepts of their disciplines, they will be organizing the information into conceptual frameworks for their students in their field-based experiences. While the teacher candidates are learning their specific disciplines, they are also organizing the knowledge for PK–12 students in professional development schools, these being located in an urban, diverse community. This type of community provides opportunities for teacher candidates to examine the variations in beliefs, traditions, and values found in different cultures and find ways to develop culturally-responsive curriculum.

4. *Strategies are important in learning to solve problems and in becoming an independent, effective teacher*. Teacher education candidates use problem-solving strategies in four performance areas that emphasize the continual improvement of all students' learning. These strategies are used consistently and specifically when solving problems related to the classroom environment, curriculum planning, assessment, and professional development and communication. Practice in these strategies helps the teacher candidates transfer to new classroom settings and situations (Borko & Putnam, 1996; Feiman-Nemser & Remillard, 1996; Palincsar & Brown, 1982; Scardamalia, Bereiter, & Steinbach, 1984; Schoenfeld, 1984; 1991).
5. *Learning is developmental and influenced by the context in which it takes place*. These experiences are developmental and layered within progressively more complex situations, which provides candidates with sustained opportunities to deepen and expand their knowledge of the subject matter and effective teaching practices (Borko & Putnam, 1996). For example, beginning with the novice experiences (i.e. freshman and sophomore years), candidates initially tutor elementary, middle school, and secondary students; during the associate or junior year, they teach small groups in identified fields of specialization; and, finally, during the intern or senior year, they teach the whole class. Being in urban settings, the teacher candidates have experiences with students from different ethnic, religious, and socio-economic backgrounds and with varying levels and types of aptitudes, interests, achievement, and exceptionalities. In this way, the teacher candidate is able to examine variations within and across cultures and their effects on students, their families, and schooling.
6. *Collaboration is important in creating a diverse learning community*. The candidates' classroom experiences occur in diverse urban and suburban professional development and partner schools to ensure collaboration among peer cohorts, mentor teachers, professionals in the schools, university faculty, parents, and other members of the community. This builds partnerships that assist in providing more authentic educational experiences for the students and requires that the teacher candidates understand and have a positive regard for different cultures, exceptionalities, and religions (Burnstein, Kiretschmer, Smith, & Gudoski, 1999).
7. *Reflection deepens the understanding of effective instructional practices*. Given the cyclical and progressive nature of the field experiences within the professional studies strand, the candidate has time to reflect about personal and others' classroom experiences, deepening their understanding of effective instructional practices. With reflection combined with practice, the candidate develops a greater repertoire for resolving problems arising in the classroom (Tatto, 1998), improves teaching and self-efficacy (Freese, 1999; Kruse, 1997), and develops professionally (Bell & Gilbert, 1994).

The framework was designed to be a visual representation of these seven principles. Each of the seven principles is integrated systematically into the courses and learning

experiences of all teacher education candidates on the basis of the framework. At the central intersection of the overlapping elements of Figure 1 is the P–12 learner. This represents the learner-centered focus of all certificate programs in the School of Education. The four professional studies areas – positive classroom environment, assessment, curriculum planning and instruction, and professional development and communication – are represented by the four intersecting circles, illustrating the inter-relatedness of the four areas.

The first circle around the professional studies areas represents the candidates' fields of study that serve as the base of content knowledge for teacher candidates. The outer circle indicates that while the teacher candidates are learning their specific disciplines, they are also organizing the knowledge for P–12 students in professional development, partner schools and other types of settings, which are located in diverse contexts.

The staggered squares encompassing the circles visualize the developmental nature of the conceptual framework. Since the acquisition of new knowledge and skills take time, the teacher candidates begin their classroom experiences during the freshman and sophomore years (novice), and continue building upon their experiences during the associate (junior) and intern (senior) years. These experiences are layered with increasing responsibility and diversity. For example, the teacher candidate conducts case studies with individual students during the novice years, differentiates instruction for small groups of students in specific discipline specialties during the associate years, and teaches entire classes in specific content areas during the intern years. At each level, faculty assess the candidates' knowledge and skills, thus assisting them to move from developmental to competent to proficient levels.

While the conceptual framework has been modified slightly by broadening the focus to include an advanced layer to the novice, associate, and intern levels within a variety of diverse contexts, the four professional areas, which are based on content knowledge and acquired within a diverse learning context, have remained constant since its inception in 2001.

Design of Assessments

To design assessments for the teacher education program, the Assessment Design Team (ADT) began by asking, "What do we want the candidates to value (i.e., dispositions) and to do (i.e., performance outcomes) when they graduate?" Once these dispositions and outcomes were established and approved by the teacher education faculty, the ADT then identified observable classroom instructional behaviors that might show candidate progress (i.e., benchmarks). The benchmarks were then elaborated by defining levels of performance (i.e., developing, competent, proficient) for each benchmark characteristic within the format of a rubric. All of the rubrics were placed online so that candidates were able to upload evidence and faculty were able to rate the quality of the evidence as it related to the characteristics of each benchmark. In addition to measuring candidate performance, the teacher education faculty also identified assessments for admission and continuation in the

program. This development process and the types of assessments are elaborated further in this section.

Identification of Performance Outcomes

Using the conceptual framework as a foundation, the Assessment Design Team identified dispositions (i.e., professional attitudes, values, and beliefs) and performance outcomes in each of the four professional studies areas and for each of the developmental levels (i.e., novice, associate, intern) (see Table 1).

Table 1. Dispositions and Outcomes for Each Professional Studies Area at Each Developmental Level

Developmental Level	Context	Professional Studies Area	Dispositions	Performance Outcomes
Novice	Tutoring and individual instruction	Positive classroom environment	Social behaviors are learned and can be taught. The role of the novice includes teaching appropriate social behaviors.	– Implementation of strategies that create a learning environment of respect and rapport fostering a positive climate for learning, equity, and excellence – Management of student behavior
		Assessment	Every task provides information about student learning. Assessment links to what each student needs to learn or has learned.	– Use of Curriculum-Based Assessment (CBA) to adapt instruction for one student – Selection and use of CBA, including technology, and criterion-referenced assessments to adapt instruction for each student and small groups of students – Keeping records of student progress and sharing information with student
		Curriculum planning and instruction	Instruction is based on student assessment.	– Implementation of provided lesson plans – Use of curriculum-based assessment to monitor student movement through a structured curriculum
		Professional development and communication	Growth as a professional requires reflection and study in collaboration with other scholars.	– Writing reflections explaining how standards were met
Associate	Small-group and individual instruction	Positive classroom environment	A classroom with clear expectations and positive feedback for appropriate behavior creates an atmosphere for optimal learning.	– Creation of a learning environment of respect and rapport that fosters a positive climate for learning, equity, and excellence – Management of student behavior in groups

Table 1. (Continued)

Developmental Level	Context	Professional Studies Area	Dispositions	Performance Outcomes
Associate	Small-group and individual instruction	Assessment	Multiple assessments across settings ensure transfer.	– Selection and use of CBA, criterion, and norm-referenced assessments to adapt instruction for each student – Design of CBA assessments and selection of other related assessments, such as real-world applications, to adapt instruction for each student and small groups of students with similar strengths – Sharing student records of progress with parents
		Curriculum planning and instruction	The flexible use of a repertoire of methods is needed to meet assessed student needs, the requirements of the task, and the discipline. The organization of curriculum uses important information from the disciplines, such as facts, concepts, generalizations, strategies, and processes, promotes purposeful learning.	– Design of instruction based on assessment – Design and implementation of a curriculum that is based on facts, concepts, generalizations, strategies, and procedures from the area(s) of specialization – Use of multiple methods and strategies to promote high academic achievement and to make connections within and across disciplines – Use of technological tools to promote learning and expand instructional options – Use of flexible grouping to meet assessed student needs and the requirements of the task – Selection and use of instructional materials that match student needs and promote academic achievement
		Professional development and communication	Parents and guardians are partners in the development of effective programming for their children.	– Writing reflections explaining how standards were met and/or what needs to be done differently

For example, in the assessment area novice candidates would be able to select and use different forms of assessment and keep track of student progress (outcomes) and would understand that every task could provide information about student learning, and assessment should be linked to what students learned (dispositions). Associate candidates would build on the knowledge and skills of their novice years and be able not only to select and use different forms of assessment but also to design assessments to adapt instruction, sharing this information with parents (outcomes).

Table 1. (Continued)

Developmental Level	Context	Professional Studies Area	Dispositions	Performance Outcomes
Intern	Large-group, small-group, and individual instruction	Positive classroom environment	Routines and procedures for the management of classroom time, space, materials, and activities promote efficiency and safety.	– Creation of a learning environment in a whole classroom setting of respect and rapport that fosters a positive climate for learning, equity, and excellence – Management of student behavior when they work in small and large groups
		Assessment	Assessment assists in grouping students for instruction.	– Design of CBA assessments and selection of other related assessments to adapt instruction for each student within a whole classroom setting – Use of assessments to form flexible groups of similar interests, strengths, or weaknesses – Use of assessments for placement of students into special programs
		Curriculum planning and instruction	A range of instructional methods promotes and develops high academic achievement.	– Planning and implementation of an articulated curriculum for a designated group of students – Selection and implementation of instructional models and strategies for a designated group of students to promote high academic achievement
		Professional development and communication	A teacher is part of a larger professional community that is nurtured through collegial relationships, and contributes to the system as a whole.	– Writing reflections that explain how standards were met and/or what needs to be done differently

They would understand that multiple assessments were needed across settings to ensure transfer (disposition). Finally, intern candidates would use their knowledge of assessments from their novice and associate years to form flexible groups and identify students who might need special program services (outcomes). They would understand that assessments assist in grouping students for instruction.

Identification of Benchmarks

Next, the teacher education faculty established eighteen benchmarks that described candidate performance criteria, which were aligned to the dispositions and performance outcomes. The benchmarks were organized by the four professional

study areas (positive classroom environment, assessment, curriculum planning and instruction, and professional development and communication) (SOE, 2015b):

Creating a positive classroom benchmarks

1. establishes expectations;
2. arranges space for safety and effective learning;
3. establishes small and large-group procedures and routines, and manages transitions (this may vary for novice, associate, and intern levels);
4. prepares and manages materials and technology for effective learning;
5. keeps progress records to match, thus adapting the curriculum to the characteristics of each student;
6. uses reinforcement and correction to increase learning, thus showing respect for students; and
7. paces lessons and activities to engage students.

Assessment benchmarks

8. select the assessment method that matches knowledge and student characteristics;
9. use formative assessment to provide information regarding student achievement levels; and
10. communicate assessment information to students, parents, and other professionals.

Curriculum planning benchmarks

11. focus attention on the information;
12. organize the knowledge when planning instruction;
13. present information for instruction related to assessment;
14. guide students in their application of knowledge; and
15. provide opportunities for students to use information independently.

Professional development and communication benchmarks

16. direct professional development;
17. facilitate communication with students, parents, and other professionals; and
18. enhance collaboration with parents and other caregivers.

Each benchmark was then elaborated into observable and measureable characteristics. Each of these characteristics was further delineated into progressive levels of performance: developing, competent, and proficient (see ibid.).

Descriptions within each of the performance levels addressed varying degrees of complexity, frequency, variety, and/or consistency in the candidates' performance. This delineation between performance levels allowed faculty to examine each candidate's strengths and weaknesses, and to plan experiences accordingly. Furthermore, each of the performance levels was rated on a nine-point scale, allowing for comparisons of candidates as well as programs. A program coordinator could use the information to make adjustments in course content and time that might be needed to develop a particular benchmark characteristic.

Each of the certificate teams (i.e., elementary, middle, and high school levels; physical education; gifted and special education; English as a second language), then identified evidence that would address each of the benchmarks. Some of the evidence examples included case studies of students, teacher work samples, instructional

units, lesson plans, observations of classrooms, student or class records of progress, action research, photos of students following expectations, management plans, and written reflections.

To share different types of evidence obtained from this information with faculty, a web-based portfolio (e-folio) was created. Candidates were able to upload different types of evidence for each benchmark and describe in a narrative format how the evidence showed that they were competent or had become proficient on a particular benchmark characteristic. Faculty, in turn, would rate the performance level of the candidates' evidence and provide written feedback so that the candidate would have an opportunity to improve their classroom performance. To achieve inter-rater reliability, all faculty were provided professional development on the critical aspects of each benchmark, on the types of evidence candidates might provide to demonstrate proficiency, and on what to look for in their evaluations (see Table 2 for an example professional development for the Assessment Benchmarks).

The e-folio was also used for the university's national accreditation to show how the teacher education program assessed its candidates and used the information for not only improving candidate performance but also the overall program.

Creation of Gates for Admission, Retention, and Program Completion

The Baylor Teacher Education Program identified five gates (i.e., admission, novice level, teaching associate level, intern level, induction level) to identify quality candidates and to monitor criteria for admission, retention, and program completion. Applicants who meet the entrance requirements to Baylor are able to select one or more certificate programs at the novice level (e.g., gifted education and elementary education; special education, elementary, and ESL) and complete any applications needed for a specific certificate. If the candidates meet an overall grade point average (GPA) of 2.75 on a 4.0 scale, successfully complete the courses required for the certificate(s) and provide evidence that indicates competency on nine benchmarks, they are able to progress to the Teaching Associate (TA) level (i.e., junior level or third year in the program). At the end of the Teaching Associate level, the candidates are able to enter a full year of classroom teaching (i.e., their intern year) if they have a 2.75 GPA, successfully complete the TA courses, post evidence that indicates competency on all of the benchmarks (i.e., greater than 4 on a 10-point scale), and score eighty percent or better on the state content and pedagogy diagnostic tests (i.e., TExES PPR and content tests). The final gate or the induction level is achieved if the candidates meet GPA requirements, have completed all courses required by the certificate(s), passed all state certificate tests, and have provided sufficient evidence to indicate competency on all of the benchmarks. Collaboration is apparent in this final review, which includes faculty and staff from the Office of Professional Practice, Office of Advising, Associate Dean, faculty from the professional development schools, and faculty from the University who review each candidate's e-folio, state assessments, and degree plans. In addition to these school-wide Teacher Education Program Gates, certificates also have additional requirements that relate to program

Table 2. Professional Development for the Assessment Benchmarks

Critical Aspects of the Benchmark	What Do Candidates Do to Demonstrate a Benchmark?	What Do Faculty Do to Evaluate a Benchmark?
Eight – Varied assessments that relate to student characteristics – Selection of an assessment that matches knowledge and student characteristics – Organization or creation of an assessment that matches knowledge and student characteristics	Show the variety of assessments used and how they relate to students. Show assessments that you have designed that relate to student characteristics.	Look at assessments to see if they match student characteristics and presumed knowledge level. Look for assessments you have created or organized.
Nine – Multiple assessment methods identify – Student involvement in self-assessment – Continuous assessment – Referral to special programs with specific information	Show the progress records that are used throughout the semester. Show the assessments that specify performance for each student and show the progress of all students. Show the data used for referral to special programs.	Examine assessment to make sure they indicate that each student is able to show progress. Look for progress records that show continuous assessment and are shared with students.
Ten – Assessment given to professional, students, and parents – Communicated frequently – Information is specific	The narrative shows how information is shared on an ongoing basis.	Look for information shared across all three groups. Determine how specific and how frequent it is.

outcomes and national recognitions. These vary but may include the Texas Beginning Educator Support System (TxBESS) observation, curriculum units, lesson plans, case studies, reflections, student progress records, teacher work samples, surveys, student engagement data, and other observation forms.

Redesign of Courses

Three types of courses were redesigned or newly designed for the clinically-based teacher education program: courses for all candidates, courses related to pedagogy, and courses specific to a particular certificate. Along with the required university courses, the initial set of courses in the teacher education program focused on technology and the teaching process, which was learned by tutoring students. The faculty decided that all students would take these initial courses.

In terms of designing other sets of courses, faculty, either together or in certificate teams, adhered to these criteria:

1. The content should be learner centered. The student in the K–12 classroom needs to be the focus in determining the effectiveness of the curriculum and the instructional methods.
2. Learning should take place in the school setting (i.e., task-embedded learning).
3. Learning is developmental. The candidate moves from simple to complex situations with increasing group size, greater group diversity, expanding professional responsibilities, greater choices of methods, and more variations in content field or domain.
4. The curriculum is based on national and state standards.
5. The curriculum is interdisciplinary and connected through major concepts, generalizations, principles, and theories.
6. Content is evidence-driven. Assessments of candidates and students are used in adapting courses and curriculum.
7. Instruction is informed by empirical evidence and student performance.

In redesigning or designing courses related to these criteria, faculty members followed a six-step process.

Step 1

During the first step, faculty examined state and national standards and related empirical research to identify important knowledge and skills that needed to be addressed. For example, one of the standards on the TxBESS observation instrument examined this competency: "Assessment is aligned with the lesson, and the candidate uses the data to plan instruction and to help students monitor their own learning" (TxBESS Standard 3d). This same competency was also tested on the state certificate test: "The teacher can best ensure accurate assessment of the students' learning by permitting the students to determine on their own when they are ready to be assessed in particular areas of instructional content" (TExES, Competency 002). Related research indicated that assessment was an important part of the instructional process and that students needed to be involved in receiving feedback regarding their performance (Brown, 1994; Kluger & DeNisi, 1996; NRC, 2001; Sadler, 1989). The standards and related research validated the need for this knowledge and related skills to be included in course content.

Step 2

During the next step, faculty identified benchmarks that were related to the research and standards and elaborated the characteristics for their particular certificate. For example, to address the previous standards in Step 1 and show how students monitored their own progress, faculty identified Benchmark 10 ("Communicates assessment information to students, parents, and other professionals") and Benchmark 5 ("Keeps progress records to match and adapt the curriculum to the characteristics of each student") as highly relevant to this set of standards. For the intern year, they noted that the candidate and the students needed to keep progress records. The records needed to show the declarative and procedural knowledge that is being learned and could be

used to form flexible instructional groups. The progress information would be shared with students, parents, and in meetings related to special education placements.

Step 3

In the next step, faculty identified the evidence that would be needed so that candidates and the students in their classrooms could demonstrate their competence related to the standards and the benchmarks. In the above example, kinds of evidence to show monitoring of student progress included candidate progress records with identified instructional groups, student progress records, reflections, interviews with students and parents, video clips of conferences, individual plans from conferences, and performance rubrics. Beyond the candidate, other sources of information might include evidence from student, peers of students, mentors, and specialists in the school, such as special education teachers, university faculty, and parents.

Step 4

Next, content and assessments were aligned to the specific knowledge and skills identified in the previous steps. University and school-based faculty described specific characteristics so that assessment rubrics could be designed, and foundational knowledge and skills could be provided in the course and practiced in related field experiences. Using the previous example standards, faculty needed to teach candidates how to:

1. develop rubrics (descriptive, clear criteria, assesses well-structured declarative, and/or procedural knowledge);
2. keep progress records (clear criteria; individual student progress demonstrated across time, tasks, and situations; criteria relate to organization of knowledge [i. e., declarative and procedural] that matches students' aptitude and achievement);
3. form flexible groups (use of class progress records to form groups around students' strengths and weaknesses);
4. provide information in special education meetings (relate progress records to students' strengths and needs);
5. provide feedback to students and parents (use detailed comments [i.e., criterion based with clear criteria] about students' strengths and weaknesses and strategies for learning); and
6. listen to Student Self-Assessments (understanding quality work; connections made within and between subject areas).

Step 5

In this step, the specific knowledge and skills were placed in courses within a developmental sequence. In the previous example, faculty inserted the knowledge and skills related to student monitoring throughout all of the courses beginning with the candidates' monitoring one student's progress during the novice years, students

placed in small groups during the teaching associate year, and all of the students in a classroom during the intern year.

Step 6

The final step, involved observing candidate performance and making adjustments to the course content and sequence to address any weaknesses. This step was ongoing and involved certificate team members and school-based faculty.

Courses for the new clinical program were phased in by year, beginning in 2001 with the introductory courses in teaching offered the first year and the introductory courses to different certificates offered the following year. By 2003, the TA courses were implemented and in 2004, the intern courses were implemented. The first candidates graduated from the new program in 2004.

Design and Expansion of Professional Development School

Upon completing the redesigning of the teacher education program, organization of the PDS governance structure and selection of new PDS sites were the next steps.

Development of Governance Plan

Expanding from one PDS to ten or more PDSs involved the creation of a more complex governance structure to ensure decision-making and accountability (NCATE, 2010). Two governing bodies, the Oversight Council and the Coordinating Council, were established for the purposes of establishing expectations, setting goals, planning professional development, and assessing program effectiveness.

The PDS Oversight Council is responsible for providing broad policy, operational leadership, and budgetary decisions for the partnership. It is composed of representatives from both the university (the Dean of the School of Education, the Associate Dean of the School of Education, the Chair of the Department of Curriculum and Instruction, and the Director of Professional Practice/University Partnership Liaison) and from the partner school district (Superintendent, Associate Superintendents, Program Directors, and the School District Liaison).

The Coordinating Council, jointly managed by Baylor University faculty and PDS school faculty, is responsible for practical planning and implementation of partnership goals and initiatives. This Council meets a minimum of four times each year. Coordinating Council members include the Site Coordinator and University Liaison from each PDS as well as a PDS principal representative. The group is co-chaired by the partnership liaisons from the university and the school district. University Liaisons share recommendations from the Coordinating Council with campus leadership teams in an effort to communicate partnership issues in a timely and effective manner. Partnership liaisons serve as the conduit for sharing information and recommendations with the Oversight Council.

At each PDS campus, PDS Steering Councils are formed. These committees consist of the Site Coordinator, University Liaison, the campus principal or his/her designee, two classroom teachers, one school specialist (i.e., special education teacher, music teacher, counselor), and one other university faculty member. The Steering Councils meet once a month to focus, plan, and oversee PDS work on the campuses and are responsible for evaluating progress in reference to the NCATE PDS standards and partnership goals. At least one teacher who is a member of the Steering Council serves on the Site-based Decisions Making Committee (CDMC) for each campus, representing the partnership interests.

Selection of Expansion of PDS Sites

A PDS Task Force was formed. It was composed of two faculty members selected by the teacher education faculty and of two teachers from the existing PDS selected by the Coordinating Council. Its specific functions were to screen and evaluate applications, conduct site visits of applicants, and make recommendations to the PDS Coordinating Council and the School of Education for campuses to be accepted and named as developing PDSs.

It was determined that two high schools, two middle schools, and five elementary schools would be added to the partnership during the expansion phase if campuses with the desired characteristic could be identified. The recommendation, application, and selection process for determining which campuses would become new PDS sites was decided based on the belief that a PDS partnership is built "on a foundation of shared interest, mutual commitment, and trust" (NCATE, 2001, p. 4). Baylor faculty members initiated campus recommendations by writing letters of support that included the rationale for why a particular nominated campus should be considered. Accompanying the nomination letter, the following was required:

1. A letter of intent from the principal;
2. A statement of need;
3. Student demographic data;
4. Student achievement results;
5. Major campus initiatives; and
6. A copy of the school's most current Campus Improvement Plan.

A timeline for submitting the required documents was established and the PDS Task Force members reviewed the submitted information, making recommendations regarding whether nominated campuses would be approved or provide a rationale for disapproval. The Coordinating Council then reviewed recommendations of the PDS Task Force and made final decisions about which campuses would be invited to apply to become a PDS. Invited schools were encouraged to visit Hillcrest PDS, the established PDS, to observe the campus and visit with staff as well as meet with the Partnership Liaison regarding the formal application process. The invited schools were provided with instructions for submitting applications that included:

1. a statement of goals connected to professional development school involvement;
2. a long-range plan indicating how the applicant would address the Guidelines for Establishing PDS Partnerships including the strengths and weaknesses of the proposed PDS in relation to the Guidelines;
3. evidence of the commitment of the principal, faculty, staff, and CDMC to the proposed partnership, including a commitment to pre-service teacher education, professional development, and shared decision making; and
4. evidence of District support for the school becoming a professional development school.

The following guidelines, based on the NCATE *Standards for Professional Development Schools* (2001), were developed to provide criteria for determining what constitutes a PDS and to provide a guide and support for the PDS partnerships as they developed. Therefore, the following standards were used to create questions that were intended to (a) aid schools in deciding whether to apply to become a PDS, and (b) assist partnerships in planning and organizing their PDS work:

1. The learning community
   - How will the partnership use current research and practitioner knowledge to develop mutual goals and a shared vision?
   - How will the needs of children form the basis of a comprehensive plan to support the learning of all children and adults? How will this plan result in changes related to learning and professional development?
   - How will systematic inquiry inform efforts to improve the learning of students, candidates, faculty, administrators, and other professionals?
   - How do the partners plan to include various parents, business, and other community members in PDS work?
2. Accountability and quality assurance
   - How will the PDS assess the performance of all P–12 students, candidates, faculty, administrators, and other professionals to determine learning needs and progress toward goals?
   - What district, state, and national standards will you use as the bases for assessments?
   - How will assessment information be used to examine current practices and determine needed changes?
   - How will the PDS involve families and community members in sharing responsibility for the learning of P–12 students, candidates, faculty, administrators, and other professionals?
   - How will the PDS communicate assessment results and progress toward goals to all stakeholders?
3. Collaboration
   - How will the partnership demonstrate that PDS work among individuals and the organization is planned, implemented, and evaluated jointly?
   - In what ways will the partnership include families, community, and business members as full participants in PDS work?

- What are the roles and responsibilities of the individuals and organizations involved in the PDS?
- How will the partners work toward parity regarding norms, roles, structures, and resources?
- How will the partnership recognize, celebrate, and reward contributions of partner members?

4. Diversity and equity
   - How will the partnership analyze data to address achievement gaps among racial groups? What initiatives are in place to address these gaps?
   - How will the partnership draw on the histories, diverse cultural backgrounds, and experiences of all people?
   - How will the partnership identify the aspirations of students and families?
   - How will the PDS support students with exceptionalities and those from diverse groups?
   - How will the partnership evaluate the curricula, instructional approaches, and assessment strategies implemented for students with diverse needs?
   - How will the partnership engage families and community members in support of equitable student learning?
   - How will the partnership work to recruit diverse candidates, faculty, and other professionals for PDS work.
   - How will PDS partners work with other partners to provide opportunities for candidates, faculty, and other professionals to develop and demonstrate their capacity to work well with diverse learners and their families.
5. Structures, resources, and roles
   - How will the PDS demonstrate that a "critical mass" of participants within and across the institutions (including leadership) is active in the partnership?
   - How will members of the site-based PDS Steering Council be selected and how often will the Council meet?
   - How will the Steering Council monitor the partnership's commitment to its mission and progress toward the partnership's goals?
   - How will the partnership create and define new roles, especially those roles that cross-institutional boundaries?
   - How will individuals be selected for PDS roles such as site-based coordinator, clinical instructors, and mentor teachers?
   - What support structures and processes are available for participants in the PDS to pursue professional and career development?

Members of the PDS Task Force visited the schools that submitted formal application and reviewed the campus data with campus faculty, staff, and administrators. Following a thorough review of findings during campus visits and submitted data, the PDS Task Force made a recommendation to the Baylor Teacher Education Faculty and the PDS Coordinating Council. Each school that applied was either accepted as a developing PDS or given specific feedback as to what was necessary before proceeding if there was desire to become a developing PDS in the

future. In 2003, nine additional campuses were added to the PDS Partnership (two high schools, two middle schools, and five elementary schools).

PDS Personnel Roles and Responsibilities

With the major expansion of the partnership, the need for clearly defined roles and responsibilities became evident. The following descriptions of roles and responsibilities were used to guide partnership personnel in determining duties and to organize the campus to provide quality field experiences for teacher education candidates assigned to the PDS sites:

A site-based coordinator is the school-based representative with primary responsibility for the teacher education candidates in the PDS. Performs such functions as facilitating placements of candidates, supporting candidates and mentor teachers, supervising candidates and co-teaching courses in collaboration with university-based faculty. Responsibilities include observing and conferencing with candidates.

A university liaison is the university-based representative who has primary responsibility for facilitating communication between the university and the school. The university liaison works with the site-based coordinator to facilitate placement and supervision of candidates, teaches site-based courses, participates in professional development initiatives on site, and is a member of the Campus Based Decision-Making Council (CDMC). Responsibilities include observing and conferencing with candidates.

A mentor teacher is the school-based teacher in a PDS who is the supervising teacher for an intern. The mentor teacher models classroom practices that support the benchmark expectations for interns. Responsibilities include co-planning, co-teaching, and observing/conferencing with the intern.

A resident faculty member is a university-based representative who teaches field-based courses and supervises candidates as they instruct students at the PDS. A resident faculty member works together with the mentor teacher and the site-based coordinator on deciding the interns readiness for increased responsibilities and on the intern's evaluations and final grades.

A clinical instructor is a school-based teacher who works in conjunction with a resident faculty member to implement field-based instruction by modeling classroom practices that support benchmark expectations for teacher education candidates. Responsibilities include observing and coaching candidates. Teaching associates co-teach with clinical instructors in PDSs.

A school partnership coordinator is a university-based representative who supports the work of all PDSs in the partnership and fosters the development of new PDS partnerships.

The Financial Model

PDS partners must use their resources differently in order to achieve their goals – blending, reallocating, restructuring, and integrating their funds, time, personnel, and knowledge. Prior to expanding the partnership, a financial model was agreed upon between Baylor University and Waco ISD. The model would focus on cost sharing and was chosen for two reasons: (a) both partners would have ownership in the initiative, and (b) both partners agreed that they would benefit from establishing the additional PDS sites.

Based on the new financial model, the following expenses would be split equally: (a) the salary of the site-based coordinator at each PDS site, (b) stipends to be paid to mentor teachers and clinical instructors for their work with the teacher education candidates, (c) costs for professional development of both school faculty and Baylor teacher education candidates, and (d) materials and supplies that would increase as a result of the teacher education candidates on the campuses.

Teacher Education Candidates in the PDSs

Generally, from sixteen to eighteen teaching associates (junior level teacher education candidates) and from six to eight interns (senior level teacher education candidates) are placed at each PDS. The Campus Steering Council determines the number of teaching associates assigned to a clinical instructor (1–4). Interns (seniors) are not placed together in a classroom; however, some PDSs choose to place one intern and two or three teaching associates in the same classroom with an experienced classroom teacher. Other PDSs choose to place either interns or teaching associates in a classroom. As a result, the capacity for candidate placements at each PDS varies.

Since the expansion of the PDS Partnership between Baylor University Waco ISD in 2003, adjustments have been made to accommodate campus capacity, school district rezoning and restructuring, and teacher education candidate numbers. In 2011, Waco Independent School District built new schools and combined several of its campuses resulting in a change in the number of PDS sites in the district. After the restructuring of the district, one high school, one middle school, and four elementary PDSs remained. Since that time, three PDS sites have been added from another neighboring school district, Midway Independent School District (one high school, one middle school, and one elementary PDS). The partnership currently consists of two high schools, two middle schools, and five elementary schools.

CHALLENGES AND LOOKING FORWARD

With the redesign process completed, this former traditional educator preparation program became more field based and learner driven. In response to a competitive standards-driven accountability context, the School of Education at Baylor University developed an overall conceptual framework, designed assessments

to measure candidates' performance on benchmarks, redesigned courses within a new administrative infrastructure, and partnered with schools in developing quality placements where candidates might develop expertise and reflect on the effectiveness of their teaching practices. This educator preparation program adhered to NCATE's (2010) ten design principles for clinically-based programs: it focused on P–12 student learning, integrated clinical experiences throughout the entire program, based decisions on data, integrated content and pedagogy, provided feedback and guidance to teacher candidates throughout the program, included clinical faculty and mentors who were strong practitioners, staffed sites for clinical purposes, infused technology throughout the program, partnered with participating schools, and conducted research to support ongoing program development.

Movement to a clinical model of teacher preparation provided answers to some of the external pressures on teacher education, but also created a new set of challenges. Faculty had to partner with other faculty across departments, share candidates and courses, and step into new roles that were unfamiliar. Some faculty were resistant to being in the field and needed to receive professional development. Eventually a new teacher educator role was created: the clinical professor (Whitford & Villaume, 2014). Clinical professors were able to provide school-based instruction at the new intersection between content and pedagogy and represented a link between the schools and the universities. They improved collaboration with schools and enhanced curricula that included a mixture of practice, content, theory, and pedagogy. Additionally, they created a research-base for the effectiveness of clinical teacher preparation (Cornbleth & Ellsworth, 1994; NCATE, 2010). The School of Education Dean also had to convince the university about a new financial model that was much more labor-intensive, requiring more monitoring of fewer numbers of candidates in school settings, and less lucrative in terms of numbers of candidates in university courses. The university also had to be persuaded to view clinical research as valuable as basic research and reward faculty who were engaged in such endeavors. These new ways of thinking took time and continue to be revisited.

As a testament to the faculty, administrators, and school partners who have spent fifteen years in developing, improving, and refining this clinically-based program, it is thriving to this day. Baylor University interns have positive effects on students (ibid.) and on their colleagues when they begin teaching (Farah, 2015). As one of the early PDS teachers remarked, "Because she is an intern and not your typical student teacher, she is getting lots more experience planning lessons, implementing lessons, bailing herself out when the lessons don't go as planned. Nothing could be better. ... I wish I had gone through a program like this" (Conaway & Saxon, 2001, p. 9).

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2. THE SEVEN PRINCIPLES OF LEARNER-CENTERED PROFESSIONAL EDUCATION PROGRAMS

Teacher Education for Students with Exceptionalities in Texas, U.S.A.

INTRODUCTION

In 2002, the National Council for the Accreditation of Teacher Education (NCATE) identified six standards for accrediting teacher education programs, which then prompted many programs to restructure and incorporate the new standards (NCATE, 2002). These standards included: candidate knowledge, skills, and dispositions; assessment system and unit evaluation; field experiences and clinical practice; diversity; faculty qualifications, performance, and development; and unit governance and resources. Increases in accountability and competition from alternative certification programs led many university teacher education programs to restructure from a traditional model to a field-based clinical model. Baylor University used this opportunity to shift to a collaborative teacher education program where the local schools shared responsibility for candidate preparation and provided a field placement for students as early as the first year in the program. In exchange, Baylor provided faculty expertise and teacher candidates who were instructed in the seven principles of the Learner-Centered Professional Education Program.

Outline of the Chapter

This chapter will explore the cognitive and teacher education research supporting each of the seven principles of the conceptual framework and provide examples of each principle from the special education and gifted education programs. By connecting the principles included in the conceptual framework to teaching practices in two programs for training teachers in exceptionalities, field-work and assignments become a natural extension of practices at the university. This chapter will begin by explaining the seven principles of the Learner-Centered Professional

E. Kimonen & R. Nevalainen (Eds.), Reforming Teaching and Teacher Education: Bright Prospects for Active Schools, 35–63.

Education Program and the organization of the programs for teaching children with exceptionalities. The remainder of the chapter will address the research basis for the seven principles and specific practices within the teacher education programs for gifted and special education. It includes details such as:

- Practices which integrate university and field-based instruction in teacher education programs.
- Teacher education practices that encourage the use of assistive technology for instruction and educational support.
- Methods of using constructivist and direct instruction designs to support student learning.
- Integrating assessment with instruction and learning in classrooms with diverse populations.
- Instructional techniques that allow for developmental differences among candidates in the teacher education program while maintaining a high quality of instruction for students served through field-based placements.

Historical Background

Baylor University is a private, Christian research university located in Waco, Texas with a School of Education that serves approximately 450 undergraduate teacher education students (i.e., candidates) through the departments of Curriculum and Instruction (C&I) and Educational Psychology (EDP) (SOE, 2015). The C&I Department primarily serves candidates who are interested in teaching general education students and EDP serves candidates who would like to teach exceptional students (e.g., those with disabilities and those with gifts and talents). The two departments share resources and personnel, but each maintains unique features that are most beneficial to the population of students served.

When Baylor's teacher education program transitioned from a traditional, university-based program to a field-based one, both departments worked together to establish the conceptual framework of the Learner-Centered Professional Education Programs. Seven principles of learner-centered instruction guided the design of the conceptual framework:

- Classrooms and schools must be learner centered, thus creating a positive environment for learning.
- Formative assessment provides information about the student and assists in designing and adapting instruction.
- A deep foundation of factual knowledge must be organized conceptually to facilitate its retrieval, application, and transfer.
- Strategies are important in learning to solve problems and in becoming an independent, effective teacher.
- Learning is developmental and influenced by the context in which it takes place.
- Collaboration is important in creating a diverse learning community.
- Reflection deepens the understanding of effective instructional practices.

Although this was a shared initiative designed to make all programs field based, the special education and gifted programs had been field based since 1993 with the establishment of the first Professional Development School (PDS) in the Waco Independent School District (WISD). The PDS was fully staffed with a university liaison from Baylor and a site-based coordinator from WISD, both of which served to support faculty and Baylor students at the school campus. The special education and gifted education programs hosted courses at the PDS every semester and served Baylor students from all levels of both programs. When the general education teacher education program moved to a clinical, field-based model in 2001, the programs in exceptionality used this transition to strengthen the existing field-based model and create additional opportunities for teacher education students to train in new and diverse settings. The new program is discussed in the following section.

THE ORGANIZATION OF THE TEACHER EDUCATION PROGRAMS FOR EXCEPTIONALITIES

The teacher education programs for candidates interested in teaching children with exceptionalities requires four years of training at the university and in the local schools. The placements in the schools range from tutoring a single student to teaching whole-class lessons in diverse classrooms. Candidates are required to provide instruction to students from a wide range of ages, abilities, and cultural backgrounds. Students move through a progression during their four years of training. The progression includes novice as a freshman and sophomore, teaching associate as a junior, and intern as a senior (see Figure 1, p. 12). As novices, candidates are expected to be developing in the four categories constituting the eighteen benchmarks created from the seven principles of learner-centered instruction and focusing on measurable behaviors that should be mastered by all new teachers. By the intern year, candidates are expected to be proficient in all benchmarks and have portfolio evidence of their growth and development.

First-Year Teacher Education Programming

Candidates interested in teaching students with gifts and talents or students with special educational needs begin training as freshman with the Introduction to Teaching, a course in pedagogy which includes an experience tutoring a student in a local school. The pedagogy course includes content on instructional strategies for tutorial instruction and student self-regulation in such settings. The content taught in the university course is practiced in a local school with a single student in elementary or middle school. A university faculty member supervises the teaching tutorial practicum and provides feedback on performance to the candidate. At this point candidates are considered novices because they are developing skills in building a

positive learning environment, using assessment for instruction, planning curriculum and instructional strategies, and using communication to enhance professional development.

Candidates also enroll in one or two technology in education courses during the freshman year. The first technology course is designed to teach education students about the electronic portfolio system that will be used to document learning and development over the next four years. In addition, the course teaches knowledge and skills needed to apply basic technology to teaching, such as the creation of video clips or multimedia presentations. The second technology course includes modules on assistive technology and advanced technology skills.

Second-Year Teacher Education Programming

During the sophomore year of teacher training, the programs for candidates interested in teaching students with exceptionalities began to diverge from the elementary teacher education program in order to provide more in-depth training with the population of interest. Candidates who would like to earn credentials to teach in special education focus on literacy and assessment in the sophomore year. During the first semester of the sophomore year, candidates complete a course on advance elementary literacy. The course includes instruction in literacy for students in middle to late elementary school who are struggling with any of the fundamentals of reading: phonics, phonemic awareness, comprehension, vocabulary, or fluency. Content includes typical and atypical reading development for the middle to late elementary student and candidates practice with a field placement teaching content-based literacy to one student at-risk for reading difficulties.

During the second semester of the sophomore year, candidates interested in special education enroll in a course on assessment and a second literacy course. The assessment course, Assessment of Students with Mild Disabilities, introduces formal and informal assessment and requires candidates to practice a variety of assessments with students in local schools. Information from the assessments is compiled into a case study on a learner who is at-risk for developing a disability in reading or written expression. In addition to the assessment course, candidates learn about primary and advanced literacy in the literacy course. The practicum for this course requires candidates to use assessment to design an instructional sequence and teach literacy to two struggling learners.

For candidates interested in teaching students with gifts and talents, the sophomore year includes a course in the Introduction to the Gifted Child. This course is designed to develop the teacher as a researcher, which was a specific need advocated for by local area certified gifted and talented teachers. Candidates learn the research process by teaching it to an individual student and then work with the student to complete an independent study. The candidates teach their individual student using pre-made lesson plans written by the program director and conduct their own research following their individual student's progress. By teaching research, candidates strengthen their

own understanding of the process and by conducting action research, they become producers of knowledge in the field.

Third-Year Teacher Education Programming

During the junior year, candidates are considered teaching associates because the skills in building a positive learning environment, using assessment for instruction, planning curriculum and instructional strategies, and using communication to enhance professional development, have progressed from developing to competent. At this point, candidates are required to teach small groups of students rather than conduct one-on-one or one-on-two tutorial sessions. This requires advanced skills in assessment, curriculum planning, instructional design, and instructional delivery. In addition, fostering student self-regulation requires more enhanced skills.

For candidates in the special education program, the junior year includes small group instruction in mathematics and inclusion teaching in science or social studies with middle school students as well as a placement in a high school life skills classroom. The placement in mathematics requires candidates to assess and plan a nine week intervention for middle school students with and without disabilities. The groups are formed based on the current level of performance of the students, which means each group may or may not have students with limited English proficiency, students with disabilities, students with dyslexia, or students who are struggling learners. In addition, candidates co-teach in a social studies or science inclusion classroom during the nine-week intervention. This experience requires candidates to modify instruction and assessments to meet the individualized educational plan for students with disabilities.

In the second semester of the junior year, candidates studying special education teach life skills at a local high school. Candidates use assistive technology, such as augmentive and alternative communication devices, and plan instruction in skills related to the students' individualized education plans. Since the students in this setting have more severe disabilities than the students taught in the first semester, candidates must learn and perfect different models of instructional delivery, such as least to most intrusive prompting and time delay.

For candidates who would like to teach students with gifts and talents, both semesters of the junior year contain a practicum in which the candidate spends approximately one hundred hours in a local PDS. These candidates teach both small and large groups of students and students with a range of abilities from highly gifted to average performing. During these group sessions, candidates work on differentiating instruction in the various domains, such as content, process, and product. The first semester of the junior year focuses on teaching literacy, social studies, and language arts with required methods classes in these areas. The second semester includes methods courses in mathematics and science. Combining the method courses with concrete practice in a clinical setting allows candidates to develop differentiation practices for all content areas and most levels of ability.

Fourth-Year Teacher Education Programming

The fourth year of the teacher education program in exceptionalities allows candidates to transition from a student to a teacher. Candidates complete two, fifteen-week internships designed to encourage transfer of learning from university courses into the public school classroom. Candidates are encouraged to request a grade-level or setting for this placement. The intern year is a continuation of the developmental progression demonstrated in the conceptual framework for this program. Candidates are expected to begin the experience as observers and gradually assume more responsibility for the classroom. The transition is encouraged by the use of seven co-teaching models that have defined roles for the mentor teacher and the candidate. These models include: one teach, one observe; one teach, one assist; parallel teaching; supplemental teaching; alternative teaching; station teaching; and team teaching. Each model encourages the candidate to assume a different role and by experiencing all models, the candidate will be well positioned to complete a week of whole-class teaching alone.

For candidates in the gifted and talented education certification cohort, the fall of the senior year includes a course on differentiation. This course teaches strategies for different content areas and the candidates create an interdisciplinary unit to illustrate what they have learned. The course also requires the completion of a functional behavior assessment of a student with challenges that may affect classroom management. During the spring semester candidates enroll in a course that describes the history, laws, policies, and models of gifted education. It also expounds upon differences for students that are twice-exceptional, meaning the individual is both gifted and expresses a disability, and those with disabilities. This course also includes instruction on collaboration between students, colleagues, and parents and as a product outcome, candidates must write a case study of a twice-exceptional learner as well as complete a program evaluation.

The senior year also includes two internships in the local schools: one teaching experience in a general education classroom and one for gifted and talented cluster or pullout groups. Parallel to the candidates in the special education strand, the candidates begin in the classroom as observers but transition to full time teaching by the end of the semester. The candidates continue to improve their practice by gaining responsibility and eliciting feedback from the classroom teacher and their internship facilitator.

Benchmark Standards for the Teacher Education Program

During the internship university faculty observes all candidates and mentor teachers. They provide feedback on performance, thus ensuring that all candidates have mastered a basic set of skills and behaviors. All candidates complete an e-folio, or electronic portfolio, documenting their performance on eighteen indicators of good

teaching known as benchmarks. The benchmarks are based on the seven principles of learner-centered education, which form the foundation of the teacher education program. The benchmarks are organized into four strands with a total of eighteen measurable outcomes that are graded as developing, competent, or proficient based on narrative and other evidence presented by the candidate. Benchmarks are completed each year of the teacher education program, but candidates only complete a full set of all eighteen benchmarks in the junior and senior years. Prior to this, all benchmark production is assumed formative and feedback is given to encourage further development. The results are used to conference with candidates and create personal growth plans designed to strengthen any weaknesses in skills or behaviors. The organization is as follows:

Strand 1 – Creating a positive learning environment

1. establishes expectations;
2. arranges space for safe and effective learning;
3. establishes small and large-group procedures, routines, and manages transitions;
4. prepares and manages materials and technology for effective learning;
5. keeps progress records in order to match and adapt curriculum to students;
6. uses reinforcement and correction to increase learning and show respect; and
7. paces lessons and activities to engage students.

Strand 2 – Assessment

8. matches assessment methods to knowledge, the curriculum, and student characteristics;
9. uses formative assessment to provide information regarding student achievement levels; and
10. communicates assessment information to students, parents, and other professionals.

Strand 3 – Curriculum planning

11. focuses students' attention on information;
12. organizes knowledge when planning instruction;
13. presents information for instruction that is related to assessment;
14. guides students' application of knowledge; and
15. provides opportunities for students to use information independently.

Strand 4 – Professional development and communication

16. participates in professional development;
17. is proficient in communication with students, parents, and other professionals; and
18. collaborates with parents and other caregivers.

In addition, each benchmark is designed to follow the developmental progression from novice to teaching associate to intern. As candidates develop, their presentations of evidence and narratives for each benchmark are graded by a more rigorous standard. All candidates are expected to be proficient in all eighteen benchmarks by the second semester of the intern year. Documentation used to complete the e-folio

of eighteen benchmarks may come from a variety of sources. It typically consists of feedback from mentor teachers and university faculty during observations, lesson plans graded by the university faculty, reflections completed by interns and graded by the university faculty, and student products resulting from intern teaching.

THE SEVEN PRINCIPLES OF LEARNER-CENTERED INSTRUCTION

Baylor University's teacher education program is designed to incrementally develop candidates' knowledge and skills using a framework that places the learner at the center of all experiences. The seven principles of learner-centered instruction are the foundation for the development of candidate knowledge and skills in all teacher education programs at Baylor. The remainder of the chapter will discuss relevant research from multiple fields and give examples of how each principle is manifested in Baylor's teacher education program for gifted, talented, and special education.

Principle 1: Classrooms and Schools Must Be Learner Centered Creating a Positive Environment for Learning.

Research Evidence and Theoretical Support

The pre-kindergarten-to-twelfth-grade learner is at the center of the conceptual framework for Baylor's teacher education program (Turner, 2011). As Henson (2003) stated, "learner-centered education involves the learner and the learning in the programs, policies, and teaching that support effective learning for all students" (p. 5). There are five principles for learner-centered education:

- Learning should be based on the experiences of the student.
- Experiences should be chosen based on each individual student's personality, interests, and understandings.
- Teachers should encourage and build the student's curiosity.
- Emotional learning helps solidify the input of knowledge.
- The learning environment should promote positive feelings, such as joy or risk-taking, rather than negative feelings of shame or fear.

Learner-centered education originated with philosophers such as Confucius and Socrates, who stressed the importance of the individual (ibid.). This would change dramatically with John Locke's idea of the blank slate, *tabula rasa*, the theory that people's experiences shape who they are rather than anything inherent or genetic (Buchmann & Schwille, 1983). In the late 1800's, John Dewey, an avid proponent of educational change, advocated that education is life and that the school should be the place to build upon both students' psychological and social states (Henson, 2003). In order to do this, Dewey claimed that education needed to be problem based to make

it applicable and emotionally rich, a concept now called "confluent" or "collateral" learning (ibid.).

Major psychologists have also advocated for the use of learner-centered education. In the 1960s, Arthur Combs suggested that to have healthy adults, schools should ensure their students are psychologically healthy with positive self-concepts by way of a learner-centered education (Combs, 1981). Russian psychologist Lev Vygotsky's theory of constructivism aligned with this view. It discussed the use of active social and cooperative learning to promote problem solving (Jaramillo, 1996). Content becomes meaningful because of students' interactions and through these interactions, students construct solutions with others. Jean Piaget's (1986–1980) stages of cognitive development demonstrated the need to meet students where they are developmentally in order to help them find mastery of individual skills (Berk, 2014). Seeing students as individuals makes learning accessible and memorable.

Several practices of learner-centered instruction have an evidence base for supporting engagement of the disengaged learner and can be found in Baylor University's teacher education program. The first learner-centered instruction strategy is acknowledging and using students' prior experiences and learning when designing instruction. This strategy allows students to use existing frameworks to understand new knowledge (Donovan, Bransford, & Pellegrino, 1999). Another strategy is increasing the authenticity of learning experiences by linking practices to real-life experiences and honoring students' cultural practices. This strategy ensures all learners feel safe in the environment and enhance motivation for disengaged learners (Bransford, Vye, & Bateman, 2002; Protheroe, 2007). The last strategy utilized by the program is for teachers to assist learners in organizing new information when they offer prescriptive, diagnostic teaching (Leko, Brownell, Sindelar, & Murphy, 2012). This strategy is used to narrow gaps in knowledge and teaches methods of knowledge organization, such as concept maps and other visual aids (Bridglall, 2001; Protheroe, 2007).

Current Practice in Baylor's Special Education Program

During the third-year experience in special education, candidates teach mathematics to a small group of three to five students who may have any of the following labels: emotionally disturbed, dyslexia, limited English proficiency, learning disabled, or at-risk for subsequent failure. By this point in the special education program, candidates have completed courses in exceptionalities and child development. These provide the candidates with a broad range of theories on learning and development, but the school experiences prior to the junior year have typically focused on developing students who may struggle in a specific content area.

When candidates enter the special education program, the common belief is that a label determines the needs of student but during this experience, candidates are taught to view students as individuals. Assessment allows candidates to see the individual strengths and needs of the students in the groups and this data is used to

create group lessons that address the individual and the group simultaneously. The students selected to be taught by the candidates are students who are not making progress in the regular education mathematics classroom and have failed to achieve a satisfactory grade on the past standardized tests. The students in question have been participated in remedial programs in the school, but they often require higher levels of support, such as may be provided by diagnostic teaching.

Candidates design an instructional strategy to match the knowledge and skills of each student in the intervention. Small groups of four to six students are formed based on instructional needs and the candidate must plan a sequence of instruction for the group and for each individual student. This requires candidates to interpret and use diagnostic test scores to study individual differences within the group. Instruction is designed to promote skill and concept development while encouraging transfer from the intervention setting to the general education classroom.

To help students transfer learning to new environments, candidates use learner-centered practices. They connect each lesson to the students' prior experiences by using techniques such as activating the knowledge gained from previous lessons and asking students about life experiences that may use the knowledge. Throughout the lessons, candidates require students to respond to direct questions about the content. The calls for response require students to verbalize their thinking, which according to Vygotsky, will further their understanding of the material. Candidates respond to the students' answers by affirming correct answers, discussing incomplete or incorrect answers, and asking follow-up questions to clarify hesitant answers. During this process, candidates track progress on each student and refine the instructional strategy to maximize student learning.

Current Practice in Baylor's Gifted and Talented Education Program

During the sophomore year students in the gifted and talented program take a learning and developmental course devoted to learning models as well as an introductory course on the gifted child. These courses give the candidates the foundational knowledge about typical and atypical development, including characteristics of the gifted learner in order for them to identify individual differences for differentiation practices.

While the candidate works one-on-one with their student in the sophomore year, they must help develop questions for their student's specific research interests and also use a student record to track what their student is learning. At the end of the semester in the one-on-one session with the student, the candidate evaluates the student's performance with specifically tailored feedback. By starting this learner-centered approach at the beginning of the candidate's time with students, it builds upon itself when the candidate's group of students grows.

In the junior year the candidate works with small groups of students and differentiates his or her practice based upon the differences in content, rate, preference, and environment of the students. The candidate continues to adapt questions and

now also divides students into smaller groups based upon student differences. Throughout the semester, the candidate communicates the progress of the students with the candidate's instructor to change instruction accordingly. The differentiation expands during the senior year teaching experiences to include differences in social and emotional needs of individual students and the candidate must use acceleration, curricular compaction, and tiered assignments to further meet student demands. Candidates must also write a case study and design an Individualized Education Program (IEP) to meet the cognitive and affective needs of a twice-exceptional student. By the end of their program, candidates will be able to differentiate using the methodologies of questioning, depth and complexity, grouping, compacting, varied activities, assessments, homework assignments, independent research, tiered assignments, creative problem solving, simulation, acceleration systems, and assessments from concepts. These settings provide the candidate with opportunities to use assessment and instruction to help each student in all areas.

Principle 2: Formative Assessment Provides Information about the Student and Assists in Designing and Adapting Instruction.

Research Evidence and Theoretical Support

To teach in heterogeneous classrooms, teachers need to know how to identify differences among students. Formative assessment, which is conducted before and during teaching, can help teachers identify the needs of both a group and of individuals, tailoring instruction to meet these needs (Kingston & Nash, 2011, p. 28). In schools today, formative assessment may not be incorporated for a variety of reasons. As Sabel, Forbes, and Zangori (2015) found in their study on science teachers, teachers may not understand the formative assessment process or have sufficient knowledge to put it into their practice. Even for teachers that understand the purpose, they have many obstacles inside and outside of the classroom affecting implementation, including but certainly not limited to behavioral issues; a wide range of student abilities, interests, and motivation; home issues, such as absent or non-supportive parents; district policies; and state standardized testing (McMillan, 2003). For those teachers who do use formative assessment, the dissonance between teacher beliefs, district and government policies, and school practices can impact the effectiveness of this practice (Sach, 2015). This is where schools of education can help.

Formative assessment comes in many varieties and has several definitions (Ainsworth & Viegut, 2015). In traditional instruction, the assessment model includes a pre-assessment, multiple lessons over different aspects of the topic area, and then a post-test which results in a final grade for the unit or period of time (nine weeks or semester reports). However, current formative assessment should include more than that. Black and Wiliam (2009, pp. 16–17) found that effective

assessment involves teachers adjusting how they teach and what they teach based on formative assessment. Additionally, teachers provide quality feedback to help students to improve, with students participating in this process through their own self-assessment. Teachers must enable student agency over their own knowledge attainment for best practice (Heritage, 2013). Furthermore, all assessments must be reliable and valid (Stanley & Alig, 2014).

In one modern design, the collaborative data analysis model (Ainsworth & Viegut, 2015), the formative assessment takes place multiple times with an assortment of strategies throughout the learning cycle. This model utilizes a team in order to continually adjust to what the students know. The team typically consists of either vertical or horizontal teacher groups, possibly including an instructional or curricular coach. This model begins with a pre-assessment, consisting of a team meeting to select the assessment tool, analyze data, set academic goals, and select strategies for this particular area and these particular students. From here, the teachers go to their classrooms and teach. Unlike the traditional model, this teaching not only consists of instruction, but also monitoring and adjusting during the instruction (Creghan & Creghan, 2013). Teachers check for understanding, give feedback, and meet the pacing needs of the students, whether that be to cover difficult material again or to provide further enrichment if the students comprehend the work (Hollingsworth & Ybarra, 2009). In the middle of the unit, the instructional team checks in to address any concerns or adjustments made. During this time students also reflect upon their progress. This may be a short journal or writing assignment, just to make sure they stay accountable to and motivated in their learning. After the team meeting and consideration of student reflections, teachers continue teaching, monitoring, and adjusting just as before. Once the teacher completes instruction, it is finally time for the post-assessment. All of the previous aspects – data analysis, goal progress, student reflection – again takes place. A cumulative view of all components is vital to determining effectiveness.

Although many assessments stop at the post-assessment, the collaborative data analysis model finishes with what is called the "bridge." During the bridge, as one would assume, the students and teachers make their way from one unit to another. This bridge time allows students who did not fully grasp the material from the last unit to "catch up," while those students who met their goals can further refine or enhance their newly-acquired skills. Schools of education must be current on formative assessment models in order to teach their pre-service teachers more than the pre-test, teach, post-test model of the past.

Furthermore, pre-service curriculum must incorporate important practices. On a foundational level, instructors should frame formative assessment as an on-going activity in the classroom, teaching these educators how to properly analyze the data from their assessments rather than simply collect student information (McMillan, 2003; Bennett & Cunningham, 2009). For courses that teach methodologies such as problem or project-based learning, explicit instruction on formative assessment strategies helps maximize student achievement (Trauth-Nare & Buck, 2011). This

instruction should also include contextualized scenarios, case-based practice, and extensive field experiences with instructor feedback (Buck, Trauth-Nare, & Kaftan, 2010). Another common method in the classroom, inquiry-based teaching, utilizes formative assessment in its practice and teachers need to use this to adjust instruction (Otero, 2006). In schools of education, pre-service teachers need weekly practice and reflection in order to develop their questioning techniques and skills with students (Weiland, Hudson, & Amador, 2014). Considering schools of education promote the use of individualized instruction for students, this should also be done with the teachers to meet the spectrum of needs, subject areas, and interests (McMillan, 2003).

Informing teachers about the ways in which they can improve their formative assessment practices once they leave the safe haven of their certification program is important. In the classroom, student involvement becomes a valuable tool, increasing motivation and providing authentic feedback regarding content (ibid.). Student input on their goals, progress, and thinking can help teachers design and students reflect. After unit completion, teachers can ask trusted students, or provide a means for anonymous comments. Teachers must be self-aware of their decision implications, misconceptions (such as the idea that students "either get it or don't"), and their biases, including the ways in which they may be assessing student effort and motivation (ibid.; Otero, 2006). Awareness will also be crucial in dealing with the differences in practice and beliefs between the teacher and school (ibid.). Outside of the classroom, teachers need sources regarding their individual subject areas (Falk, 2012) and a teacher community to gain perspectives on planning and practice, troubleshoot, and find camaraderie among peers (Bjørnsrud & Engh, 2012; Sato, Wei, & Darling-Hammond, 2008). Professional training such as National Board Certification can provide an avenue for these types of support (Wylie & Lyon, 2015). Leading teachers to known resources and emphasizing the need for them to seek out their own will help not only with formative assessment, but with all classroom needs.

Current Practice in Baylor's Special Education Program

In the second year of the special education program, candidates co-enroll in a literacy class and an assessment class. The combination of these two courses serve as a laboratory for understanding, applying, and evaluating formative assessment. Before teaching and assessing students, candidates spend four weeks learning about formative and summative assessment. This instruction is designed to equip candidates for an initial pre-assessment of a student who struggles with literacy. After this initial learning period, candidates conduct a pre-assessment and return to the university for instruction in evaluation. During this component, candidates use formative assessment information to construct a three-week learning sequence based on individual student and group needs. At this time, candidates are also instructed in using continuous formative assessment during instructional delivery as a method of data collection on student learning and as a tool for adjusting content and instructional delivery methods during a lesson. Candidates then return to the field to teach a six-

week literacy intervention that integrates the five components of literacy, phonemic awareness, phonics, fluency, comprehension, and vocabulary, with the application and evaluation of formative assessment. As a final product, candidates write a case-study of a student which translates the assessment data and instruction into layman terms.

Current Practice in Baylor's Gifted and Talented Education Program

The candidate's knowledge of the data collection process begins early, in the one-on-one, small-group, large-group, and whole-class environments. In the sophomore year of the candidate's program, they use a product checklist along with state standards to begin assessment and learn how to evaluate using a creative problem-solving matrix. During the junior year, the candidate implements both pre- and post-assessments with their groups in order to frame instruction. They also learn and design multiple forms of assessment, such as extended and limited response, checklists, rubrics, and exit tickets. The candidate must keep a record of student performance in both qualitative and quantitative measures. The candidates learn the difference between assessment and grades, as well as the proper way to use grades within the classroom. Benchmark test scores from the district must be used to further improve instruction and student achievement. In the senior year, the candidates must use assessments as only one part of their student case study to evaluate the needs of a twice-exceptional student.

Principle 3:
A Deep Foundation of Factual Knowledge Must Be Organized Conceptually to Facilitate Its Retrieval, Application, and Transfer.

Research Evidence and Theoretical Support

The organization of curriculum requires an understanding of declarative, procedural, and strategic knowledge in the field (Alexander & Judy, 1988, pp. 375–377). The revised version of Bloom's Taxonomy suggests declarative knowledge includes knowledge of facts and terminology, such as the vocabulary used in a specific discipline (Krathwohl, 2002, pp. 213–214). Procedural knowledge consists of information about how to do things and how to use skills or methods to reach a goal or outcome (Dole & Sinatra, 1998, p. 109). Strategic knowledge, in Bloom's Revised Taxonomy, is a part of metacognitive knowledge and refers to awareness of one's thinking, monitoring one's thinking and behaviors, and knowledge about when and where to apply specific strategies (Krathwohl, 2002, pp. 215–217).

Both psychology and education have a deep interest in how knowledge is organized, retrieved, and generalized to other settings, a concept known as "transfer" (Dole & Sinatra, 1998, pp. 113–114). Transfer requires organized knowledge (Baroody, Feil, & Johnson, 2007, p. 117). According to Piaget, organized knowledge is easier to process and integrate into existing schemata (Billet, 2001). Schemata represent the

building blocks of all knowledge and these can be integrated into complex webs of knowledge if an organizational structure is present. Incoming information is filtered through a learner's schemata, which serves to activate an existing schema (Blissett, Cavalcanti, & Sibbald, 2012, p. 816). The activated, existing schemata serve as a filter that allows sorting of information and predication or evaluation of outcomes.

Piaget proposed intelligence develops through assimilation and accommodation, or using an existing schema to interpret and evaluate the world (Piaget, 1964, pp. 236–246). Assimilation is the process of incorporating new experiences into existing schemata, while accommodation requires modifying an existing schema because present experience negate an existing understanding. A large complex web of knowledge about a particular subject allows for assimilation to occur more frequently and is referred to as equilibrium (Blissett et al., 2012). Existing schemata are complex enough to encompass new incoming information from experiences, but if these experiences do not conform to a learner's previous understanding, the learner will enter disequilibrium. In this state, the web of knowledge is not complex enough to accommodate new information and existing schemata must be modified (Billet, 2001).

Current Practice in Baylor's Special Education Program

The special education program teaches candidates to organize knowledge for effective and efficient learning. The students participated in the field-based practicums throughout the program have skill and concept deficits that warrant intervention provided by specialists. As candidates move through the program, they learn additional methods for narrowing skill and concept deficits.

During the junior year, candidates are expected to design a nine-week mathematics intervention for a group of middle school students. The students in the intervention have failed to make progress in the Response to Intervention framework used by the school and require more intensive intervention prior to referral to a special education program or prior to changing the placement for a student with special needs. Candidates create and deliver the more intensive intervention and, by doing this, learn to organize knowledge for efficient learning.

Students involved in intensive interventions require efficient organization of knowledge because the goal is to increase the rate of learning such that students in the intervention are able to function similarly to their peers in the general education classroom. Curriculum design leading to a rate of learning change requires the following: assessment, progress monitoring, sequencing instruction, and setting measurable goals. At this point in the program, candidates have used assessment and progress monitoring in literacy but they have not experienced either process in mathematics. Instruction to achieve such progress occurs during the first four weeks of the semester with candidates practicing these processes in the schools starting during the fifth week of the semester. Sequencing instruction and setting goals are taught throughout the entire semester.

Candidates pre-assess a group of middle school students in the fifth week of the first semester of the junior year and use this data to connect standards, such as the Texas Essential Knowledge and Skills, to sequencing content and setting goals. Pre-assessments include a diagnostic mathematics assessment, state standardized assessment results from the previous year, universal screening results from the beginning of the current year, and student work samples from the general education mathematics classroom. Candidates use multiple sources of data to determine a sequence of skills and concepts that will provide the greatest number of usable skills in the least amount of time. The sequence is referred to as the instructional strategy because it represents a roadmap for helping this student reach the same level of performance found in the general education classroom at the end of the intervention. Several knowledge organization guidelines are used to determine the sequence and these include: task analysis to identify pre-skills of a strategy or concept, teaching preskills to mastery before teaching the concept or strategy, teaching easier skills before more difficult ones, and separating information that may be easily confused (Stein, Kinder, Silbert, & Carnine, 2006).

This instructional strategy represents a map to reach the goal of the intervention, but the utility and efficiency of the strategy must be constantly evaluated. Candidates evaluate the strategy using weekly progress monitoring of student performance. Since the instruction in the intervention is to mastery, data from the curriculum-based assessment used for progress monitoring should indicate progress toward the goal, and if progress is not indicated, the candidate must determine why the student is not progressing as planned. This involves multiple steps, but it ultimately leads candidates to change either the organization of knowledge in the instructional strategy or the organization of knowledge during instructional delivery. As the organization in both areas follows the same guidelines, this teaches the candidates to use task analysis and error analysis as methods of chunking knowledge for learners. For students with special needs, chunking knowledge into developmentally appropriate, sequenced units allows the most efficient and effective learning.

Current Practice in Baylor's Gifted and Talented Education Program

In the beginning courses of the program, the candidates learn about the major educational theories including behaviorism, cognitivism, and social learning. The candidates build their knowledge around classical and modern concepts and in their sophomore year, the candidates complete a synthesis paper of all theories in conjunction with their personal beliefs and experiences. Starting at these conceptual levels allows candidates to plug in and connect later ideas to each other before expecting them to teach students to connect the ideas.

For their instructional practice, candidates learn to ask questions and create visual representations with their small and large groups. The candidates learn both concept teaching and learning as a prerequisite for teaching their students how to think critically and design their assessments more effectively. By their junior year,

candidates in the gifted and talented program use types of knowledge to develop their lesson plan and design their sequence of instruction. Candidates must utilize a spectrum of the knowledge taxonomy when assessing student performance.

All candidates also complete courses in crucial domains. Candidates must take classes on teaching literacy, social studies, mathematics, science, art, drama, physical education, and music. These courses educate candidates not only on the topics, but how the various concepts connect and how they will teach these ideas to their future students. Throughout the program, candidates must also take course content exams and state licensure exams. At the end of the program, the students must participate in a final debate and demonstrate their knowledge of the field of gifted education. These methods help assess that the candidates have gained the full knowledge required in each subject and that the candidate is prepared for his or her work in this particular educational setting.

Principle 4:
Strategies Are Important in Learning to Solve Problems and in Becoming an Independent, Effective Teacher.

Research Evidence and Theoretical Support

The most useful problem-solving skills are flexible and adaptive. For experts, who generally have a large and complex understanding of a domain, solutions can be readily generalized and problem-solving skills may be applied in novel situations (Hatano & Oura, 2003). Expert and novice problem solvers organize their knowledge differently (Davidson & Sternberg, 2003). Expert problem solving within a domain may seem effortless to viewers because much of the pattern-matching and awareness of salient details missed by novice problem-solvers occurs at a subconscious level (Fadde, 2009). The expert problem solver relies on planning, anticipation, and reasoning to determine the best solution. Expert and novice problem solvers organize their knowledge differently. Mayer (1992) described the novice problem solver as an individual who has strategies to solve the problem, whereas the expert breaks the problem into parts to determine the correct solution.

Although extensive research has been completed to deliberate the differences between the knowledge base for novices and experts, as well as the organization of problem solving, research also shows that experts monitor the strategies utilized to solve the problem more carefully than novices (Voss, Greene, Post, & Penner, 1983; Newell & Simon, 1972). To become teachers who practice effortless problem solving, individuals need an extensive background in their content area and extensive practice solving problems in the classroom with feedback from expert instructors on salient information to consider in each situation (Shulman, 1986). For example, teachers-in-training may lack the underlying representations available to expert teachers and as such, may be unaware that a behavior problem is developing in a classroom or may be unaware of their role in changing the developing behavior

problem (Hogan, Rabinowitz, & Craven, 2003; Simon, 1979). Research on expert and novice representations has found novices may adopt expert-like representations if novices receive instruction in recognizing the underlying structure of problems in that field and this instruction may shorten the typical time required to develop expertise (Klein & Hoffman, 1993; Quilici & Mayer, 1996; Zimmerman & Campillo, 2003).

Current Practice in Baylor's Special Education Program

During the junior year, candidates in the special education program conduct a functional behavior assessment and create a behavior intervention plan for a student in the teaching practicum. To begin problem solving for behaviors, the candidate meets with a multidisciplinary team that may include the instructional facilitator, classroom teachers, related service personnel, and administrators. The team helps identify the problem behavior. The candidate uses this information to conduct an extended observation of the student during which data on antecedents to, and consequences given for, the behavior are recorded. The length of the preliminary data gathering depends on the severity and the specificity of the behavior. This is the first step in determining the function of the behavior.

After initial data have been collected, the candidate meets with university faculty to create an observable definition of the behavior and discuss possible functions of the behavior. Baseline data on frequency and duration of the behavior can be collected once the behavior is defined. Baseline data are collected at different times of the day and in multiple settings. Candidates also interview personnel who interact with the student to collect information on with whom the behavior occurs, where the behavior occurs, and other information that may help with the design of an intervention. From the data collected in interviews and during baseline, candidates formulate a hypothesis about the function of the behavior and design an intervention to reduce the occurrence of the behavior. The intervention must include evidence-based practices and objectives that can be used to monitor the student's progress.

Current Practice in Baylor's Gifted and Talented Education Program

For candidates in the gifted and talented education program, faculty members begin teaching strategies in the first course. These include items such as managing time, increasing positive interactions, using authentic methods of discipline, varying classroom group activities, adapting questions, and following the praise versus correction ratio of 4:1. The candidate's experience includes working with a single student during their sophomore year to the instruction of an entire class during their senior year. This experience allows candidates to hone their strategy use gradually from simple to complex situations. Along with the strategies, candidates build upon their domain knowledge and apply research skills to increase teacher effectiveness. Candidates must also reflect on each lesson plan with an expert, a Baylor University

faculty member. The candidates gain independence and transition from a novice to a more qualified teacher through a gradual release of responsibility. The program scaffolds effective teaching (including problem solving) so that the candidates will be able to continue independently once they graduate.

Principle 5: Learning Is Developmental and Influenced by the Context in Which It Takes Place.

Research Evidence and Theoretical Support

The conceptual framework of the teacher education program at Baylor University is designed to be developmental because developing expert teaching skills requires extensive practice (Borko & Putnam, 1996). Research supports an average of ten years or 10,000 hours of practice to become an expert in a field. This practice must be conducted in the social setting where the expertise will be used, such as writing lessons and teaching them in a school with children as opposed to writing lesson that are then acted out in a college course at the university (Billet, 2001). In addition, the development of complex skills requires intentional planning and a positive environment for practice (Bambrick-Santoyo, 2013; Maggio, Cate, Irby, & O'Brien, 2015).

Extended practicums in classroom working with diverse groups of students appears to be the key to the development of expertise in teaching unique populations, such as with disabilities and students with gifts and talents (Sharma, Loreman, & Forlin, 2012). In addition, the needs of students in the practicums should increase as a candidate becomes more advanced in teaching skills. Vygotsky (1978) suggested designing instruction that is within the zone of proximal development would encourage a learner's development. For teacher education, the zone of proximal development may be interpreted as the distance between mastered situations and situations where the candidates require the assistance of a more advanced teacher in order to be successful. Teacher education programs should present practicums with increasing complexity to encourage candidates to develop the range of skills needed for teaching in exceptionalities (Warford, 2011; Leko et al., 2012). As metacognition related to teaching develops, candidates should be able to design and implement instruction with increasingly diverse populations (Pintrich, 2002).

Current Practice in Baylor's Special Education Program

Candidates wishing to specialize in teaching children with disabilities teach students with a broad spectrum of needs during the teacher education program. The first placement in the freshman year is in a general education classroom as a tutor. Candidates supplement classroom learning and provide support for students in one of four content areas: English language arts, mathematics, science, or social studies.

In the first semester of the sophomore year, candidates teach decoding skills for multisyllabic words to a late elementary age student using a scripted lesson format. The student may or may not have a diagnosed disability, but must be identified as a struggling reader by the school. The second semester of the sophomore year also has a placement in literacy, but the focus of this placement is instruction for beginning readers. Candidates must assess two kindergarten to second grade students who struggle with reading and use the assessment results to construct a six-week reading intervention. Candidates teach in pairs, which means all assessing, lesson planning, and instructional delivery will be shared. In the junior year, candidates use the sophomore experience to build a nine-week intervention in middle school mathematics for a group of four to six students. The students in the intervention are selected by evidence of past academic failure and may have complex diagnoses, such as emotionally disturbed and learning disabled. The second semester of the junior year occurs in a high school life skills setting where candidates teach one or two students with moderate to severe needs. During this placement, candidates must collaborate with therapists, other teachers, and paraprofessionals to best serve the needs of the included students.

Current Practice in Baylor's Gifted and Talented Education Program

Candidates learn about the typical development of children in their first courses in the program. This includes major theories of social, moral, physical, cognitive, and emotional development, among other topics. Starting in the second semester of the sophomore year, candidates focus on characteristics of gifted students. Candidates must apply their knowledge of what impacts development by examining examples within the courses and writing case studies about students they teach. In the junior and senior years, when the candidates begins to teach larger groups, they must collect data on classroom demographics and complete a background study to examine individual differences. These items impact how the candidates differentiate instruction for students of all ability levels. The candidates also take this information into considering when collaborating with students, parents, teachers, and other important figures in the student's life that interact with the child in a variety of contexts.

Principle 6: Collaboration Is Important When Creating a Diverse Learning Community.

Research Evidence and Theoretical Support

Collaboration is an essential part of today's schools and forms the basis of many current initiatives for educational reform (DuFour, DuFour, & Eaker, 2008). By definition, collaboration is voluntary, involves direct communication, occurs between

individuals with equal responsibility, and is goal-directed (Friend & Cook, 2013). This form of cooperation is supported by theories in organizational structure from the corporate sector and has become an important area of research in many disciplines, such as medicine, nursing, education, and social reform (Wyles, 2007; Peck & Scarpati, 2004; Waldron & McLesky, 2010). Additionally, the National Board for Professional Teaching Standards and the Interstate New Teacher Assessment and Support Consortium both recommend instruction in collaboration for pre-service teachers. This type of interaction is a part of positive school culture (CCSSO, 2011; NBPTS, 2001).

Social network theorists claim that individuals are interconnected and embedded within social structures (Degenne & Forsé, 1999, p. 13). Teachers are embedded within the social structure of the school, which may or may not include many of the defining factors of collaboration, such as shared responsibility for decision making, trust among teachers and administrators, and collective efficacy (Goddard, Goddard, & Tschannen-Moran, 2007). Schools with a social structure that supports collaboration may indirectly impact student achievement in ways that would not be possible without collaboration. Some of the lesser acknowledged benefits of a supportive social structure include collective responsibility for student achievement and teacher professional development (Moolenaar, Daly, & Sleegers, 2010). Schools with social structures supporting collaboration create safe places for teachers to experiment with novel instructional strategies and innovative practices (Bryk & Schneider, 2002).

Teacher educators must prepare pre-service teachers for participation in collaboration. With the passage of Individuals with Disabilities Education Act of 2004, the federal government created legislation supporting the inclusion of individuals with disabilities in the general education classroom. Special education teachers serving these students must collaborate with the general education teachers in order to provide the depth and breadth of services mandated by the federal government (Friend & Cook, 2013, pp. 15–18). In addition the social structure of the schools must adapt to support a new model of service.

To prepare teachers for this environment, teacher education should embed practice in interpersonal problem solving, teaming, co-teaching, handling difficult interactions, and communicating in existing clinical experiences. Interpersonal communication consists of a set of skills that help individuals listen effectively, construct appropriate responses, and control nonverbal communication that may detract from the message (Harris & Sherblom, 2011, pp. 77–79). Pre-service teachers will also need instruction in handling difficult situation because such situations offer the greatest opportunity to exercise collaboration skills. New teachers lacking such training may find these situations to be a major contributor to job stress (Martinez, 2004). The number of students with disabilities who are served in the general education classroom has increased dramatically in the United States since 2004. Such students are currently served through a variety of models that includes teacher teams and co-teaching (Loiacono & Valenti, 2010, pp. 24–25).

Current Practice in Baylor's Special Education Program

In each practicum semester, candidates in this special education program are supervised and given feedback by a variety of specialists. During the first semester of the junior year, candidates complete a co-teaching assignment in a general education science or social studies classroom at a middle school. Classrooms for this experience are selected because the classroom teacher has superior skills in differentiating instruction and classroom management. Students with disabilities are included in these classrooms, and the classroom teacher has previously served as a mentor. The experience is designed to help candidates develop skills necessary to serve as inclusion specialists in a general education content classroom.

Prior to completing a co-teaching experience in the classroom, candidates receive instruction about basic models of co-teaching and differentiating instruction based on content, process, and product. This knowledge is used to create a series of three lessons to be taught on three consecutive days. Candidates teach the lessons in teams of two or three, receiving daily verbal and written feedback from the classroom teacher and the supervising professor. The candidates write daily reflections incorporating the feedback received as well as a final reflection as a means of consolidating what they have learned from the entire experience. This final reflection requires candidates to discuss the changes in their classroom problem-solving behaviors during the experience.

Current Practice in Baylor's Gifted and Talented Education Program

Collaboration occurs both inside and outside of the Baylor classroom for candidates. In the partner schools, candidates work with parents, teachers, and administration during the sophomore year. While working with individual students on their research projects, the candidates communicate with these groups. This helps all parties begin on the same page. At the end of the individual research study, the candidate facilitates the research showcase, elaborating on the progress that the student has made throughout the semester in the research process. Further in the program, the candidate presents benchmarks when working with the gifted and talented team, additionally communicating assessment information to the student, parent, and the candidate's mentor teacher. All work together to create the best environment and outcomes for the student.

The mentor teachers and the candidates also jointly attend research conferences. During the senior year, the mentor teacher selects one conference for candidates to attend and the candidate also picks a different conference. In this way, the mentor teacher helps guide the candidate to proper avenues for further instructional guidance that has a basis in valid research. This also allows for independence and interest for the candidate, thus making the continued learning process seem more appealing. At the research conferences candidates are able to share the strengths and challenges of each course in the program with their peers. From one-on-one struggles to whole-

class success stories, the candidates work through these issues with their cohort. The cohort moves through the program together and therefore establishes a sense of trust and community. This creates an opportunity for the teachers to communicate honestly and freely. During these strategy sessions, the Baylor faculty member remains present and engaged in order to ensure that the candidate continues to teach according to best practices. The collaboration then exists in all settings for the teacher candidate.

Principle 7: Reflection Deepens the Understanding of Effective Instructional Practices.

Research Evidence and Theoretical Support

Dewey's concept of reflection as a special type of problem solving is the most prevalent form of reflection in teacher education. His framework is often attributed as the source of this practice (Howard, 2003, p. 197; Dewey, 1910). Subsequent interpretation of Dewey's framework leads to the following four specific issues that are relevant to any teacher education program practicing reflection:

- Is reflection thought or action?
- Should reflection be immediate or should it occur over an extended period of time?
- Should reflection be problem centered or less focused?
- To be considered reflection, does the practitioner need to consider the socio-historical context of the actions? (Schön, 1983, p. 69; 1987; Gore & Zeichner, 1991, pp. 120–121).

While there is little consensus on how to reconcile the issues listed above, the use of reflection to help pre-service teachers form a professional teaching identity is undisputed. Professional identities are developed over time through systematic reflection and interpretation of personal experiences in the classroom (Sutherland, Howard, & Markauskaite, 2010).

Reflection may occur on several levels, but the ultimate goal of reflection for teachers is transformation of beliefs and values (Lee, 2005). Complex experiences, such as teaching in a classroom, require reflection if these experiences are to impact a teacher's beliefs and values in ways that are transformative (Reiman, 1999), but teachers may need guidance and structure to produce reflections that lead to maximum growth. Scaffolding new teachers' reflections requires measuring their current level of reflection as well as using this level to generate deeper reflections. These reflections encourage perspective taking, inquiry, and flexible thinking about classroom and school-wide situations (Sprinthall & Thies-Sprinthall, 1983). Researchers have established different categories of reflections, such as technical and critical reflection (van Manen, 1977, pp. 210–213), but regardless of the classification used, the goal is to produce productive reflections that integrate theory with practice (Davis, 2006).

Methods for scaffolding the depth and complexity of reflections include using action research (Ross, 1990, p. 98), on-line discussion spaces (Harrington & Hathaway, 1994, p. 552), or targeted written reflections (McMahon, 1997, pp. 209–211). Each of these methods situates field-based learning within a Vygotskyan framework that blends scholarly language with personal experience in the classroom, thus granting pre-service teachers the opportunity to develop complex teaching and learning concepts (Warford, 2011, p. 1553).

Current Practice in Baylor's Special Education Program

Reflection is used throughout Baylor's program for preparing special education teachers. As candidates progress through the program, they are assessed on their ability to reflect on field-based experiences and link these experiences to theory presented at the university. One method used to develop skills in reflection is cognitive coaching. Beginning in the sophomore year, special education candidates participate in coaching during teaching practicums. Candidates teach in pairs, which provides an opportunity for observation and feedback concerning each teaching session of the practicum.

Candidates are trained in the practice of cognitive coaching prior to entering the practicum setting. Since the candidates are in pairs, each only teaches one half of the instructional period and uses the other half to record observations of the partner's teaching on a coaching form. The form includes space for each section of the lesson, such as setting expectations, connecting to prior knowledge, instructional delivery, and corrections or differentiation used. Coaches record only facts on the coaching form and are instructed in using non-evaluative language when recording data. In addition, partners may decide to focus observation-specific behaviors or practices, such as using specific praise or signaling for a response from the students. After the teaching session, the partners discuss the notes from the instructional period and encourage the development of evaluative and reflective practices by each partner. Partners use leading questions to help each other consider why a method did or did not work and how to improve practice in future teaching sessions.

Current Practice in Baylor's Gifted and Talented Education Program

In each course, the candidate is expected to analyze their instructional strategies in reference to the progress of their students. This happens in a variety of forms. Informally, the candidates discuss the effectiveness and beliefs about common practices with the instructor and their cohort during their classes on campus. They thoughtfully reflect on personal experiences in accordance with current research in this safe classroom atmosphere. Formally, the students must also submit weekly reflections. These reflections only go to the instructor so the instructor can give individualized feedback to the candidate. This allows all candidates the time to reflect and also discuss any aspects that they feel should not be shared in the whole group setting. Reflections

revolve around various topics, such as student achievement and experiences within the school, such as special education meetings for particular students. The candidates must also reflect about their teaching practice. The students in the gifted and talented education program must evaluate the effectiveness of individual lesson plans in regard to specific student needs: those of typical performance, those with a disability, and those who qualify as having gifts or talents. This reinforces the need for the variety of differentiation practices the candidate has already learned. Candidates also video themselves teaching and receive feedback after self-reflecting on aspects such as professionalism or questioning techniques. Each course having built upon the skills of the candidates, by the end of the program, the candidates will have reflected upon the spectrum of the teaching experience in addition to having received constructive criticism in order to continually improve upon their practice.

CONCLUSIONS

The teacher education program in exceptionalities at Baylor University restructured in 2001 to create additional clinical practice for teacher education candidates. The National Council for the Accreditation of Teacher Education added clinical practice as an important element of teacher education in 2002, and Baylor University designed the Learner-Centered Professional Education Program to be reflective of these new recommendations. Seven research-based principles of strong education programs formed the basis on the Learner-Centered Professional Education Program. These principles include:

- Classrooms and schools must be learner centered, thus creating a positive environment for learning.
- Formative assessment provides information about the student and assists in designing and adapting instruction.
- A deep foundation of factual knowledge must be organized conceptually to facilitate its retrieval, application, and transfer.
- Strategies are important in learning to solve problems and in becoming an independent, effective teacher.
- Learning is developmental and influenced by the context in which it takes place.
- Collaboration is important in creating a diverse learning community.
- Reflection deepens the understanding of effective instructional practices.

From these seven principles, the teacher education faculty created eighteen benchmarks, or measurable behaviors that should be demonstrated by all teacher education candidates. These benchmarks are used to measure the effectiveness of content, courses, and field-based experiences at producing proficient teachers. Candidates in the programs for exceptionalities require a diverse set of experience to develop proficiency serving learners of varied backgrounds, abilities, and ages. The seven principles and the eighteen benchmarks serve as a unifying theme that creates a coherent program from this set of diverse experiences.

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PART TWO

TRANSFORMING SCHOOL PEDAGOGICS

SARAH J. CARRIER & KATHRYN STEVENSON

3. CHILDREN EXPERIENCING THE OUTDOORS

A Natural Setting for Science Learning in the United States

INTRODUCTION

Outline of the Chapter

This chapter will demonstrate how outdoor education can answer the call for science education reform while benefiting the whole child. It begins by outlining research on how outdoor experiences can provide science engagement benefits that last a lifetime. We then outline the specific science reforms that have been presented in the United States and globally to encourage lifelong science achievement. The remainder of the chapter draws connections between how outdoor education can address reform goals and strengthen the likelihood that benefits provided from outdoor experiences will last a lifetime. First, we make the case for how fostering a connection to nature can complement and augment science instruction. We then outline different forms of outdoor education in formal, non-formal, and informal settings, highlighting place-based instruction and considerations for urban settings as special cases. We acknowledge challenges associated with using outdoor education as a science instruction methodology, paying special attention to issues of diversity around ethnicity, gender and culture. The chapter ends with a summary and an invitation for educators to consider outdoor education as a powerful tool in implementing science education reform.

Student-Centered Instruction

Hammerman and Hammerman (2013, pp. 48–49) presented a detailed overview of how instruction can be interpreted through both traditional and student-centered lenses. The latter is consistent with reform efforts described in this chapter. The traditional teacher focuses on test preparation, directs activities for students (e.g. "cookbook" activities and labs), and creates lessons focused on the "right" answers with minimal

E. Kimonen & R. Nevalainen (Eds.), Reforming Teaching and Teacher Education: Bright Prospects for Active Schools, 67–88.

contextual relation to the real world. A teacher using student-centered instruction allows students to ask questions and design their own learning, facilitates student critical and creative thinking (rather than dictates), learns alongside students, and works to provide context so that students understand learning situated in real-world contexts. In response, students participating in student-centered classrooms gather and contextualize information through analyzing data and reflective questioning as opposed to memorization and parroting of facts as may occur in a traditional classroom. Student-centered work emphasizes investigations, data, and meaning-making, while traditional student work often focuses on notes and worksheets.

Outdoor education provides ample and varied opportunities to support student-centered approaches to teaching. Outdoor education offers a learning environment "where students can be free to investigate and explore and/or be inspired and create without the barriers to learning that are often found in the classroom" (ibid., p. 49).

The Nature of Outdoor Education

Outdoor education refers to using natural settings both as an environment for learning and as a teaching tool. Outdoor education can provide authentic learning experiences called for in recent science education reform goals. A large body of research demonstrates benefits not only for science achievement, but also for motivation to learn in science and other subjects, for connection to nature, as well as for social and cognitive development. Though outdoor education has numerous benefits for science teaching, these extend far beyond the science classroom. They include equipping students with the knowledge, skills, and dispositions needed for a lifetime of learning about, and engagement with, science and the environment.

Many science professionals have described an early interest in the natural world that persisted through stages of formal education as they moved toward life-long careers in science. Scientists who have recounted early experiences in outdoor settings include the naturalists Rachel Carson and Jane Goodall, who attributed their early experiences exploring nature as contributing to their strong relationship with the natural world (Atkins, 2000; Farber, 2000; Huxley, 2007). The physicist Richard Feynman (2005) identified explorations in nature with his father as providing context for learning about patterns and structure. The naturalist and biologist Edward O. Wilson (1994) credited his free explorations in natural settings with piquing his interest in entomology and nature's patterns, and the paleontologist Stephen J. Gould (1991; 2002) described his early revelations about the natural world and his connections with Darwin's explorations as the foundation of his life's work.

Early outdoor experiences as reported by science professionals have the potential to support both children who will choose careers in science as well as those who will connect with science in other ways during their lifetimes. Many adults identify their free explorations in natural settings when children as formative events or significant life experiences (SLEs) (Chawla & Cushing, 2007; Chawla, 2001; 2006; Palmer, Suggate, Robottom, & Heart, 1999; Sobel, 1990; 2002), impacting their world views.

Many adults associate the time spent in nature as children with adult choices related to occupation, academic interests, and hobbies (Corin, Jones, Andre, Childers, & Stevens, 2015) as well as environmental appreciation and stewardship (Chawla, 1999; 2009; Wells & Lekies, 2006). Since these stories suggest that early nature explorations may spark life-long interest in the environment and science, they should encourage science educators to focus on the value of providing young children with experiences in the natural world.

Positive impacts of outdoor experiences may also be realized before children reach adulthood. Research on outdoor learning (Dillon et al., 2006; Eaton, 2000; Malone, 2008; SEER, 2000) has found outdoor experiences to be effective for developing cognitive skills that enhance classroom-based learning. Further, following outdoor experiences, researchers have documented improved environmental attitudes (Cheng & Monroe, 2010, p. 45), and improved comfort levels in the outdoors (Carrier, 2009, p. 9). Cognitive and affective benefits of outdoor education have the potential to promote engagement in critical thinking (Hungerford & Volk, 1990), which is essential for developing science reasoning.

Concerns have arisen about children's decreased outdoor time and increased time indoors (Coyle, 2005; Malone, 2008) as outlined by American author Richard Louv (2008) who coined the term "nature-deficit disorder" in his book *Last Child in the Woods*. Louv's book assimilated and inspired a large body of research on the benefits of time in nature, including physical (Frumkin, 2001), psychological (ibid.; Taylor & Kuo, 2009), and cognitive well-being (Dillon et al., 2006; Frumkin, 2001; Malone, 2008; Rickinson et al., 2004; Taylor & Kuo, 2009; Wells & Evans, 2003). Other benefits include decreased instances of myopia (Rose et al., 2008, pp. 1280–1283), improved attention (Kuo & Faber Taylor, 2004, p. 1584; Taylor & Kuo, 2009, pp. 405–406), decreased stress (Wells & Evans, 2003, pp. 319–320), and connections to nature (Kahn & Kellert, 2002). Although Dickinson (2013) cautions about this movement's casting of time in nature as the key to most any individual or societal ill, the volume of empirical studies chronicling positive associations with time in nature suggests that outdoor education offers strong potential to provide tangible benefits.

Beyond the psychological, emotional, and physical benefits of time in nature, learning about the natural world in nature has the potential to enrich instruction by providing sensory and contextual information that anchor science lessons in the natural world (Ives & Obenchain, 2006; Malone, 2008; Rivkin, 1997). Using the outdoors as a setting and focus of instruction has been linked to improved science test scores, increased ability to apply science concepts to real-world situations, increased enthusiasm and interest in science, and enhanced emotional and cognitive development (Dillon et al., 2006; Lieberman & Hoody, 1998; Malone, 2008). Outdoor education experiences encourage children to ask and seek answers to questions (Renninger, 2000), thus potentially boosting overall science learning (Falk, 2001; 2005, p. 267). Given the varied benefits to children and potential to inspire life-long engagement with the natural world and science, outdoor education has enormous potential to contribute to reform efforts in science education.

REFORM EFFORTS

The launch of the Russian satellite Sputnik in 1957 initiated educational reforms in science in the United States and beyond, and over decades these reforms included a range of pivotal documents (e.g., AAAS, 1993; 2001; 2007). These documents laid out the content and practices necessary for students' paths toward science literacy including a heavy emphasis on scientific reasoning and critical thinking as well as authentic learning experiences. Relatedly, calls for providing students with authentic learning experiences (e.g., assessing the health of a river by documenting its macroinvertebrate populations) have been prompted by various reform efforts (e.g., AAAS, 1990; NRC, 2007a).

More recent reforms of science education as identified in *Framework for K–12 Science Education* (2012) encourage engagement in science practices to build students' appreciation of science and proficiency in science over multiple years (NRC, 2012, p. 26). This document guided development of the *Next Generation Science Standards* and defined science practices necessary for understanding how science helps humans confront challenges in society such as the development of clean energy and making personal decisions about health care (NGSS Lead States, 2013). Presented along with Cross Cutting Concepts that connect key features of learning about the world (e.g., patterns, cause and effect, energy and matter) and Disciplinary Core Ideas (e.g., life, physical, Earth/space science, engineering design), the framework defines the following scientific and engineering practices:

1. asking questions and defining problems;
2. developing and using models;
3. planning and conducting investigations;
4. analyzing and interpreting data;
5. using mathematics and computational thinking;
6. constructing explanations and designing solutions;
7. engaging in argumentation from evidence; and
8. obtaining, evaluating, and communicating information (NRC, 2012, p. 8).

Outdoor education can offer an important setting for contributing to these science education reform objectives. The term outdoor education has been used in many contexts, including adventure education (Hattie, Marsh, Neill, & Richards, 1997), informal nature exploration (Falk, 2005), and structured education held outdoors. In this chapter, we draw on the definition outlined by Priest (1986, p. 13): Outdoor education (a) is a method for learning, (b) is experiential, (c) takes place primarily in the outdoors, (d) requires use of all senses and domains, (e) is based upon interdisciplinary curriculum matter, and (f) is a matter of relationships involving people and natural resources. The following sections present research on outdoor education and young children learning science, outline several forms of outdoor education, and present observed barriers to outdoor education including among diverse audiences. The chapter ends with discussion of pathways for educators to consider outdoor education as a legitimate tool for addressing science reform efforts.

CONNECTION TO NATURE AND CHILDREN'S SCIENCE LEARNING

Research suggests that early science instruction may be pivotal in building life-long interest in science. Connecting children with the natural world may augment this process. Young children are more capable of engaging in scientific reasoning than previously thought, and these understandings support providing students with early opportunities for science learning (NRC, 2007b, pp. 251–260). Researchers suggest that very young learners can distinguish objects from symbols representing those objects (DeLoache, 2005, para. 9–11). By the age of three or four children can already determine the credibility of reports (Koenig, Clement, & Harris, 2004, p. 697). Further, children seem to retain an innate interest in science throughout elementary school (Osborne, 2007, p. 105). By providing children with learning opportunities that build on their inherent interests, we can impact children's lives at an early stage. One promising method for leveraging children's abilities and interests in order to promote science learning is to engage young children in experiential science activities connecting with the natural world (Loucks-Horsley et al., 1990, p. 48). Children have a strong interest in the natural world (Kirikkaya, 2011; Maltese & Tai, 2010; Osborne, Simon, & Collins, 2003) and their experiences in the natural world have been found to improve their interest in science (Lindemann-Matthies, 2005; Zoldosova & Prokop, 2006). Although connection to nature seems to wane as children approach adolescence (Kaplan & Kaplan, 2002; Osborne, 2007), profound or sustained experiences in nature have been found to lastingly affect views of nature on into adulthood (Chawla, 1999; Ewert, Place, & Sibthorp, 2005; Wells & Lekies, 2006). By building on children's connection to nature, science educators may be able to help foster a paralleled lasting effect with science interest.

Building Learning on Children's Prior Knowledge

Educators have an opportunity to boost interest in school science by integrating outdoor education into science instruction in ways that both leverage and build on children's connection to nature. Children's curiosity about the natural world develops through informal observations (Luce & Hsi, 2015; Spektor-Levy, Baruch, & Mevarech, 2013), and science educators can help children build scientifically accurate explanations for phenomena to begin to make sense of observed patterns in their world. Children may, for example, have noticed and wondered about dew on blades of grass, observed the movement of the sun across the sky, noticed that some trees lose their leaves in winter while others remain evergreen. Children often develop their own personal theories to explain phenomena such as seasonal or weather patterns, and educators can position learning opportunities in the context of children's experiences. Rennie (2007, pp. 128–130) identified characteristics of learning as personalized, contextual, and cumulative; therefore, providing such experiences for young children is critical to building a base for future learning. Educators can both examine children's prior

experiences in nature to build on their current understandings as well as guide them through new experiences. Providing children with experiences in the natural world offers personal and contextual connections and can influence learning for years to come (Chawla, 1999; 2009).

Fostering a Connection to Nature

To achieve the connection with nature that may augment science learning, educators should prioritize direct experiences. Kellert (2002) distinguished between children's direct, indirect, and vicarious experiences in nature. According to Kellert, direct experiences involve physical contact with natural settings and non-human species in an unstructured format. Indirect experiences may involve physical contact, but that contact is managed or restricted by adults, as in a nature center or zoo. Vicarious experiences involve no physical contact, including videos, photographs, and textbook representations of the natural world. Kellert (2002) found that indirect and vicarious experiences, more typical of children's experiences in the context of school, are insufficient to significantly impact a child's affective, cognitive, and evaluative development in a way that contributes to his or her environmental relationship and connections with nature (pp. 118–120). In a study of the influence of natural elements in home environments, Wells (2000) found low-income urban children's relocations to greener residences had a distinct effect on children's cognitive function (pp. 790–791). In a related study of day-care settings in Sweden, Grahn, Mårtensson, Lindblad, Nilsson, and Ekman (1997) found that children whose day care included outdoor time had greater attentional capacity than children in day-care settings with less outdoor time.

A key aspect of direct experiences in nature is the less-structured or "free" aspect that Kellert (2002, pp. 118–190) described as central to identification with the natural world. Direct experiences in natural settings can provide opportunities for free-choice learning. Free-choice learning experiences are learning experiences that are self-motivated, voluntary, socially mediated, and guided by an individual's interests (Dierking, Falk, Rennie, Anderson, & Ellenbogen, 2003, p. 109). Free-choice learning experiences in natural settings have the potential to promote pro-environmental behaviors and attitudes in children (Ballantyne & Packer, 2005, p. 282) in addition to honing children's interests in natural science (Lindemann-Matthies, 2005; Renninger, 2007). When children are free to explore in natural settings, they often discover things of interest to them, make observations, and gather data without being part of a structured science learning experience (Eberbach & Crowley, 2009; Lindemann-Matthies, 2005). While opportunities for truly free choice learning in school settings are limited, opportunities do exist elsewhere.

Children's interest in the natural world seems to peak during elementary school, and researchers have found that an individual's relationship to nature is most positively impacted before age eleven (Kaplan & Kaplan, 1989; Sobel, 2002; Wells & Lekies, 2006). Ernst and Theimer (2011) reported an increase in connectedness

with nature in programs serving children in grades three to six, with negligible increases in programs serving children at the high-school level (pp. 590–591). Similarly, Liefländer, Fröhlich, Bogner, and Schultz (2012) found that nine-to-ten-year-old children were more connected to nature than children age eleven to thirteen. Additionally, they report that although short-term connectedness to nature increased with participation in a four-day environmental education program at a local nature center, younger children retained their connectedness levels four weeks after participation, while older children did not (pp. 377–378).

This research on young children's connection to nature may also point to an opportunity to leverage early experiences in nature to sustained interest in science. Researchers have found that children have a strong interest in the natural world (Kirikkaya, 2011; Maltese & Tai, 2010; Osborne et al., 2003), and children's experiences in the natural world have been found to improve their interest in science (Lindemann-Matthies, 2005; Zoldosova & Prokop, 2006). By building on children's connection to nature, science educators may be able to help foster a paralleled lasting effect with science interest. On their own, children may not draw connections between their experiences in the natural world and the science they are learning in school, tending to view school science as a classroom-bounded enterprise (Carrier, Thomson, Tugurian, & Stevenson, 2014, p. 2211). Educators have an opportunity to strengthen children's connections with nature and simultaneously improve their interest in school science by explicitly integrating outdoor education into science instruction. The following section reviews examples and research demonstrating this notion.

INTEGRATING OUTDOOR EDUCATION INTO SCIENCE INSTRUCTION

Efforts to provide authentic learning contexts situated in the outdoors have grown over the last several decades. Examples of outdoor programs across countries include The Boston Schoolyard Initiative, which has focused on establishing outdoor classrooms in schoolyards that include professional development programs, and Science in the Schoolyard, for teachers in urban schools (Manzo, 2008, para. 18–21). In addition to programs in the United States, schoolyard greening efforts have occurred in Canada (Learning Grounds sponsored by the Evergreen Foundation), in England (Learning through Landscapes), and in Sweden (Skolans Uterum), among others (Dyment, 2005; Rivkin, 1997). These programs have the goal of promoting schoolyard experiences to supplement traditional classroom instruction. Outdoor experiences, whether in the schoolyard or elsewhere have the potential to intellectually and affectively connect children with the natural world and provide opportunities for interaction with nature's patterns and variation. A variety of designs and settings for learning both indoors and out follows.

Formal Education

Formal learning is generally defined as in-school learning that is highly structured and mediated by a teacher (Eshach, 2007, pp. 172–173). Although Kellert (2002) emphasized the need for free structured exploration of nature, research suggests that integrating outdoor education into structured settings fosters a connection to nature and boosts science learning. The main advantage of integrating ongoing outdoor education, such as in the schoolyard, into formal settings is the opportunity for sustained, supported learning as opposed to one-time experiences. Field trips are often isolated and lack continuity compared to schoolyard activities that offer students opportunities to explore weather patterns, seasonal changes, and life cycles on a regular basis. Researchers have consistently found that one-day interventions have less impact on children's connectedness to nature than do longer interventions (Cheng & Monroe, 2010; Ernst & Theimer, 2011; Liefländer et al., 2012).

Schoolyard activities offer ample opportunities to link outdoor education to many curriculum areas. For example, students engaged in building, cultivating, and observing a pollination garden on school property may learn about plant biology and plant-pollinator interactions (science), use various tools to measure changes in plants (technology), engage in problem solving to ensure the garden remains well-watered (engineering), and collect and analyze data on plant growth and pollinator visitation (mathematics). By using local and accessible schoolyard settings as a learning tool, students are provided with a context in which to situate multi-disciplinary knowledge and skills.

Although more research is needed on outdoor education in formal settings, it appears that schoolyard science offers cognitive, affective, social, and physical benefits (Carrier Martin, 2003, p. 57; Coyle, 2010). Several studies have found a link between increased experiences in nature and academic performance (Rickinson et al., 2004; SEER, 2000). Schoolyard science lessons have been found to improve students' environmental attitudes, behaviors, and outdoor comfort levels (Carrier, 2009, pp. 9–11; Skelly & Zajicek, 1998, pp. 581–582). Additional benefits were improved confidence, pride in community, stronger learning motivation, and an improved sense of responsibility (Rickinson et al., 2004).

Non-Formal Education

Non-formal education is, in a sense, situated between formal and informal education. It shares with formal education structured activities guided by the instructor, but the nature of instruction is highly adaptable and generally more student centered (Eshach, 2007, pp. 173–174). Field trips have been many teachers' choice to provide children with non-formal exploration experiences in nature (Anderson & Zhang, 2003; DeWitt & Storksdieck, 2008; Rickinson et al., 2004) and when presented well, non-formal experiences in informal settings have the potential to provide children with experiences that extend learning (Behrendt & Franklin, 2014, p. 242). For

instance, a class may visit a nature center and go for a guided walk. The instructor has clearly defined goals and learning objectives, but he or she encourages student exploration and questions, and the learning activity adapts to those explorations. The main learning objectives of the walk may center on plant adaptations, but student questions about spiders can result in an impromptu lesson on arachnid life cycles.

One particularly effective form of non-formal education used by many teachers is published environmental education curricula. In the United States, examples of such curricula include Project WET, Project WILD, and Project Learning Tree. Each of these programs offer professional development introducing teachers to non-formal education techniques (e.g., close examination of patterns in nature, focus on form and function), as well as ideas of how to use natural settings as an integrating context for instruction in science. Further, such experiences provide opportunities across disciplines including social studies, language arts, and mathematics. Research suggests that this type of professional development and exposure to curriculum is effective for building practices that involve issue analysis and critical thinking among middle school students (Stevenson, Peterson, Bondell, Mertig, & Moore, 2013, pp. 4–5), as well as boosting content knowledge in science (Broussard, Jones, Nielson, & Flanagan, 2001, p. 40).

Informal Education

Informal education refers to spontaneous learning as occurs through personal reading, watching television, talking with family, and engaging in hobbies or any other unstructured learning opportunities (Eshach, 2007, pp. 173–174). In a science education context, informal learning is often associated with field trips to museums or nature centers, or inquiry-based learning in which students drive the learning process. Both informal learning environments (such as nature centers) and inquiry-based practices have been shown to improve scientific reasoning skills (Gerber, Cavallo, & Edmund, 2010, pp. 545–546).

Effective outdoor education offers learners opportunities to contextualize and create meaning from experiences. Experiential learning frameworks suggest four steps – experiencing, reflecting, conceptualizing, and applying (Kolb, Boyatzis, & Mainemelis, 2000). Informal learning occurs during the experiencing step, in which learners are encouraged to engage in self-guided explorations. The reflection step helps learners connect their observations to their prior knowledge, after which they can use their observations to conceptualize a new understanding about the world, and finally apply new understanding to future experiences (ibid., pp. 200–201). Although connections to nature suggest that student-centered explorations are critical to gaining maximum cognitive, affective, and social benefits from time spent in nature (Kellert, 2002, p. 139), guiding children to draw meaning from their explorations in formal, non-formal, and informal learning experiences is critical to leveraging the benefits of outdoor education into sustained science learning (Falk & Dierking, 2000, p. 86).

Place-Based Instruction

Children can establish meaningful relationships with specific places in nature (Devine-Wright & Clayton, 2010; Gruenewald & Smith, 2014; Moore, 1986; Sobel, 2002), and providing opportunities for connecting children to places in nature can support such relationship building. The combination of place meanings and place attachments, held by a person or a group, constitutes a functional definition of a "sense of place" (Brandenburg & Carroll, 1995). Place-based education focuses on using the local community as an integrating context for learning in an attempt at making learning relevant to the lives of students (Powers, 2004).

Place-based education does not necessarily occur outdoors, but many forms of it have an outdoor education component and have shown themselves to be highly effective in building connections to nature as well as to interest and achievement in science. Smith and Sobel (2010) outlined a large body of research that supports place-based education for building motivation for learning and higher academic achievement in science and other subjects such as mathematics and language arts as well as improvement in areas not measured by testing such as self-motivation, confidence, and civic engagement.

Urban Settings

Children have been found to enjoy exploring nature even in relatively urban settings (Karsten, 2005; Karsten & Vliet, 2006; Moore, 1986; 1997), as well as in more wild locations (Sobel, 2002). However, there may be a desirable level of "naturalness," to generate awe and wonder in children (Hadzigeorgiou, 2012). There may also be a point at which the remoteness of the setting challenges a child's comfort level in such a way as to negatively impact the child's feelings about the experience (Bixler, Carlisle, Hammitt, & Floyd, 1994; Kals & Ittner, 2003). The novelty of the setting of field experiences may also negatively impact children's feelings about nature, particularly if the setting is unfamiliar for the student (DeWitt & Storksdieck, 2008, p. 184). Children can establish meaningful relationships with specific places in nature that may contribute to their connections with it (Devine-Wright & Clayton, 2010; Gosling & Williams, 2010; Gruenewald & Smith, 2014; Moore, 1986; Smith, 2002; Sobel, 2004). Schoolyards (urban and otherwise) have been used effectively to promote environmental learning and comfort levels (Carrier Martin, 2003; Dillon et al., 2006; Lopez, Campbell, & Jennings, 2008; Malone & Tranter, 2003; Rickinson et al., 2004).

CHALLENGES TO OUTDOOR EDUCATION

Direct encounters with nature have a long history in the education of children (Cornell, 1989; Hammerman, Hammerman, & Hammerman, 2001; Rickinson et al., 2004; Sundberg & Öhman, 2008), but many educational programs around the world have abandoned nature studies in authentic settings, including the outdoors. Despite the

long history of outdoor education, some reform efforts have served to discourage such practices as schools shifted focus toward accountability models of instruction and global competition structured curricula with direct links toward career preparation.

Research on the benefits and barriers of including outdoor instruction have a dedicated education base (Coyle, 2005; 2010; Malone, 2008), but outdoor experiences continue as peripheral education practices (Barker, Slingsby, & Tilling, 2002; Carrier, Tugurian, & Thomson, 2013). Despite the benefits of outdoor experiences, traditional elementary schools rarely include outdoor learning opportunities as regular components of curriculum (Burriss & Burriss, 2011; Sobel, 2004). Instead of designing activities that move beyond the indoor classroom to the outdoors, teachers tend to base instruction indoors (Dyment, 2005, pp. 35–37), often relying on print and web-based media to teach children about the natural environment. Perhaps as a result, children often fail to connect their experiences in science class to the outdoor world around them (Carrier et al., 2013, p. 2075).

One challenge to outdoor education may be related to low comfort levels among students. Younger generations have been documented to spend less unrestricted time in outdoor surroundings and spend more time indoors or in controlled outdoor settings than previous generations. Some reasons for more time spent inside include fear of the outdoors, a preference for indoor screen time, or urbanization (Hofferth & Sandberg, 2001; Louv, 2008; Malone, 2008). Fear of the outdoors may be both a cause of avoidance and a result of it, as the lack of experience with the outdoors may contribute to children's fear of it (Bixler et al., 1994, para. 9). These fears have been documented in several studies in terms of general comfort in nature (ibid.; Carrier Martin, 2003) and fears specific to wildlife (Van Velsor, 2004). Haras (2010, p. 25) pointed out that fears of or discomfort when outdoors may impact learning in such environments. Students who do not feel they "belong" in the outdoors have less inclination to connect with and care for the natural world. Encouragingly, comfort levels have been shown to improve with time in nature (Carrier Martin, 2003, p. 56), suggesting that teachers who help students spend time in nature in spite of their fears may be able to help overcome them.

Comfort levels of teachers, administrators, and parents may also present barriers to outdoor education. Teachers have expressed safety concerns about using natural settings for environmental education (Simmons, 1998, p. 26). These fears range from concerns about animals, including insects, and poisonous plants to fear of the unknown. Parent anxiety about outdoor hazards has further impacted the amount of time children spend in the outdoors in free play (Sutterby, 2009, pp. 290–291). Parents' fears are influenced by global media, resulting in parents limiting children's free explorations in outdoor settings (Gill, 2007; Valentine, 1997, pp. 74–75). Malone (2008) described a building cultural fear of public spaces that further influences classroom cultures.

In addition to safety and litigation concerns, elementary teachers face challenges as science educators that may reinforce their tendency toward teaching science indoors. These challenges include elementary teachers' low self-efficacy in science teaching

(Cobern & Loving, 2002; Sandholtz & Ringstaff, 2011), school policies that have resulted in the marginalization of science in formal school settings (CEP, 2007), and the resulting lack of time for rich science instruction (Cocke, Buckley, & Scott, 2011). Time constraints for science teaching have been documented for decades (Finson, Lisowski, Fitch, & Foster, 1996; Murphy & Beggs, 2003; Stevenson, Carrier, & Peterson, 2014), and limited time spent teaching science and social studies continues to be a challenge for teachers (Cocke et al., 2011; West, 2007). Assessments of the knowledge of science acquired by students have been identified as limiting their learning experiences and reducing motivation for learning in the United Kingdom as well as the United States (TLRP, 2006; CEP, 2007; Jones & Edmunds, 2006; NRC, 2011; Pringle & Carrier Martin, 2005), yet situating instruction in the outdoors has the potential to increase student interest.

These barriers likely help explain why schools rarely include outdoor learning experiences in natural settings (Burris & Burris, 2011), which may contribute to children's disconnection from school science (Calabrese Barton & Yang, 2000; Cobern, 2000). Providing more opportunities for experiences in the natural world in the context of schooling may remediate deficits in experience, improving comfort levels in the outdoors (Carrier Martin, 2003, p. 56). When children fail to connect with science, they are learning in school with the outdoor world around them (Carrier et al., 2013, p. 2075), addressing children's experiences in the context of school may support their connections. Children's elementary science experiences, when aligned with learning in the outdoors, may encourage their connections with elementary science as they move into upper grades (Calabrese Barton & Yang, 2000; Cobern, 2000), and these experiences can improve science learning for all.

OUTDOOR EDUCATION AND DIVERSE AUDIENCES

Ethnicity

Outdoor education is beneficial for all children, but ensuring access to nature experiences may be especially beneficial for minority populations. In a review of research related to inequity in children's exposure to natural environments, Strife and Downey (2009, pp. 112–113) found that children's access to and experience in nature varies by ethnicity and socio-economic status, with minority and poorer students having less access to nature. In the United States minority populations are disproportionally concentrated in urban centers, where there is less direct access to natural areas, and lack of transportation in these areas can make gaining access logistically difficult or impossible (Godbey, 2009, pp. 18–19). Further, minority populations may be culturally excluded from natural areas, as outdoor recreation tends to be dominated by Caucasian populations of middle to high socio-economic status (Finney, 2014; Jones, Jones, Hardin, Chapman, Yarbrough, & Davis, 1999; Shores, Scott, & Floyd, 2007).

Providing students with connections using outdoor learning opportunities may have promise for addressing achievement gaps associated with environmental and science literacy. African-American and Hispanic populations traditionally underperform their Caucasian counterparts in documented assessments of science, yet all students benefit from culturally responsive experiences that can build students' self-efficacy for learning science (Andersen & Ward, 2014, p. 10). Some research suggests that a key reason behind the achievement gap is rooted in language; therefore, encouraging experiences that provide opportunities for building language can narrow learning gaps. This reasoning is supported by Vygotsky's vision on the importance of language in learning. By using the environment as the common "language," populations that traditionally underperform in reading and language arts can have access to a different way to gather and interact with information. Because all children can directly observe nature, school-based outdoor education has the potential to provide a culturally relevant context for science learning that draws on experiences teachers can provide for all children. Research on environmental literacy has shown that outdoor education boosted environmental attitudes and behaviors among African-American and Hispanic students even more than among Caucasian students (Larson, Whiting, & Green, 2011; Stevenson et al., 2013), and similar trends may hold in a science learning context.

Gender

Research suggests that leveraging girls' higher levels of connection to nature through outdoor education may help support girls continuing in science in upper grades. Researchers have found significant gender differences with respect to children's experiences and attitudes toward the environment, with girls having more pro-environmental attitudes than boys (Coyle, 2005; Stevenson et al., 2013; Zelezny, Chua, & Aldrich, 2000). For example, Müller, Kals, and Pansa (2009, pp. 62–65) found that adolescent girls display significantly more emotional affinity to nature than boys. They also found girls spent more time in nature and were more willing to act in support of the environment than were boys. Girls have demonstrated particularly high interests in the biological sciences (Baram-Tsabari & Yarden, 2008, pp. 82–86), which educators may build on through outdoor exploration (Moore, 1986). However, outdoor education has the potential to build environmental attitudes and behaviors among fourth and fifth grade boys (Carrier, 2009, p. 7), suggesting that outdoor education may capitalize on existing attitudes and behaviors for girls and build them for boys. Pro-environmental attitudes and connection to nature may be an important tool for educators in encouraging and maintaining girls' interest in science. Maintaining interest as girls become older may be particularly important. Research suggests girls ages from five to six spend similar amounts of time outdoors as boys, but that older boys (ages 10–12 and 15–17) spend significantly more time outdoors than do girls, representing a thirty-one percent decrease in outdoor time over five years among girls (Cleland et al., 2010, pp. 403–404). Parental influence was a major

factor in encouraging girls' outdoor time, however this parental influence was not found with boys.

Culture

Culture may play a role in determining a child's environmental identity (Clayton, 2003). Although adults across cultures displayed preference for natural settings and concern for the environment are commonly aligned, different cultures evaluate the importance of the environment differently (Kahn & Kellert, 2002; Kaplan & Kaplan, 1989; Schultz & Zelezny, 1998; Ulrich, 1993; Van den Berg, Hartig, & Staats, 2007). For example, Native American cultures traditionally honor interconnectedness with nature (Cajete, 1999). In a comparison of Americans living in Namibia and native Namibians, Chang and Opotow (2009) found Namibians assigned rights to non-human entities, while Americans were less likely to do so. The presence, absence, or condition of the environment accessible to certain cultures may also play a role in the way people in that culture relate to the environment. Müller and associates (2009, pp. 62–65) found adolescents in Lithuania have a higher affinity toward nature than German adolescents. They attributed this difference to Germany's more industrialized and urban character.

Although American schools include a great deal of content related to the natural world (NRC, 2012), they rarely connect to children's interests by relocating science instruction outdoors (Burriss & Burriss, 2011; Carrier et al., 2013; Coyle, 2009; Dyment, 2005). Studies have repeatedly documented that teachers feel they do not have time to integrate outdoor education or environmental topics in class, largely due to pressure from standardized testing (Ko & Lee, 2003; Stevenson et al., 2014; Tal & Argaman, 2005). Given the demonstrated link between outdoor education and academic achievement, educators should view this reality as a missed opportunity. Outdoor education could be seen as complementary rather than antithetical to reform goals, but lack of outdoor education in schools may explain why despite high interest in nature, children generally lose interest in school science as they move toward middle school (Osborne et al., 2003; Thomson & Fleming, 2004). Some authors have suggested that one possible reason for children's disengagement with school science is the inability of traditional school science to acknowledge children's way of thinking about nature (Calabrese Barton & Yang, 2000; Cobern, 2000).

DISCUSSION

Outdoor education offers a myriad of opportunities for impacting children's knowledge, attitudes, and behaviors that encourage personal interactions with nature and environmental stewardship. These opportunities can capitalize on children's natural curiosity about science and their world (Luce & Hsi, 2015; Spektor-Levy et al., 2013). Outdoor education has been shown to positively impact student interest, motivation, emotional development, and cognitive gains (Dillon et al., 2006; Malone,

2008, p. 15). Outdoor learning occurs in formal, non-formal, and informal education settings. The integration of outdoor contexts in formal education to connect with children's lives has the potential to fully integrate school subjects and offer rich opportunities for learning in: science, social studies, mathematics, language arts, physical education, and the arts. In addition to enhancing children's interests, shared class participation in outdoor activities gives teachers and students a chance to recognize, acknowledge, and affirm children's identities as learners.

In the outdoors, children can be active participants in learning, and outdoor experiences encourage exploration, critical thinking, and problem solving in authentic settings that connect directly with patterns in nature. Using the outdoors as a context for learning, children can investigate patterns, energy flow, form and function, consider living and non-living components of the natural world, and participate in practices of science. Whether educators are preparing children for careers in science or for public engagement in science (Feinstein, Allen, & Jenkins, 2013) the inclusion of outdoor experiences can provide children with a well-rounded education.

Despite the challenges of outdoor education, overcoming the barriers is possible. It may not be realistic to expect teachers to relocate some of their instruction outdoors. For example, the outdoors may be less accessible in urban settings, or teachers may feel they lack the skills necessary to teach in the outdoors. In such cases field trips to nature centers may be an option to provide children with the benefits of increased experience in natural settings. In addition, professional development opportunities can impact teachers' efficacy in connecting children with the outdoors, and the combination of professional development with established curricula developed for outdoor instruction can help expand teachers' efficacy and build opportunities for all students.

Given the decades of reform efforts to improve instruction, current strategies are emerging that build on new understandings of learning (NRC, 2005). It is important for educators to understand and incorporate strategies that attend to children's prior knowledge, begin to build a deep foundation of factual knowledge, and develop metacognition that allows learners to take charge of learning. Outdoor education should be viewed as a legitimate tool for addressing reform efforts offering potential to build young children's foundations for future learning and engagement.

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4. INQUIRY AND CREATIVITY APPROACHES IN EARLY-YEARS SCIENCE EDUCATION

A Comparative Analysis of Finland and Romania

INTRODUCTION

The discourse on science education during the current decade has continuously referred to the significance of cross-curricular twenty-first century skills such as collaboration, critical thinking, problem solving, design and engineering skills, creativity, and ICT literacy (Craft, 2005, pp. 56–57; Webb & Rule, 2012, p. 379). The worldwide debate of educational stakeholders has highlighted the need to revive and reinforce the above-mentioned skills and competences for the next generation to complement their content-based school learning. The future society we are building requires people to have the capabilities and abilities to respond to the societal and economic challenges of a globalized and technologically oriented world. These twenty-first century skills have been defined as competences that students need for their future working life or to act as future responsible citizens. As societies have become more technological and multicultural, global cooperation, interpersonal communication, and critical thinking have become vital school subjects. At the same time, changes in local cultures demand innovative approaches for people to be successful in highly competitive environments. It is expected that these twenty-first century skills will be fostered in order to prepare students for globalization and increase students' abilities to survive in the new international context. The development of such skills and competences occur in specific cultural, national, or local contexts. Thus, international versus national contexts and backgrounds need to be discussed when analyzing educational policies designed to support such developments (Jean-Francois, 2015).

The topic we are discussing has led to various suggestions for planning school instruction to meet students' requirements. Science education plays a key role in this discussion because of its possible contributions to twenty-first century skills such as higher order thinking skills, inquiry approaches, and scientific literacy (Asay &

E. Kimonen & R. Nevalainen (Eds.), Reforming Teaching and Teacher Education: Bright Prospects for Active Schools, 89–116.

Orgill, 2010; Harlen, 2013). The European Commission reports (Cachia et al., 2009; Heilmann & Korte, 2010) nominate creativity as one of the core elements to focus on in school teaching and learning. Creativity-based abilities are perceived as a major component of twenty-first century skills, supporting other skills and being a driving force to them.

This chapter will review pre-school and elementary school teachers' conceptualizations and practices in regard to Inquiry-Based Science Education (IBSE) in early-years science education as well as the role of creativity in supporting this learning process. The European Union-funded project Creative Little Scientists (CLS, 2012; 2013a) organized a large-scale study covering nine European countries to map and compare policies and practices in IBSE and Creativity development Approaches (CA) in early-years science and mathematics education. The project reviewed the common features of the nine studied European countries and created recommendations for further practice and future research. Recent research (Dede, 2010) and the theoretical framework set by the CLS project (CLS, 2012) have acknowledged the common synergies between CA and IBSE, which closely resonate with the above-mentioned twenty-first century skills, and which are pedagogically associated with learning theories as promoted by constructivism and humanism. This chapter examines and compares IBSE and CA in the case of Finnish and Romanian early-years education teachers. The selected two countries have quite divergent educational policies and systems that provide fruitful societal and educational comparisons from a European perspective of the strategies used in early-years science education. We base our evaluation on data collected in the CLS project for Finland (Havu-Nuutinen, 2012; Havu-Nuutinen & Tahvanainen, 2013) and Romania (Sporea & Sporea, 2012; 2013).

INQUIRY-BASED SCIENCE EDUCATION AND ITS CONNECTION WITH CREATIVITY

IBSE definitions vary across studies. Nevertheless, notable agreement exists concerning the significance of IBSE in science education (Asay & Orgill, 2010; Harlen, 2013). IBSE is defined as an approach that emphasizes student-centered learning activities, advocating experimental problem solving. Inquiry is a term commonly used both within the education system and in everyday life to refer to the quest to obtain explanations and/or information by trying to answer formulated questions. Within scientific circumstances, it refers to research, investigation, or the "search for truth" (ibid.). In regard to schoolwork, one group of academics defined inquiry-based instruction as emphasizing understanding and variation of the skills developed in the process (IAP, 2010, p. 5):

> It is a process of developing understanding which takes account of the way in which students learn best, that is, through their own physical and mental activity. It is based on recognition that ideas are only understood, as opposed to being superficially known,

> if they are constructed by students through their own thinking about their experiences. In the classroom these experiences include direct observation and investigation of materials and phenomena, consulting information sources such as books, experts, the internet and discussion with others in which ideas are shared, explained and defended. This learning will involve the development and use of skills of observation, raising investigable questions, planning and conducting investigations, reviewing evidence in the light of what is already known, drawing conclusions and communicating and discussing results.

IBSE refers in many ways to the skills and procedures scientists employ in their investigative work to understand the world around them, and it is expected that students conducting "scientific investigations" will use similar approaches in the classroom. One of the core priorities of IBSE targets children's understanding of the nature of science and scientific phenomena in relation to their concepts and prior knowledge. Inquiry-based approaches in science teaching and learning aim to guide learners in finding alternative solutions to the problems they are facing, and to better decipher the world they live in. IBSE aims to deal with issues that are context related and require multifaceted understanding and action. Students should also develop an understanding of the way scientific ideas and knowledge are obtained, the skills that are needed for this, and the attitudes expected from students in seeking and using evidence (ibid.). For this reason, the development of skills supported by reasoning, justifications, or critical thinking is required in IBSE practice. In IBSE, students are encouraged not only to represent and communicate their findings but also to create an understanding of the way concepts are scientifically connected.

Besides the cognitive factors of learning, the inquiry approach involves affective factors such as motivation, curiosity, and enjoyment toward science-related activities. In addition, IBSE encourages young students' self-regulation, self-control, and the ability to reinforce self-esteem in order to overcome difficulties of the learning process (Harlen, 2013). Affective factors have been seen as extremely significant in young children's learning process. Young children's cognitive capabilities are limited, for which reason they need means to engage them emotionally in constructing their understanding of the surrounding world. With the support of emotional imagination, young children will be able to reach a scientific understanding of the phenomena under discussion (Fleer, 2013).

In early-years science education, the level of teacher's scaffolding in inquiry-type activities varies according to the pedagogical context, the novelty of the studied topics, and the age of students. Depending on the phenomena or intended purpose, teacher's involvement varies from a structured to an open approach. In the open approach, the teacher is less involved, stands aside, and gives more time and space to children's initiative. In the structured approach, ready-made materials and given work recipes are used and children participate in activities and perform suggested tasks under the teacher's guidance. Table 1 shows some essential features of the inquiry-based learning method in science education and suggests possible variations to be applied in the classroom.

Table 1. Essential Features of Inquiry-Based Learning in Science Education (see CLS, 2013a, pp. 69–70)

Feature	Open	Guided	Structured
Question: Children investigate a scientifically-oriented question.	The child presents a scientifically-oriented question.	The child selects from, or refines, a range of scientifically-oriented questions provided by the teacher, materials, or other sources.	The child is given a scientifically-oriented question by the teacher, materials, or other information sources.
Evidence: Children give priority to evidence.	The child determines what constitutes evidence or data and collects it.	The child selects from data/evidence provided by the teacher, materials, or other sources.	The child is given evidence or data by the teacher, materials, or other sources.
Analyse: Children analyze evidence.	The child decides how to analyze evidence.	The child selects from ways of analyzing evidence provided by the teacher, materials, or other sources.	The child is told how to analyze evidence provided by the teacher, materials, or other information sources.
Explain: Children invent explanations based on evidence.	The child decides how to formulate explanations based on evidence.	The child selects from possible ways to formulate explanations given by the teacher, materials, or other sources.	The child is given a way to formulate explanation based on evidence.
Connect: Children connect explanations to scientific knowledge.	The child independently finds and examines other resources and forms links to scientific knowledge.	The child is directed to other resources and shown how to form links to scientific knowledge.	The child is given other resources and shown the links with scientific knowledge.
Communicate: Children communicate and justify explanation.	The child chooses how to communicate and justify explanations.	The child is given broad guidelines on how to justify and communicate explanations.	The child is given all the steps to justify and communicate explanations by the teacher, materials, or other information sources.
Reflect: Children reflect on their inquiry process and their learning.	The child decides independently how to structure reflection on the inquiry process and his or her learning.	The child is given broad guidelines to structure reflection on the inquiry process and his or her learning by the teacher, materials, or other information sources.	The child is given a structured framework for reflection by the teacher, materials, or other sources.

As illustrated in Table 1, IBSE provides several options for independent and creative learning. Creativity is referred to as the ability to produce something novel or unique, or as a process in which different features of higher order thinking skills are employed (Sternberg, 2003). IBSE is a scaffolding learning process that offers

opportunities for personal solutions in a flexible environment. Learners have plenty of room to exercise their learning skills and discuss conclusions. Basic thinking operations may be expanded to creative thinking through changing the learning environment (Daud, Omar, Turiman, & Osman, 2012, p. 471). However, what is needed to achieve creative thinking in IBSE contexts?

A review of the recent literature on creativity reveals the complexity of the concept. The following analysis of the theories of creativity is based on Kozbelt's study (2011, pp. 473–479). There are several theories that try to define what researchers mean by the concept of "creativity." Some of them focus on the theoretical definition of the concept, while others refer to the practical ways in which creativity manifests itself. The theoretical viewpoint considers the concept as an entity, the definition of which is derived from particular theoretical contexts such as psychology, cognitivism, economy. In these cases, creativity is often defined very narrowly, which makes defining it in school contexts challenging. In contrast, the practical approach analyzes creativity with respect to the contexts in which the use or emergency of creativity is exploited to capture the features of creative behavior (ibid., pp. 474–475). From this perspective, creativity becomes essential within school context.

In the practically oriented framework, not all instances of creativity are equal. More often, two definitions of creativity are employed according to the considered level of creative magnitude. A standard distinction differentiates the "big-C" (associated generally with history-making instances of creative breakthroughs belonging to eminent individuals) versus "little-c" creativity (a common, minor manifestation accessible to ordinary people). In recent years, two additional categories of creative magnitude have been proposed: firstly, a "mini-c" category that provides more room to subjective or personal realizations of creativity, and secondly, a "pro-C" category that characterizes professional-level creators who have not yet attained eminence but who are well beyond common creators in respect to their knowledge, motivation, and achievements (ibid., pp. 474–475).

School-based studies are often focused on little-c or mini-c approaches. Researchers have been interested in the creative processes in particular learning situations or in situations in which creativity appears as part of subject learning, for example, in mathematics teaching (Panaoura & Panaoura, 2014) or in science education (Daud et al., 2012; Webb & Rule, 2012). In these studies, creativity is understood as contextualized where domain contexts matter. In a school-based project, it is important to consider the way a traditional content-based learning process can be implemented as a creative process in which new methods and/or another context are emphasized. From this perspective, between IBSE and CA, common synergies can be identified, which makes our discussion more challenging and significant. Especially in early-years context, new context and approaches may produce creative outcomes and support personal investigative processes. This has been revealed with older students (Daud et al., 2012) and, additionally, defined in the theoretical framework of the CLS project (CLS, 2012, pp. 63–64). These synergies have been identified as follows:

- Play and exploration: Recognizing that playful experimentation/exploration is inherent in all young children's activity – such exploration is at the core of IBSE and CA in the early years.
- Motivation and affect: Highlighting the role of esthetic experience in promoting children's affective and emotional responses to science and mathematics activities.
- Dialog and collaboration: Accepting that dialogic engagement is inherent in everyday creativity linked activities in the classroom, while play has a crucial role in learning in science and mathematics. Play is a critical feature of IBSE and CA, enabling children to externalize, share, and develop their thinking.
- Problem solving and agency: Recognizing that a scaffolded learning environment can provide children with shared, meaningful, physical experiences and opportunities to develop their own questions and ideas about scientifically relevant concepts.
- Questioning and curiosity: These are central to IBSE and CA, recognizing that creative teachers often employ open-ended questions and promote speculation by modeling children's curiosity.
- Reflection and reasoning: Emphasizing the importance of meta-cognitive processes, reflective awareness, and deliberate control of cognitive activities, which may be still incipient for young children, but which have to be incorporated into early-years practice of scientific and mathematical learning in the IBSE framework.
- Teacher scaffolding and involvement: Emphasizing the importance of teachers' mediating the learning process to meet the child's needs rather than being under pressure to fulfill the requirements of a given curriculum.

Creativity is a process that can be developed and enhanced. Every person has a "dormant" potential, and therefore this potential should be discovered and enhanced by giving individuals the opportunity to "activate" their creativity. Young children are obviously curious and have an interest in testing their ideas. New findings are often emotionally fostered. However, young children need a scaffolding. Teachers have the responsibility to conceptualize and promote questions in order to encourage children to make discoveries on their own (Havu-Nuutinen, 2005). Hence, increasing teachers' competences and awareness of approaches that foster children's creativity in subject-related contexts is essential.

THE ROLE OF IBSE AND CREATIVITY IN EARLY-YEARS SCIENCE TEACHING

Although IBSE was widely launched as a leading and promising approach in science education, it is not being systematically used in classrooms. In secondary school or in higher education, science teachers use laboratory work more often than elementary or pre-school teachers, but even this does not cover the requirements for IBSE (IAP, 2010). Teachers without a strong background or subject knowledge often lack

confidence in teaching science using the inquiry-based approach, and they tend to approach science teaching on their own terms and based on their own understanding (Tatar, 2012, p. 260; Webb & Rule, 2012, p. 379).

It also seems that hands-on activities are more common than IBSE in early years because the focus is on process skills development and discovery-associated learning. Through concrete explorations, which are natural to children, they start to find connections between scientific concepts and their everyday activities. Experimental explorations are often seen as a way to motivate young children (Kramer & Rabe-Kleberg, 2011). Discovery learning and hands-on activities are sometimes described synonymously in practice, causing confusion and challenging the researcher to identify practical implementations in IBSE. Generally, early-years science education rarely follows the procedure found in scientific research, and, in this context, no research design is used. In addition, early-years activities lack tasks encouraging children to develop their scientific reasoning and understanding. Kallery, Psillos, and Tselfes (2009, p. 1187) reported that the didactical activities they investigated in relation to early-years science education did not promote scientific understanding because of their occurrence at the representative level. This means that the activities mainly addressed the qualitative descriptions, and no links between evidence and theoretical aspects of phenomena were present in the instruction. However, IBSE seems to be effective for young learners when benefiting from appropriate teacher's scaffolding. For example, experiments that are supported with collaborative discourses could provide significant opportunities for understanding complex scientific phenomena. A strong social component is embedded in these processes (Siry, Ziegler, & Max, 2012; Fleer, 2013).

One of the common challenges faced in early-years science education is teachers' competence in setting up opportunities to conduct IBSE and CA. Many pre-school teachers have superficial training in the methods used to integrate science teaching into their classrooms activities, and they may also lack adequate scientific subject knowledge to support children's learning (Moomav, 2012, p. 58). Early-years teachers' education addresses science education quite cursory, which naturally leads to their reticence in teaching science. Inquiry-based science teaching should be integrated into pre-service teacher education curricula, where the basis for future classroom practice is created.

Teachers' educational practice is strongly affected by their educational beliefs and knowledge of child development (Einarsdottir, 2003), as well as their own values (Craft, Cremin, Burnard, & Chappel, 2007). This means that teachers who fail to understand the significance of science education in child development are not prepared for using an inquiry-based approach. According to Westman and Bergmark (2013), pre-school teachers value scientific exploration, but they seem to emphasize the more esthetic and social aspects of learning.

Similarly, teachers are aware of and recognize the importance of creativity, but they do not know how to nurture it (Webb & Rule, 2012). Often, there is no opportunity or explicit need to conduct creativity lessons, and so it becomes crucial to find the

most appropriate ways to develop CA and merge it with IBSE in teachers' pedagogy. According to Webb and Rule (2012), creative approaches are challenging for young children because they are unfamiliar with them, but, in the end, such alternative approaches to science teaching produce more enjoyable and better outcomes.

Regarding the findings recently reported in the literature, we can say that science researchers perceive IBSE as highly conceptual and procedural, while teachers have a practical approach to IBSE based on collaborative explorations that provide time for communication and sharing of ideas. However, both methods together set up a frame that refers to the creative approach, in which problem solving, agency, and engagement have a crucial role to play. Creative science learning involves communication and emotional features, in addition to requiring innovative conceptual constructions. To conduct creative teaching in the classroom, these dimensions should be nurtured and supported (Daud et al., 2012). Teaching, especially creative teaching, is also perceived as a process in which cultural artifacts play a significant role.

IBSE and CA are highly recommended and supported by several European Union-funded projects as methods highlighting and reinforcing the skills recognized to be significant in the future world we are building (see Sporea & Sporea, 2014). Research published widely across Europe has identified existing challenges in local practices (Pell, Galton, Steward, Page, & Hargreaves, 2007). The remainder of this chapter discusses the use of IBSE and CA in Finland and Romania, at the pre-school and elementary school levels. It tries to identify the challenges confronting these countries in science education (Kärnä, 2012; Ciascai & Haiduc, 2009). However, the major contribution of this discussion is to provide detailed information on the early-years context, as most published research focuses on the later years of schooling.

COMPULSORY EDUCATION AND TEACHER EDUCATION IN FINLAND AND ROMANIA

Early childhood education and compulsory education have some differences in the Finnish and Romanian educational systems. In Finland, pre-school is a compulsory school year before comprehensive school, while in the Romanian educational system, pre-school refers to early education from the age of three to the age of six. In both countries, similar laws have been adopted, and obligatory education starts in both at the age of six. In Finland, this means a part-time pre-school approach, while in Romania, it means full-time compulsory education (MECTS, 2011). A Finnish child usually starts comprehensive school at the age of seven and a Romanian child starts it at the age of six. In both countries, compulsory education spreads over the elementary education and lower-secondary education levels, taking ten years.

There are also some differences in school practices. In Romania, at pre-school level, group size counts for up to fifteen children, but no fewer than ten and no more than twenty, while for elementary school, the mean number of children is twenty. However, a class cannot be organized with fewer than twelve students or more than twenty-four students (ibid.). Only one teacher is responsible for each

group of children. In Finland, the government does not regulate the group sizes in this manner, but rather according to a law (see OAJ, 2015). One professional adult is needed for four under three-year-old children. In pre-school, one competent teacher is required for twenty-one children. Generally, pre-school groups consist of six to twenty children. In elementary school, the teacher is responsible for his or her class, which may have a maximum of thirty-two students. Assistant teachers are temporarily used in subjects like arts and crafts.

The major differences between the two countries occur in teacher evaluation. In Romania, teachers are evaluated using the following methods: (a) self-evaluation; (b) peer evaluation; and (c) evaluation by the administrative council, based on certain files that must be submitted and an interview (MECI, 2009). Direct evaluation of teachers is done for classroom activities and extracurricular activities using questionnaires and/or interviews with students, parents, and other interested parties. These results are correlated with an analysis of teacher activities' outcomes such as publications, books, guides, students' notebooks, and practical material. Teachers attending courses devoted to special training programs receive recognition based on their portfolio and practical work. Indirect evaluation of teachers is done during national tests for students when teachers' qualifications and results are assessed (ibid.). In Finland, teachers are not evaluated according to any specific national standards. Students' achievements and outcomes are made publicly available and presented over the year in public ceremonies and festivals, but this is not done in terms of any evaluation. All school activities are public and any one can follow teachers' and students' work over the school year. Teachers are responsible for informing the parents about their schoolwork and assignments. They conduct discussions with parents and other educational professionals if they have difficulties achieving their planned goals with their students, or if special education is needed. Again, these processes aim to support students' learning, not to evaluate teachers. Finland has no national tests, tlineschool ranking lists, or inspection systems.

Teachers in both countries receive their training at a university. In Romania, graduates of "educational sciences" are certified at the bachelor's level. Students gain a diploma after they attend specific courses, some of them compulsory and others optional (Bîrzea et al., 2006; MECTS, 2011). In both countries, minor studies focus on science education, while major studies focus on educational sciences. The Finnish government regulates the norms and qualifications necessary for students to participate in teacher education, but a national teacher training curriculum does not exist in Finland and the content of teacher education is determined by each university. In Romania, teacher education is governmentally regulated.

Despite the differences in educational systems, both countries have actively analyzed the impact of national education and followed the international discussion about the role of creativity and inquiry-based science education. Both countries confirm the existence of similar challenges in science education and aim to strengthen the educational outcomes. As members of the European Union, even though we come from different cultural backgrounds, we have "embarked on the same boat."

We thus consider this comparison between Romania and Finland to be of interest to the international educational community as a comparative study of the ways in which IBSE and CA merge with each other within different educational systems.

This chapter reviews Finnish and Romanian teachers' conceptualizations and practices in respect to inquiry-based science education and the role played by creativity in this context. More specifically, it analyzes how teachers conceptualize their aims, approaches, and pedagogy from the viewpoint of inquiry and how they determine the role of creativity in these settings. Finally, it compares teachers' conceptualizations with the actual classroom practices observed for some selected participants.

RESEARCH METHODOLOGY

The data for both countries were collected as part of the CLS project during 2012 and 2013. The data collection occurred in two phases employing quantitative and qualitative approaches. Teacher survey was used to understand teachers' conceptualizations and classroom experiences with regard to IBSE and CA. The survey focused on teachers' approaches in early-years science teaching, in learning and assessment, and on the role, if any, creativity plays in these instances.

Teachers' classroom practices were examined from the following three perspectives: (a) aims, purposes, and priorities; (b) teaching, learning, and assessment; and (c) contextual factors. This chapter focuses, in a comparative manner, on aims and purposes, teaching and learning approaches, and pedagogical methodologies, to determine the manifestation of inquiry-based science education and creativity in teachers' conceptualizations and in practice in Romania and Finland.

Apart from the teachers' survey, a fieldwork study examined the ways in which the approaches used by teachers foster children's interest and motivation in science learning. For the fieldwork, the observation protocol and instruments employed were developed by the project consortium and were completely reported in the project deliverables (CLS, 2013a; 2013b).

In both Finland and Romania, the core instruments for the fieldwork and data collection were as follows: field notes, videotapes, digital photos, teacher interviews, a map of the classroom or the learning area, and children's artifacts such as drawings. In addition to these, there were supplemental instruments such as planning sheets, local curricula, evaluation sheets, and learning material created and/or published by the teachers involved in the research, teacher journals, Fibonacci style tools to support diagnostic observation, Involvement Scale, Reggio style documentation, and conceptual drawing. Furthermore, the Finnish team collected some additional data through group interview with children and learning walks. These tools were not used in the Romanian research.

In both countries, the teacher survey was conducted during May 2012 using the electronic survey tool Survey Monkey. The project questionnaires, translated into the local language, were sent to selected teachers, and adequate response rates were achieved. In Finland, the questionnaires were sent to randomly selected 400 pre-

school and elementary school teachers, while in Romania, the teachers were reached through national associations, professional networks, or researchers' e-mail contacts, in order to reach a large audience, spread across the country.

All the participants were certified teachers having high expertise; more than half of the teachers had over ten years' working experience. Nearly sixty percent of the Finnish teachers and thirty percent of the Romanian teachers had a master's degree.

The fieldwork data consisted of six teacher cases from each country. These six cases represented different scenarios, including teachers from pre-schools and from the first and second grades of elementary schools. The teachers' distribution in the two countries is presented in Table 2.

Table 2. Distribution of Participants from the Two Countries

Country	Pre-School Teachers		Elementary School Teachers		Total	
	Survey	Fieldwork Observation	Survey	Fieldwork Observation	Survey	Fieldwork Observation
Romania	101	3	140	3	240	6
Finland	13	3	57	3	70	6

Survey data were analyzed quantitatively using descriptive statistics to map frequencies of conceptualizations for the different topics under discussion. Histograms were used to compare the data.

The recordings of field study were transcripts aiming to create narrative episodes of each teaching sessions. A narrative episode was defined as a written narrative account that described an observed event or series of connected events of science teaching/learning with a focus on IBSE and creativity. Each narrative episode formed a coherent story by itself. These episodes were used to analyze the observations for their relevance to the research questions and the factors of analysis.

This chapter presents and discusses the outcomes of these two sets of data in relation to the research tasks focused on in this study. It presents here the summary of two different sets of data, in Finland and Romania, based on the national reports the authors have created for the project deliverables. Within this context, the focus is on a parallel comparison of teachers' conceptualizations and observed practices with respect to inquiry approaches and the role of creativity in the aforementioned context.

When assessing the subsequent findings and when drawing conclusions from this work, the following limitations need to be considered: the survey was not conducted during an appropriate time in the school year and thus only a small sample of teachers responded to the questionnaires in Finland. The field study

covered only a limited number of schools and timescale of the school year (i.e., during the wintertime classes). There might be several other activities and drivers, not captured in the study, used by early-years teachers in their science education practice, in both countries.

INQUIRY APPROACHES TO TEACHING AND LEARNING IN SCIENCE EDUCATION AND THE ROLE OF CREATIVITY

Aims and Priorities in Science Teaching

Learning goals today are broadly aimed at inquiry-based learning, in which social factors are merged with teachers' conceptualizations. In both countries, teachers aim to create opportunities for collaboration among children and to develop children's positive attitude toward science. Over eighty percent of surveyed teachers see collaboration as the driving force to achieve the expected outcome in science learning. Science education is clearly seen as having the potential for engaging children's social skills, including communication skills such as asking questions about objects, organisms, and events in the surrounding environment and trying to formulate evidence-based answers to these questions. Therefore, the socio-pedagogical approach becomes the philosophical background for teachers' conceptualizations in regard to the aims and objectives of science teaching.

The other clearly identified goal in science teaching is the development of children's attitudes, as indicated by most of the Finnish and more than half of the Romanian teachers. Positive attitudes toward science learning or learning in general are highly ranked as an outcome of the educational process. When interviewed, teachers indicated that interest and motivation are essential parts of early-years science education, with emphasis placed on creating knowledgeable citizens. This proved to be of major interest, as several studies have indicated that students' attitudes toward science learning during later school years tend to become less favorable, so more focus should be placed on these issues during early-years education.

Cognitive outcomes are seen in both countries to be similarly significant, but they are not a priority. Almost all teachers showed an interest in promoting children's understanding of scientific ideas and concepts. Scientific processes were fostered by sixty-five percent of the teachers in Finland, and by seventy-seven percent of the Romanian teachers. According to established practice, teachers understood their responsibility to encourage children's conceptual and procedural learning. However, there was more variation in terms of fostering scientific inquiry skills such as understanding scientific investigations and the way scientists work. Only one third or less of the Finnish teachers often or very often foster these learning outcomes, while seventy percent of teachers in Romania are preoccupied by this aspect. Finnish teachers tend to focus on scientific procedural learning by enhancing process skills. Romanian teachers set targets on outcomes with an impact toward formulating questions and understanding scientific processes.

In both countries, teachers do not show the ability to encourage children to conduct scientific investigations and do not place enough emphasis on describing issues related to the ways scientists perform such investigations in a manner enabling others to repeat the process.

Conceptualized and Practiced Teaching and Learning Approaches

Teachers report in the survey on the use of teaching activities that facilitate children's process skills development, such as observing and describing their immediate surroundings, and that support children comments about their observations. Teachers also regularly focus on questioning, both those addressed to students and the ones promoted by their teacher students during investigative work. Based on teachers' conceptualizations, the foundation for an inquiry approach is created in early-years science education, as is shown by the survey responses in both countries. The skills needed for explorations leading to enhanced knowledge and to an understanding of the natural and man-made world through direct interaction are supported through the collection of data to be used as evidence in formulating explanations of phenomena and events (Harlen, 2013). However, early-years teacher do not always assign sufficient time to concrete experiments as required by a true inquiry-based approach. Teachers in both countries have different options in planning and conducting investigations. In Romania, the inquiry-based approach is practiced through investigative means more often than in Finland. Table 3 presents the science teaching activities that are focused on often or very often for the majority of teachers. More than seventy percent of teachers in Romania teach the essential skills for scientific investigation. Finnish teachers focus on interactive approaches with a corresponding lack of focus on data collection and designs of studies.

Divergent tendencies are also visible in teachers' conceptualizations about the role of creativity in teaching activities. Finnish teachers report observing, describing, and communicating activities to be the most creative approaches. They put less emphasis on investigative approaches such as planning and conducting investigations; however, this study indicated a potential for creativity-focused methods. Romanian teachers encourage investigative approaches and processes in which children have the opportunity to create their own projects.

In this respect, teachers' conceptualizations, with some exceptions, became evident in the analysis of case narratives. In both countries, teachers fostered process skills, but in some cases, Romanian teachers went further in regard to developing inquiry skills, such as group work or communication. In Finland, observations or classifications of objects or phenomena are seen as sufficient for science teaching, while explorations are rarely used for reasoning or additional problem-solving development. Observations are systematically recorded and sometimes elaborated with teacher support, as indicated in the following:

Table 3. The Order of Science Teaching Activities as Perceived by the Majority of Teachers That are Focused on Often or Very Often

Activities in Romania	Activities in Finland
– Observing natural phenomena, such as the weather or a plant growing, and describing what is seen	– Observing natural phenomena, such as the weather or a plant growing, and describing what is seen
– Asking questions about objects, organisms, and events in the environment	– Asking questions about objects, organisms, and events in the environment
– Communicating the results of investigations and explanations	– Communicating the results of investigations and explanations
– Employing simple equipment and tools to gather data as an extension of the senses	– Using data to construct reasonable explanations
– Designing or planning simple investigations or projects	
– Conducting simple investigations or projects	

In this learning activity, the children study snow and the natural states of water. Here they had a problem-based activity: what happens when snow is heated? Children collected snow using various measures, and in doing this they also learned measurement units (e.g., 1 liter, 0.5 liter, and 3 deciliters). Because a camping cooker was used to heat the snow, the activity was partly in form of a demonstration. The teacher was strongly involved in the activity and asked questions about the phenomena involved.
Teacher: What do you think, how much water will we collect when the snow has melted?
Children: More. ... Less.
Teacher: What can you see here? [pointing to the steam]
Children: Steam.
The teacher pours water back into the dish.
Teacher: What do you think now: is there more or less water than when it was snow?
Children: Less.
Teacher: Could you tell me how much there is, approximately?
Children: There are three liters. ... There is half a liter. ... There is one liter.
After discussion, they agree that there's about a half liter of water.
Teacher: How much snow did we have?
Children: One liter.
Teacher: So when water is in the liquid form, it takes up less space than when it is snow.
(Mary, Case 1, Finland)

In the above example, the teacher guided the learning process by organizing an experiment. They were faced with a problem to be solved through the activity ("What happens when snow is heated?"), and together they tried to find an answer

to this problem. In this way, the children were highly engaged in the activity. The results of the experiment were individually reported by making drawings, but they were elaborated and reflected on with the teacher's assistance. This example also proves children's minor role as investigators. The children were not encouraged to collect more data, to prove evidence, or to justify their observations.

However, teachers place emphasis on the creative potential of investigations. To exemplify, the investigations were ranked as the third most creative approach in science education by nearly half of Finnish teachers. Additionally, over half of Romanian teachers were interested in conducting investigations, designing and planning investigations, and asking questions. Observation and communication were most often valued by Finnish teachers, while using data to construct reasonable explanations or to employ simple equipment and tools to gather data, was perceived as potentially creative only by one third of them. Table 4 presents the most creative approaches as ranked by the teachers.

Table 4. The Most Creative Approaches in Science Education as Selected by Teachers

Approaches as Ranked by Romanian Teachers	Approaches as Ranked by Finnish Teachers
– Conducting simple investigations or projects	– Communicating the results of investigations and explanations
– Designing or planning simple investigations or projects	– Observing natural phenomena, such as the weather or a plant growing, and to describing what is seen
– Asking questions about objects, organisms, and events in the environment	– Asking questions about objects, organisms, and events in the environment

Communication and observational activities were used in very creative ways in Finnish case studies, in outdoor contexts, which were selected as authentic learning environments for the development of process skills. Finnish teachers often took children outdoors during severe winter weather, and data were collected in these conditions. The outdoor context offered each child the opportunity to gather information from the surrounding environment and to find creative solutions to problems proposed by the teacher.

Learning activities are strongly focused on cognitive dimensions such as gathering evidence and making connections in various contexts. The activities were carried out in both large and small group settings in which the teacher played the role of a facilitator by asking questions. The teacher presented a problem or task (e.g., "Try to find a plant that is smaller than yourself.") and scaffolded children by providing necessary instruments and posing supportive questions.

Teacher: What have we done every time we've been here?
Child: Measure things.
Teacher: What have we measured?
Children: Ice. ... Water. ... The temperature of water.
Teacher: What else have we done every time since August? ... We have done this before, in August.
The teacher says that they are going to find something smaller and something taller than the students, and that for this purpose they are going to use measuring sticks.
Teacher: Now look for something smaller than yourself. ... Think just to yourself, don't follow anyone else.
Teacher: What did you find? ... What could that be?
Teacher: Look for something bigger than yourself.
Child: I found a pine tree, it's bigger than me.
Teacher: Which tree is it?
Teacher: Can you find something with the same height? ... This is one meter.
The teacher gives measuring sticks to everyone.
In the second phase of the learning activity, the children measure the temperature of snow.
Teacher: What's the figure you are reading? ... Is there a minus or a plus sign?
Teacher tells the children to put the thermometer above the snow.
Teacher: What happens now? ... Is it warmer under or above the snow?
Child: Above.
Teacher: When there are minus degrees, the bigger the number, the colder it is.
(Kirsten, Case 3, Finland)

In practice, Romanian teachers undoubtedly rely on experiments. In most of the narratives included in the CLS reports, small-scale experiments are presented in which the children have high agency and enough space to express their own ideas and thoughts. However, in many cases, the experiments are strongly guided and modeled by teachers, so few opportunities for creative and flexible approaches to solve problems are left to students.

Teachers believe that they are incorporating different forms of inquiry approaches in their teaching (see Table 5). A similar tendency seems to be valid for both countries; teachers most frequently follow open or guided inquiry with young children. The method varies depending on the nature of the task to be fulfilled. Finnish teachers mostly apply a guided approach to find evidence, to connect ideas to scientific concepts, or to reflect on the results. On the other hand, the social dimension of learning activities (i.e., explaining and communicating) more usually follows open inquiry. Romanian teachers highlighted similar approaches in their answers, but they were more predisposed toward an open approach. The conclusion can be drawn that in Romanian classrooms, children have more options for their ideas and thoughts.

The study findings in the observed cases indicate that several features of the guided inquiry approaches were identified. The observed activities included the characteristics and contexts of inquiry approaches; however, several major requirements such as (a) experiment design, (b) hypothesis formulation, or (c) reasoning were lacking. The experiments were child centered and had a great

Table 5. Inquiry Approaches Used by Teachers in the Classroom

Aspect	Country	Open	Guided	Structured	N/A
Question: Children investigate scientifically oriented questions.	Finland	22%	47%	30%	1%
	Romania	42%	42%	15%	1%
Evidence: Children give priority to evidence.	Finland	22%	65%	13%	
	Romania	24%	53%	21%	2%
Analyze: Children analyze evidence.	Finland	16%	61%	22%	1%
	Romania	25%	47%	26%	2%
Explain: Children formulate explanations based on evidence.	Finland	73%	22%	4%	1%
	Romania	43%	36%	19%	2%
Connect: Children connect explanations to scientific knowledge.	Finland	15%	67%	10%	8%
	Romania	30%	55%	14%	1%
Communicate: Children communicate and justify explanations.	Finland	50%	45%	3%	2%
	Romania	21%	53%	19%	7%
Reflect: Children reflect on the inquiry process and their learning.	Finland	21%	53%	19%	7%
	Romania	31%	46%	20%	3%

potential for inquiry, but unfortunately, strong evidence of the teacher's engagement was often present. There was still room to formulate children's initial thoughts and their solutions in framed contexts, as textbook-defined inquiries were seldom used. Note the following floating and sinking experiment in Romania:

> Maria introduced children to the story of the dove that is expected to save an ant from drowning in a river. She has a list on the whiteboard of possible materials to be used as materials that float. She suggests that the students run an investigation in order to identify the best idea to solve the problem. Children are given small containers of water in order to verify what materials existing in the forest can be used as little "boats" for the ant: nuts, feathers, wooden sticks, leaves, pebbles, acorns, pieces of bark, fir cones, etc. Maria asks every group to come to the front table and to take the materials they think to be most suitable for the task to save the ant. Children have to evaluate *a priori* what objects float. (Maria, Case 1, Romania)

Finnish teachers seemed to prefer guided inquiry activities in which children followed the teacher's designed experiment. Often, the experiments had some exceptional feature to make work more exciting. When interviewed, teachers argued

that the IBSE approaches are appropriate to increase children's willingness and curiosity to explore scientific phenomena.

> Children had their own volcanoes and they all stood close to the table. The teacher provided a working sheet that was intended for making predictions: which ingredients, when mixed together, make a volcano erupt? Before each experiment, children marked down their prediction and after it, they marked down the results. Children measure the sugar content into the volcano mixture, and the teacher gives them the vinegar, allowing them to smell it.
> Children: Terrible smell!
> Teacher: Who knows how much vinegar is in this dish?
> Children: 600 liters. ... One liter. ... Half a liter.
> Teacher: The size of a milk bottle is one liter. Is this the same size?
> Children: No.
> Teacher: This is one deciliter and you can put ten of them in one milk bottle.
> Teacher: Many of you predicted that the volcano is going to boil over with these ingredients. Let's see what happens.
> Teacher: When you have poured the vinegar into the volcano, you should move back. Please, now you can start.
> Children pour the vinegar and move back looking excited.
> Children: No, nothing is happening.
> Teacher: OK, please come and mark your result on the work sheet.
> Nothing happens and the children mark the outcome onto the work sheet. Then they pour the sugar and vinegar away and mark down the second prediction.
> Child: I knew it!
> Children measure the salt into the volcanoes, and the teacher gives them the vinegar.
> Teacher: How did we work in the first case?
> Child: You will give us permission and then we will pour carefully.
> Teacher: Yes! And then?
> Child: We step backwards.
> The teacher asks the children how they should work with the ingredients and then gives permission for them to pour the vinegar.
> Children: Nothing!
> Nothing happens, and the children once again mark the outcome on the paper form. Next, they mark the predictions for the last pair of ingredients (baking soda and vinegar). Children measure the baking soda into the volcano mixture, and the teacher gives them the vinegar, asking them to move the volcanoes to the middle of the table. The children pour the vinegar, looking happy and excited when the volcano boils over. The children laugh.
> Teacher: Did you manage?
> Children: Yes.
> Child: My volcano can erupt once again!
> Children mark the outcome on the work sheet.
> One child wonders why the liquid on the table is violet and is told that the color is from the paint on the volcano.
> (Rita, Case 2, Finland)

Although the teacher involvement was recorded as high, the children seemed to have the opportunity to learn the basic methods of gathering data and reporting their findings. The experiment provided the initial experience for the children to engage in scientific inquiry and to use different data collection methods to solve the problems they are facing.

In conclusion, teachers' conceptualizations emphasize IBSE education more than can be observed in their actual practice. The approaches teachers use are often experimental and support young children's abilities to learn, but teachers' engagement and preparation play a crucial role as well. Learning approaches foster social skills such as communication, which in one sense supports conceptual learning at the same time. To reflect the characteristics of IBSE, teachers place less emphasis on the role of investigation in children's initiative experiences or knowledge, and they design investigation activities together with children. In addition, the role of higher order thinking skills, such as criticism or optional opinions, is rarely addressed.

Pedagogical Approaches: How Does the Teacher Facilitate Learning?

The pedagogical approaches used by teachers incorporate several methods to facilitate learning. According to the survey, nearly all early-years science teachers try to build their teaching on children's prior experiences. Teachers reinforce the idea of family, and the environment in which the child grows up shapes his or her role as a future citizen. In addition, teaching is related to everyday life and is often considered to be interdisciplinary. For example, in one case study, the teacher Maria started the demo session based on students' previous knowledge and experiences from everyday life. Maria interrogated them about the characteristics of water:

> Teacher: What are the characteristics of water we learned about based on the experiments we conducted in the last lessons?
> Child 1: Water is a liquid.
> Child 2: Which flows.
> Teacher: What are the properties of liquids?
> Child 3: They have no form.
> Teacher: What forms do liquids have?
> Child 4: The form of the glass.
> Teacher: Anything else about water?
> Child 2: Water has no smell.
> Teacher: Clean water has no smell.
> Child 5: Water has no color.
> Child 6: Water does not poison you and has no acid.
> (Maria, Case 1, Romania)

As the teachers indicated in the survey, problem-based learning seems to be an approach that is often used. Teachers have the clear intention to develop children's problem-solving skills through small-scale experiments. Problems are related to

children's immediate living environments, to particular science concepts, or to phenomena such as sinking and floating, water characteristics, colors, and the like.

Imagination is fostered by almost all teachers. Play and exploration are systematically used in science teaching, but it seems that free pretend play is not used in Finnish school learning. In Romania, on the other hand, it is widespread and more than eighty percent of teachers use it often. However, drama is not so often applied in science education contexts. As mentioned earlier, social approaches such as collaboration and dialog are used by more than seventy percent of Romanian teachers.

The following narrative episode refers to the Romanian teacher Maria, who is teaching about floating and sinking. This is an example of how imagination is used to engage children in a scientific context:

> Maria asks children what a forest is and what kind of trees can be found in a forest. There is a permanent dialog with children, who respond to the teacher's questions. The little ant is looking for food. During what seasons do ants gather food? All the children are engaged in the dialog, and they are asked if they agree with the answers. The ant arrived near the creek and dropped into water. A dove flying around saw what happened and came to help the ant. When telling the story, Maria shows children some drawings representing the ant and the dove. She speaks slowly, pronouncing all the words very clearly, both in Romanian and in English. The children are asked to describe and then compare the two characters. How can the dove help the ant?
> Teacher: What do you think the dove could have done to save the ant?
> Child 1: It could take the ant with its beak.
> Child 2: That would not work; the dove's beak is too strong.
> Teacher: Then the dove looked around to find something to help the ant out of the water. I wouldn't tell you what it found. I shall leave you to guess what it used. You have to discover what the object is that the dove used.
> Child 3: Let me tell you. I know what it is about. The dove helped the ant with its feet. With its paws.
> Teacher: Let's pay attention. Where was the ant? Where was its mound located?
> Child 4: At the edge of the forest.
> (Maria, Case 1, Romania)

Reviewing the rest of the narrative episodes, we can see that the stories or imaginative contexts were used as an introduction for the science explorations. The stories work as training aids when unknown scientific concepts or phenomena are introduced. On the other hand, stories or imaginative settings are invoked in the experiment, and by playing a game, children learned to solve problems.

Although the teachers who were surveyed emphasized the role of investigations as creativity potential, their pedagogy did not include it in carrying out investigations. Their teaching approaches show only a few signs that their longitudinal research projects have the design of a scientific investigation. In addition, ICT tools are not used systematically, and only one third of the teachers mentioned using them often. In the case studies analyzed, nearly all schools and kindergartens had access to several ICT tools such as interactive whiteboards, PCs with appropriate peripherals, and the Internet. It was recognized that available

devices were not used in an effective way, despite the fact that these were present in school resources.

According to the rankings given by Finnish teachers, the most creative teaching methods are physical exploration and outdoor activities, while Romanian teachers emphasized the importance of integration with other subjects. Play and imaginative activities were seen as fostering children's creativity in both countries as well as in widely used case studies. Although the stories and fairy tales were not ranked as leading creative teaching methods, they were systematically used by teachers in practice to capture children's attention and interest. Learning activities were often tied up with imaginative figures or contexts to increase children's engagement and motivation. However, Finnish elementary school teachers do not explore the potential of the imagination as much as their pre-school Finnish colleagues, and elementary or pre-school Romanian teachers.

Using history in science teaching is not seen as an element that develops creativity in early-years science. The teachers used approaches that showed no signs of historical elements being used and thus they ranked this practice very low. In addition, field trips or visits were not seen as very creative, although these were included in instruction.

Teachers' reflections about their role in the learning process used by children illustrate their pedagogical thoughts about IBSE. Teaching is seen as a problem-based activity, where ready-made answers have a minimum role. In both countries, teachers perceive their role in inquiry approaches as facilitators, and children's own inquiry supported by the teacher is considered to be significant. Teachers also recognize that children need to have enough time for their own explorations, and most of them aim to avoid explicit instruction. These conclusions prove that teachers in both countries know the value of supporting children's own work and efforts in seeking solutions to scientific questions, and they do not aim to impose their opinions on children. Most of them seem to realize that children need more time to spend on their personal investigations.

As highlighted earlier, this practice does not fit teachers' conceptualization in inquiry-based learning. As facilitators, teachers play the role of leaders, and in nearly all observed cases, the experiments are pre-prepared by teachers. There is no room for improvisation according to children's ideas or suggestions. The activities were planned to be conducted as child centered, but not child initiated.

Similar to learning approaches, the most creative teaching approaches are related to investigation and problem solving. In addition, child-initiated investigations are seen as mostly creative. Imaginative teaching approaches are valued by Romanian teachers, while problem finding is valued by Finnish teachers. The comparison of ranked approaches in both countries is presented in Table 6.

The children's own ideas and imagination came out in the cases studied. These creative episodes often follow open inquiry and are more flexible in relation to children's own decision-making processes. The following episode is an example of an extracurricular activity in which the interdisciplinary context emerges clearly. The

Table 6. Teaching Approaches That Most Likely Contribute to the Development of Children's Creativity

Approaches as Ranked by Romanian Teachers	Approaches as Ranked by Finnish Teachers
– Fostering imagination	– Encouraging problem finding
– Encouraging children to try out their own ideas in investigations	– Encouraging children to try out their own ideas in investigations
– Encouraging problem finding	– Relating science to everyday life

session was designed for informal science learning as an experiment in which the number of various materials was mixed with play.

> The lesson starts as children are invited to watch an animated movie about the squirrel Scrat, kept prisoner on a sea shore, having its supply of acorns inside ice cubes. In order to survive it has to take out the acorn from the ice. At this point, the movie stops and the teacher introduce a challenge in order to catch the students' attention and induce an emotional state. She writes an encrypted message on the whiteboard, in which a string of numbers has to be replaced by letters, according to a provided legend in order to decrypt the message. Children receive worksheets to use for this task and they are asked to discover the hidden message. The message decrypted, reads in English, "HELP SCRAT." It is actually a brief version of the topic of the problem to be solved by the children. This intervention, as an interdisciplinary approach, is a mixture of English language literacy and mathematics. Group work is the key to discovering the answer to the encrypted message. It is expected that the investigations will run based on children's previous life experience and knowledge. (Stela, Case 2, Romania)

Collaboration or using questioning count for less than one fourth in fostering creativity, but these approaches were reported as often being used as learning methods. In addition, only about a fifth of the teachers believed that "building on children's prior experiences" contributes substantially to creativity development in relation to science learning. Prior experiences were used frequently as a teaching method in both countries.

Problem finding and solving episodes were more often present in Romanian teachers' teaching plans than in Finnish classroom practice. The major difference between the teachers was noted with perceptions relating to experimental short-scale explorations or experiments. In Romanian classrooms, children are actively engaged in conducting problem-solving activities, and this expresses their high agency in the activities.

> Stela asks students to formulate the task to be performed clearly. Children are invited to work in teams and to offer some solution to help the squirrel to reach its food. A bowl of ice cubes, each with an acorn inside, is distributed to each table. Stela explains

> the tasks both in Romanian and in English. Each group starts looking for a solution by formulating an experiment. Various items that can be used in the experiment (teaspoons, salt, sugar, a small hammer, plastics containers, hot water, worksheets) are displayed on a table in front of the class. (Stela, Case 2, Romania)

In general, the teachers' pedagogical skills and understanding of child development are seen to show genuine competence. The teachers also seem to have the clear aim of using inquiry, which they value. However, the practice needs more elaboration if it is to fulfill the requirements for IBSE implementation. More potential exists for conducting IBSE classes with young children. Creative approaches in science teaching have also proved to have synergies with IBSE, but the issue of how creativity is developed through IBSE is not evident in practice.

CONCLUSION

Major Similarities and Differences between the Countries

As stated in the introduction, twenty-first century skills such as problem solving, creativity, collaboration, and ICT literacy have been found to make a significant contribution to science education. These skills should play a key role in early-years education and provide a basis for a spiral learning process in later years. This chapter has discussed and compared Finnish and Romanian teachers' conceptualizations and practices with regard to IBSE and analyzed the role of CAs in these settings.

In both Romania and Finland, teachers emphasize cognitive and social factors of learning, considering both conceptual and procedural skills. Most teachers who contributed to the project valued the common attributes of inquiry-based science teaching and, in theory at least, seemed to accept the significant role played by IBSE in early-years education.

However, Finnish teachers do not systematically target inquiry skills in the educational process, but rather pay attention to cognitive and social process skills such as observation and communication skills. Romanian teachers, in contrast, lay greater emphasis on developing investigative skills.

Reflecting on their conceptualizations on the scope of scientific approaches and methods, teachers use several attributes of scientific inquiry such as formulating questions, promoting problem solving, and debating the results, but not always based on evidence. Despite the fact that several teachers declared during the interviews that they were familiar with scientific inquiry and problem-based teaching, it seems that they lacked a full understanding of the concepts involved and failed to implement them in practical classroom work. Their approaches, in most cases, do not include the planning or the design phase. Neither identifying evidence, nor post process reflection is always included in the learning processes. If scientific phenomena are to be understood they need to be considered in terms of existing evidence in a set context. Considering these aspects from several viewpoints supports children's abilities to develop understanding of concepts in later years.

There seem to be more opportunities to apply scientific inquiry for teaching and learning than teachers use. There may be several reasons for a lack of fully finished approaches, but there is proof that educational systems do not include well-defined training programs for teachers on these issues in either country. As Yager and Akcay (2014) argued, most science educators use the term, but many lack an understanding of what "science inquiry" is, of what it looks like in the classroom, and of the specific changes it requires in terms of instruction and an organizer for the curriculum. Teachers use several synergies of IBSE and CA (see CLS, 2012, pp. 63–64), but the rational of their conceptualizations and practice is clearly not evident to them. It seems that creativity is not clearly and constantly embedded into their pedagogy.

A comparison of the two countries reveals major differences in the implementation of inquiry. As teachers conceptualize their aims, Finnish teachers often concentrate on using process skills, while Romanian teachers scaffold children in problem-solving situations, in which reasoning and decision making are involved. Finnish teachers conceptualize the issues, their practices being focused on the description and the comparison of emergent findings, with few signs of reasoning or searching for evidence. Romanian teachers emphasize the investigative approaches more than their Finnish counterparts do, and their practice includes some characteristics of investigations. These differences can be found in their practice as well. Romanian children have the opportunity to conduct investigations using different methods as well as to compare the results they obtain.

Most of the teachers addressed the frequency with which they used guided or open inquiry approaches. Several activities had more features of a guided inquiry than an open one, but meanwhile, the role of the teacher seemed to be more structured. Teachers were questioning children and giving guidelines for the experiments. Experiments were fully prepared by teachers, often with little room being left for children's initiatives. However, science-related activities followed the child-centered approach and encouraged the children to use skills needed for IBSE.

Teachers' intention to develop children's communication and problem-solving skills became evident mostly in cases when they are using questioning. Teachers in both countries frequently used sessions in which they address questions and lead the discussion in this particular way. However, communication was focused more on comments on results than on offering explanations. Communication about results was linked in most cases with defining the problem in a written form and using data recording on worksheets, two basic attributes of scientific inquiry. Results were shared with the entire class and discussed by the end of the lesson. A major drawback of the education systems in reference to the IBSE concepts was that students were not trained to look for evidence or to offer their own explanations in relation to a studied subject.

Teachers systematically ranked the features of IBSE as having a creativity potential. Instead of using investigations in their pedagogy, the teachers preferred investigations as creative approaches to learn science. Designing, planning, and conducting investigations were more highly valued in Romania than in Finland,

and in the latter case, communication and observations were ranked to be the most creative activities. The gap, which is recognized in practice and highly valued, is not clearly stated by teachers themselves. It seems that teachers value and like to teach, without recognizing the ample opportunities offered by IBSE. In practice, the teachers tend not to urge the children to develop their skills even if these are needed and practiced in inquiry. The definition of IBSE is not always clear for the educators, and the transfer of the conceptual description into actual practice is not easy for the teachers.

Imagination and play have a crucial role in teachers' pedagogy. The experiments or explorations are often merged with multiple aspects of imaginative situations or play settings. The approaches are evident in practice as well. However, some country-related differences also exist. In Finland, these features of pedagogy are involved only in pre-school and not in elementary school, while in Romania there is no big difference between the two. Finnish comprehensive school teachers seem not to value the affective aspects in their pedagogy as highly as their Romanian colleagues do.

Recommendations

In science teaching, inter-disciplinary approaches can be an efficient vehicle to promote creative teaching, as both teacher and students have to assemble different types of knowledge and various experiences to come to a conclusion. Integration between the school subjects was ranked as a creative approach for teaching but did not systematically occur in studied cases. Some fruitful implementations were identified, although only to a small degree. Science and mathematics were integrated in both countries, and Romanian teachers combine, in some situations, science contents with English language learning, as Finnish teachers do with Finnish language learning. Advanced integrated project or investigations rarely occurred, and teachers needed more resources to conduct interdisciplinary inquiries with young children.

Teachers need more practice in setting small-scale investigations appropriate for early-years children and in learning to maintain the proper distance, thus providing children with a chance to look for or find evidence and draw conclusions. In addition, teacher education programs should concretely guide the pre-service teachers to conduct IBSE and reflect on their experiences regarding the theoretical descriptions. Pre-service teachers need more practice and scaffolding during their education if they are to reach the confidence and acquire the capabilities necessary for the preparation of learning settings for young children. Generally, teachers have a good relation with children and they are experts in collaborating with early-years-aged students, but the intention is not sufficiently ambitious. It seems that there are more opportunities to enhance young children's curiosity, attitudes, and inquiry skills than there used to be. Nevertheless, the appropriate settings are not exploited efficiently.

Although the collaboration and social aspects of learning constitute teachers' strengths, using them more effectively should be encouraged. Teachers in the

cases studied used the question-based approach, but the evaluative and conclusive questions are still missing. Teachers could foster children's skills through well-formulated scientific questions as well as by providing optional questions to scaffold the children quest so that they could perceive their observations critically.

According to the survey and field observations, IBSE and CA can be fostered in early- years science. Teachers are capable of facing the synergies of IBSE and CA with young children and the approached used in practice revealed several interesting and emotionally loaded learning processes. More encouragement should support teachers' attempts to use IBSE and CA. Teachers have the potential to scaffold the children, but more ambitious pedagogy should be applied. A need exists to analyze challenges strictly and encourage teachers toward using more open and guided inquiry, as appropriate.

This comparative research shows the general tendency in conceptualizations and practices followed by early-years educators in the two European countries studied. Major differences were observed when analyzing how dimensions of learning are emphasized as well as in how learning settings are organized. The reasons for the differences might be cultural, such as using outdoor learning environments in wintertime, but these cultural differences provide a creative way to add value to local education and find more appropriate methods of learning. In Finland as well as in Romania, school curriculum re-design is needed in order to reform school education. Local experiences such as those discussed in this chapter can provide us with the elements necessary to create a global education system capable of fostering the skills needed in the society of the future.

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SINIKKA PÖLLÄNEN & MĀRA URDZIŅA-DERUMA

5. FUTURE-ORIENTED REFORM OF CRAFT EDUCATION

The Cases of Finland and Latvia

INTRODUCTION

The purpose of this chapter is to describe craft education from three perspectives: current craft education, the challenges craft education will face in the future, and descriptions of two future-oriented pedagogical models with some examples that may reform craft education.

The present chapter will describe craft education in Finland and Latvia, countries whose educational and cultural histories differ. In both countries, craft education has had a permanent place in education as a separate school subject or combined with other subjects. In both countries, the value and appreciation of crafts have changed over time. Crafts were included in the curriculum mostly for practical reasons: it was important and valued that men and women be able to prepare the tools and artefacts needed in daily life (Pöllänen & Kröger, 2000, p. 234). After industrialization, craft teaching was rooted in learning the skills believed necessary for the success of a nation state (Garber, 2002, p. 139). In today's technologically advanced urban society, the strong tradition of handicraft education in general education is being reassessed (Karppinen, 2008, pp. 87, 90). Thus, this chapter briefly describes the history of craft education up to the present.

Learning, living, and working in a changing world challenges us to redesign our educational practices and extend the boundaries of traditional learning. This poses challenges for craft teachers to create new pedagogical perspectives. Thus, the chapter ends with examples of craft projects and pedagogical models that may help in the construction of new methods for craft education. Future-oriented pedagogical models illustrate the shifting focus from the end product and a person's skillfulness to abilities that can be recontextualized (van Oers, 1998, p. 482) in a new way outside the original learning context. The examples show how a teacher can facilitate learning across spaces and communities. Answering future challenges also requires the introduction of collective work into the, thus far, individual craft process.

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PERSPECTIVES ON CRAFT EDUCATION

Beyond the Holistic Craft Process

Craft as an activity is based on the intellectual and physical characteristics of the maker (Ihatsu, 2002, p. 16). In crafts, a special way of knowing about the world has been formed: Knowing is directed by a vision of doing by hand and shaped by the mental and concrete products of doing. "Hand" includes all extensions of the hand and mind provided by current technology (Brey, 2000, pp, 2–5; Seitamaa-Hakkarainen et al., 2007, p. x). In different contexts, the synonyms for "craft" are "handicraft" and "handcraft." In Finnish and Latvian, the word "craft" refers to the words for hand and work (*käsityö/rokdarbi* = hand + work). According to Kojonkoski-Rännäli (1998, p. 31), the word "work" implies that there is always human activity directed by thinking. This activity includes the idea of the product that is going to be made, the product itself, and the craft know-how (including skills) in the product's realization. Anttila (1993, p. 16) saw that craft is the same as design while there is always an intention of giving form by different techniques when making products of different materials. Thus, Kojonkoski-Rännäli (1998, p. 92) introduced holistic craft and ordinary craft to describe the design and manufacturing process of handicrafts and the role of the maker in that process.

In the holistic craft process, all phases are conducted by the same person either on his or her own, or as an active member of a group (see Pöllänen, 2009, p. 3). According to Pöllänen (2009; 2015a), the maker is in charge of the ideas, the design, the preparation, and the assessment of the artefact and the production process in the following four steps:

Coming Up with Ideas/Innovation

The holistic craft process begins with brainstorming ideas. Previous skills, experience, and various stimuli constitute the basis of problem-solving activities. The teacher's role is to activate students with a meaningful learning task or theme, and direct their motivation. In the beginning, the ideas are outlines or scenarios.

Students' own themes for their activities may be found in daily life and cultural forms such as national and created heritage, the future, traditional or contemporary art or industrial design, paintings, games, drawings, sculpture, popular art, music, stories, films, newspapers, poems, nature, history, field trips and excursions, advertisements, or memories. Inspiration, in turn, can be provided by sensations, objects, shapes, structures, materials, and phenomena. This phase can include sensory experiences, such as music, smells, and scents. Media, especially social media and the Internet, may also serve as a source of ideas while at the same time helping to adapt information-searching strategies and critical thinking.

A common stimulating theme can assist in creating associations and shaping ideas. It is possible to use different creative techniques to suggest ideas (for brainstorming, question lists, the use of analogies and metaphors, SWOT Analysis,

breaking problems down into manageable components, morphological synthesis, or a relevance tree, see Nickerson, 2004, p. 404). The idea phase and problem analysis can benefit from technology (e.g., three-dimensional [3D] design), scenario planning, role-playing (see Mind Tools, 2014), as well as playing the Design Game (see Kinard, 2009, pp. 86–87).

In any case, beginners also need a conception of what they are getting into. Images, drawings, or examples of completed handicrafts and a sense of the techniques, materials, and tools needed to support the activity are needed. Sketching and sharing may concretize the learning task. In upper grades, testing materials and technical solutions support innovation and may increase students' creative solutions. Participatory and collaborative activities may support students' motivation to acquire new ideas for the learning task.

Design

The design stage is a transformation during which the inner ideas are given a symbolic form, and then concretized and documented in a visible design plan. Visual and technical designs help to raise the best esthetic and functional qualities of the product (plans for visual characteristics, technical solutions, and the fabrication process).

In this phase, a beginner needs stimuli and advice as well as support and feedback to guide the design process. This becomes easier and more concrete with the learner's or the group's previous knowledge of the topic and craft-related skills. Design can be supported by activities such as round table sketching (see Kröger, 2014), establishing a learning café, or using a learning method called "stealing." Here students may generate ideas (see eNorssi, 2014). Students may be inspired by different kinds of materials, for example, touching and exploring rough and soft textures with their eyes shut. The process can promote multi-literacy skills by taking advantage of visual, verbal, and auditory elements. Different memories, smells and scents, tastes, images, sounds, colors, light, objects, and shapes are significant impulses (see Kojonkoski-Rännäli, 2006, pp. 97–100). Craft education can also be linked to regional or local issues as well as to global challenges and sustainability.

Students can also be inspired by projects organized by institutions around the world. In addition, different visual art techniques and materials – pencils, watercolors, gouache paint, pastels, and computer graphics software – can be used to make sketches and compositions. It is necessary to focus on natural, ecological, renewable, and recycled materials for sustainable development. General documentation during the idea generation and design phase, and more specific documentation of testing and experimenting solutions during the practice phase, visualizes learning and includes it as a part of the making process.

As the learners' level of expertise increases, technical drawing symbols, dimensions, and scales are used in the plans. External design information, such as design constraints (e.g., the user, the purpose, the available resources), and stimulus (e.g., data sources, questions, tips, options, experimentation, testing), as well as

support of the choices, are needed at the beginning of the design process. These constraints create a feeling of safety and release energy for the creative process itself. However, since the nature of the designing process is the central learning objective of this phase, the constraints must encourage the process. Manufacturing-related technical design can be promoted by exercises that support three-dimensional understanding, such as prototyping or model-making, and technical experiments. When working with beginners the teacher can also use concrete examples of details and working stages, simulative games, half-solved examples, or hints containing working plans. Because design must be meaningful, it must take into account the way it fulfills its purpose in its function.

The design phase is the most important one in holistic craft, because this phase includes retrieving information, conducting experiments, solving problems, and evaluating solutions. It also involves considering the possible outcome. All of this reflects personal and group working processes and balances the outcome against the resources available (e.g., time, materials, machinery, equipment, tools, skills, costs). Although the design process is time-consuming, visualization is important, since it can assist in problem solving and handling a huge amount of information. Virtual design allows cooperation beyond the classroom and borders.

Making

Making an artefact is about realizing the design and revising previous knowledge and skills so that the new things learned during the process become incorporated into the existing body of knowledge. The knowledge needed in design is embedded in the context, formulated through searching and testing as a group effort, as well as individually. In many phases, the preparation phase also entails testing. Since the issue is about becoming intimate with the design process and then preparing a new product, of which the learner has no previous experience. For design problems the intent is to motivate inquiry not limited only to knowledge of materials, methods, and tools but also incomposing the underlying science. In this case, new knowledge is connected and applied in problem solving. As a result, in an iterative (i.e., spiral and cyclic) process, the technical and visual design of the artefact can still change during the making process due to learning.

The actual artefact can be implemented from various materials and textiles, using technical work techniques. Therefore, the students' creative process may lead to prototyping an innovation. Making learning visible with documentation helps students understand their problem-solving processes and expand their individual and group learning.

Assessment

The last stage of the holistic craft process is assessment, the central part of which consists of visualization, articulation, and reflection. Assessing the artefact and the

production process, as well as reflecting upon metacognitive skills, are all part of this phase. Sketches, notes, texts, images, videos, and their various combinations may support reflection and assessment discussion with other participants. Creative methods, such as narrative, drama, diaries, comics, performances, music, and videos, may support the assessment process and help to openly share the learning results. It is also possible to extend the discussion beyond the classroom into international channels. The implemented product, its quality and completion, is only a part of the evaluation. The assessment phase returns to the previous phases of the process, all the way back to the visual and technical design and the idea phase.

Altogether, holistic craft comprises all the above mentioned phases of the craft process (see Pöllänen, 2009; 2015a). If a phase is omitted, the craft becomes ordinary craft. Accordingly, ordinary craft is a reproductive activity in which the maker does not affect the design phase. Ordinary craft can also be a process in which the maker reproduces a previously learned model or technique (Pöllänen, 2009, p. 251). Thus, the craft-maker might use strictly guided instructions or utilize prepared substances. Creativity is integrated into the divergent process of holistic craft, and the manufacturing process of ordinary craft is, in turn, integrated into the convergent process (Mäkelä, 2011, p. 237).

Craft education includes the ideas that the knowledge of materials and of the process acquired through authentic experience creates a sense of commitment and responsibility, and that the different phases of the craft process stimulate the learner's own cognitive, sensory-motor, emotional, and social factors (Ihatsu, 2002, p. 19). Accordingly, engaging in holistic craft means being bodily, emotionally, and cognitively active (see Petitto, 2008; Mäkelä, 2011, pp. 222–225). Huotilainen (2013) noted that craft tasks are brain-activating exercises because they involve coordination and stimulate connections between neurons in the cerebellum. The significance of physical and bodily experiences in crafts reflects the exceptionally high representation of the hand in the brain – especially in the motor cortex. This part of the brain is involved in planning, controlling, and executing voluntary motor functions. Other parts of the brain control the sensory systems that are activated when a person engages with even the simplest crafts are also crucially involved. Wilson (2002) argued that the knowing subject is the minded-body or the embodied-mind (p. 626). In crafts, embodied knowledge is connected to thinking, reflecting, designing, and solving problems during all phases of the craft holistic process (Pöllänen, 2009, pp. 6–13). According to Robert and Michele Root-Bernstein (2013), crafts develop creativity and such skills as observation, visual thinking, the ability to recognize and form patterns, as well as manipulative ability. These are all skills that are crucial for scientists and innovations. Thus, using the hands in an active making process in crafts affects the brain, language, and culture. This increases the likelihood of both crossover creativity and of achieving important results (pp. 16–20).

CRAFT EDUCATION IN FINLAND AND LATVIA

Craft Education in Finland

Crafts have had an established presence separate from art since the Finnish school system was established in 1866. According to Bennett (1926), Finland became the first nation to institute crafts as an integral part of the national program for comprehensive school. The founder of Finnish public education, Uno Cygnaeus (1810–1888), integrated crafts in general education, and his ideas later spread outside Finland, first to Sweden and the other Nordic countries and then to England, the rest of Europe, and the United States (Reincke, 1995, p. 8).

Educational handicraft was taught as a method of harnessing the hands, head, and spirit as a re-energizing force for educating moral citizens (Cygnaeus, 1910a, pp. 193, 441). Craft education was supposed to teach students accuracy, patience, purity, punctuality, and prudence (Simpanen, 2003, p. 8). Educative craft also emphasized dexterity, design, and esthetics as well as consideration, innovation, and creativity (Cygnaeus, 1910b, pp. 195–196). Handicrafts included all traditional craft techniques and materials common during that period (wood, metal, textiles, local craft traditions, and even basic saddle-making and shoemaking skills) (ibid., p. 284).

However, the implementation of craft education in practice mostly involved developing the skills needed to maintain agricultural and household equipment and tools (e.g., furniture, household appliances, agricultural tools, carpets, clothes, socks, mittens) (Simpanen, 2003, pp. 11, 13). Craft education was also divided by gender: handicrafts for girls and woodworking for boys. In the beginning, there were no clear instructions, and teaching varied from school to school (Ahonen, 2003, p. 55).

In the early years of industrialization, faster craft processes such as using machines were introduced to replace the slow manufacturing techniques. Educational model series presented necessary exercises and tools, and because the work in factories was stratified, managing the entire craft process was not necessary. Work education supported the objectives of diligence, efficiency, and hard-working. However, hobby-inspiring crafts played a role in craft models (e.g., for dolls and toys, see Marjanen, 2012, p. 223).

After the Second World War, crafts with esthetic and practical features were supposed to help the transition to work and teach capabilities for daily life (Simpanen, 2003, p. 16). The primary aim was to develop students' personalities and create independent, hard-working citizens (Marjanen, 2014, p. 144). It was also important to produce or repair the artefacts needed in daily life. Increasing wealth brought new patterns of purchasing goods from international production, and this led to the need for consumer education (VN, 1952, pp. 179–182). Girls were taught traditional women's crafts and clothing care, while boys received instruction in woodworking, metalworking, and electrical work as well as in electric and mechanical engineering. However, the theoretical curriculum of the parallel secondary school system (from 12 to 16 years) did not provide boys in cities with craft education. Craft education was, however, taught at rural schools and girls' schools. Gradually, craft was taught

in all parallel secondary schools, typically from grades one to three (ages 11 to 14) (Halila, 1949, pp. 143–145).

In 1970, the old parallel school system was transferred to the comprehensive school system. In craft education, the techniques, materials, and objectives with ideas for student products were listed grade by grade (OPM, 1970). Crafts in comprehensive schools were intended to provide students with a wide theoretical perspective. In practice, they modernized into textiles and technical work as separate school subjects. All students were supposed to study both subject areas from grades one to three (ages 7 to 9). After that, the students could choose one of them for grades four to seven. During the sixth grade, students were allowed to choose a new subject area. Thus, the students in textile crafts learned technical crafts, and vice versa (ibid.). To promote gender equality, the National Core Curriculum in 1985 introduced new general objectives to provide the same opportunities for boys and girls in all school subjects (KH, 1985). As a result, students studied technical work and textiles in grades one to four, and the number of common periods in grades five to nine was increased. Gradually, the discussion about the educational value of design, art, and expression (textiles) as well as technology education (technical work) intensified.

Ever since 2004, craft has been a combined single compulsory subject for all students (OPH, 2004). The curriculum discusses the holistic craft process and common craft, both of which include technical work (e.g., wood, metal, plastic, electronic work) and textile work (e.g., sewing, knitting, crocheting, weaving, embroidering, textile printing, felting). In spring 2014, a new national curriculum was proposed in the *Basic Education Act*. The main reforms in craft education are in science-based teaching and learning. According to the proposal, craft is a compulsory subject (two hours a week) for all students from the first to the seventh grade; after the seventh grade craft is optional, with other art and skills subjects also being available. Craft has its own objectives, but these are supposed to be implemented in open themes and with a holistic interdisciplinary approach. Craft is supposed to be explanatory and experimental, being realized using various visual, material, technical, and manufacturing solutions (see OPH, 2014, p. 430). The curriculum does not give instructions for the pedagogical models, the prepared handicrafts, or the materials and techniques to be used. Instead, the curriculum emphasizes the use of many materials, co-creation and collaboration, and participatory learning.

Craft Education in Latvia

Crafts as a school subject was introduced in Latvia in 1874. However, in practice the position of crafts was uncertain, and their implementation was limited: The students cleaned the yard and classrooms, and chopped firewood (Vītiņš, 1988; Volāne, 1997, pp. 26–29). The Latvian craft subject was theoretically based on the ideas then current in the Nordic countries concerning the teaching of crafts (e.g., Cygnaeus, Solomon, Clauson-Kaas). Later, a Latvian system, named the Russian craft system,

which was created by Kārlis Cīrulis, was introduced (Cīrulis, 1879a; 1879b; 1887a; 1887b; 1887c; Kotriakhov, 2006, p. 76). This system described the content, methods, and organization of the craft subject, but it also introduced craft as a tool for bringing out students' personalities (Anspaks, 2004, pp. 32–33). During the first period of Latvian independence (1918–1940), craft was a separate and general school subject. The aims of the subject were preparation for practical life and the development of students' personality. According to the curriculum of folk and elementary school (for elementary education, see IM MLN, 1928; 1935; LTP, 1925), girls learned knitting, crocheting, embroidery, sewing, darning, and weaving, since 1935, and boys learned woodworking, basketry, pasteboard work, book binding, metalworking, glass-working, and agricultural work.

After Latvia was occupied by the Soviet Union and incorporated into it as a republic (1940–1991), the name of the school subject was changed. Initially, the subject was named "practical work" in grades one to four (1954–1969), and since 1970 "manual training" in all grades. The aim of the subject changed, and it concentrated primarily on practicing polytechnical skills for work. Crafts were taught in varying degrees in different years and different classes. During the school year 1948–1949 practical work was missing from the list of the subjects taught (Žukovs, 1987, pp. 72–89). In grades one to three or four, students mainly learned practical work, specifically paper work, pasteboard, fabric, plasticine, construction set, and clothing maintenance (LPSR IM, 1949; 1955; 1981). After grade four or five, girls and boys were taught different skills: Boys studied woodworking, metalworking, technical drawing, electrical engineering, while girls studied sewing, embroidery, crocheting, and knitting as well as nutrition, electrical engineering, and, during some periods, metalworking, woodworking, and electric installation. Girls and boys had agricultural work (LPSR IM, 1961; 1970; 1984).

After the restoration of Latvian independence in 1990, the subject name and content were changed again. For grades one to four and for boys, the subject was called "crafts." For girls, the subject was called "housekeeping" and consisted of crafts and home economics. The main aim was to promote the development of a moral, intellectually rich, creative, and harmonious personality. Textile techniques were supplemented with weaving and macramé in elementary and secondary school, and with printing, batik, machine embroidery, and machine knitting in secondary school. According to the curriculum (LR TIM, 1991; LR IM, 1992, pp. 4–5; LR IM MSD, 1992, pp. 32–37, 42), greater emphasis was placed on designing products. Since 1998, the subject of housekeeping has been the same for both genders in grades five to nine. Boys and girls study home economics but may have an optional part of textiles or wood and metalworking (LR IZM ISEC, 1998, p. 3).

Today, craft education in Latvia is included in the subject "home economics and technologies." It consists of one hour of paper work, textiles, molding and nature materials, wire, combined work, and the basics of home economics for grades one to four. For grades five to nine, the class lasts one or two hours per week. All students learn home economics but may choose between technologies I (textiles)

or technologies II (wood and metal). The textiles course consists of compulsory knitting, crocheting, weaving, embroidery, painting, and printing, but students may also learn other techniques. Wood and metal technologies consist of processing operations – planing, turning, incorporation, and surface treatment, working with manual and electromechanical instruments, machine tools, and repair work (MK, 2014b). Currently, the focus in home economics and technologies is on the holistic craft process. A new competence-based curriculum will be introduced in 2020. The course will aim to teach independent and purposeful working, preparedness to cooperate with other people, and to use a variety of resources interactively (MK, 2014a).

CRAFT TEACHER EDUCATION

As craft education in the school context has changed, teacher education has changed over the years in Finland and Latvia regardless of their historical and cultural differences.

Craft Teacher Education in Finland

Initially, from 1880 to the 1970s, craft teacher education was seminar and college-based education differentiated as textile crafts and technical craft (Seitamaa-Hakkarainen et al., 2007, p. 6). The education was mainly segregated by gender. The main reform in the history of craft teacher education was in the 1970s when all teacher educational institutions were transferred to universities. Today, craft teacher education in Finland is offered at three universities, and all students graduate with a master's degree (5 years, 300 ECTs [an European grading scale]). The main subject in craft teacher education is "craft science" for textile and technical crafts. The current objective is to develop degrees allowing students to combine craft contents within a single subject. This is a challenge because it diversifies craft, but at the same time, teachers' levels of skillfulness are feared to be decreasing (Kaukinen, 2006, p. 82). Today, students can study one craft as their major subject and the other as a minor subject. Nevertheless, minor studies are optional, and students have the possibility to take a subject other than crafts as their minor. Additionally, all classroom teachers in Finland are qualified to teach all core subjects of the national curriculum from pre-school to grade six. These elementary school teachers may also specialize in crafts and be certified to teach grades seven to nine.

In 1982, the first professorship in textiles, design, and manufacturing processes for handmade textiles was established (see Seitamaa-Hakkarainen et al., 2007, p. 6). It was internationally pioneering in the field of crafts. The 1990s was an academic discipline-building decade when science-oriented craft teacher education was established and the first postgraduate students wrote their dissertations. The discipline developed into a multidisciplinary research area the main objective of which was to study craft activities and results. Thus, the title of the professorship

was renamed craft science. In practice this meant that it no longer concentrated on specific materials, techniques, or products. This facilitated seeing craft science as an umbrella that could combine research concerning areas such as design, craft-making processes, and the use of products. Methodological issues and theoretical premises were applied to non-material craft. However, the Ministry of Education and Culture failed to standardize the title of the main subject as craft science in all craft teacher education institutions until the end of 2013 (OKM, 2013).

Craft science has its own separate and identifiable object of research. The paradigm of craft science is situated at the intersection of science, art, and technology. Research in craft science is multi and cross-disciplinary. It has methodological and theoretical connections to other sciences, for example, to cultural anthropology, cultural history, educational sciences, psychology, occupational therapy, education, art history, as well as semiotics. First, the research is primarily based on the human sciences studying human activity in the psychological, esthetic-artistic, social, cultural, historical, and socio-economic dimensions, with consideration also being given to the natural sciences and technological factors. Research projects in craft science continue to develop an appropriate theoretical basis with applicable current methodological solutions. Research in craft science has focused on multi-disciplinary problems and research projects.

Studies in craft science concern the interaction between knowledge formation and design and, the manufacturing processes related to scientific thinking. Learning is based on problem-based questioning, design, and manufacturing with teams and alone. In general, the main task in craft teacher education is to provide students with the qualifications for teaching and consulting in the domain of crafts in various educational settings and sectors of society. The aim of the studies is to provide expertise in craft education and to promote a high level of continued research in this field. The challenge is to implement craft teacher education so that it could better confront the varying demands of society, life, and culture.

Craft Teacher Education in Latvia

Craft was taught at the Baltic Teachers' Seminarium founded in Riga in 1870. Nonetheless, in the middle of the 19th century when the subject craft was introduced in schools and teachers were educated at the seminary, opportunities to learn crafts were not always available. During the first period of Latvian independence, from 1918 to 1940, teacher education was carried out in different ways, using such frameworks as courses, pedagogical classes, seminaries, and institutions, all of them including craft (Žukovs & Kopeloviča, 1997, pp. 43, 44, 56, 97, 118, 158–187). Manual training as the main subject was not taught to future teachers during the Soviet period until 1980 (Amanis, 1992, p. 7; Melgalve & Kļaviņa, 1998, pp. 8–9).

Today, the opportunity to study home economics and technologies as the main subject is available to teacher students at three Latvian universities. All home economics and technologies students graduate with a professional bachelor's degree

in Education (4 years, 240 ECTs). After that, students have the opportunity to continue their studies in master's programs. However, this is not required to become a certified teacher. At the end of their studies, students write a thesis focusing on some theme from home economics and technologies. However, classroom teachers and teacher students with a major in another subject may also study home economics and technologies as their minor subject. This qualifies them to teach grades one to nine.

CHALLENGES IN CRAFT EDUCATION TODAY

The last few decades have been described as a period confronted by profound challenges to our educational, health, cultural, and financial institutions. The resulting changes have created an ever-increasing need for robust lifelong learning, innovation, and the knowledge and skills necessary to solve the problems of the future (Scardamalia, Bransford, Kozma, & Quellmalz, 2011, p. 231). The next generation should also be empowered and enabled to express themselves creatively (Harris, 2012, p. 4). In order to confront these challenges successfully, our students should thus have a better opportunity to become active, communicating, and collaborating agents who are able to confront and solve complex problems while adapting and innovating in response to new demands and changing circumstances. In this process they will be using technology to create new knowledge and expand human capacity and productivity (see Binkley et al., 2011). This will require future-oriented pedagogical models as well as skills that can be recontextualized (van Oers, 1998, p. 482) in a new way outside the original learning context. It could also offer an eventual framework for reforming crafts in different contexts.

Karppinen (2008, pp. 85, 90) claimed that skill-based craft teaching that has emphasized functional objects as end-products of the craft process has at least partially lost its meaning. The focus in craft education must shift from a perspective that is tradition based (Ihatsu, 2002, p. 198) and individualistic (Garber, 2002, p. 132), thus emphasizing the end-product and a person's skillfulness (Karppinen, 2008, p. 85), to one oriented toward creating novel responses to the challenges in today's world. The main problem in crafts has been reproducing artefacts according to given models without any creative input (ordinary craft). However, design in holistic craft has proved difficult to concretize. Additionally, teaching innovation and creativity has been difficult. Several teachers have also indicated that combining crafts with other subjects so that it could be taught at schools gender-free with multimaterial content has resulted in the expectation that the students must become competent in too many skills.

At the same time, craft education at school having decreased, crafts have become one of the most popular self-chosen leisure activities. The well-being-enhancing element of crafts as a leisure activity is due to the significance of empowering experiences in crafts (Pöllänen, 2015b, p. 73). Interest in creative crafts and technology (technical work) has increased, but they are still undervalued (e.g., Root-

Bernstein & Root-Bernstein, 2013, pp. 16–20) as elements enhancing sustainability and well-being in different contexts.

ORIENTATION TO THE FUTURE IN CRAFT EDUCATION

The pedagogical models presented in this chapter were based on research to confront the challenges facing craft education. The models show how a teacher can shift from a teacher-centered teaching style to the connected learning and object-oriented process of knowledge creation as an approach for acquiring more generic skills (see Garber, 2002, pp. 142–143; Pöllänen, 2009, p. 250). These challenges require two responses. Firstly, creative knowledge work practices and collective work should be introduced into the craft process, which has thus far had the nature of an individual activity. Secondly, each group member should be given the opportunity to contribute while learning something new, feeling comfortable, and being appreciated. Collective and participatory learning may be facilitated to enhance design and knowledge-creation in crafts by making use of appropriate pedagogical strategies (see, e.g., ibid.; Kangas, Seitamaa-Hakkarainen, & Hakkarainen, 2013).

Kangas (2014) indicated that to engage in genuine design inquiry, students need sufficient time and support to understand the rationale directing the design practice if they are to actually engage in these practices in a design community. They also need to reflect on and share their emerging design knowledge (p. 63). Because design is inherently interdisciplinary, the learning process calls for knowledge of different disciplines and authentic contexts. In the iterative design process and the holistic process of crafting, design competence develops through several connected social, material, and embodied levels of thinking, interacting, and meaning making. These together integrate the process into a whole (see Pöllänen, 2009; Liljeström, Pöllänen, & Enkenberg, 2013a).

Crafts Implemented with Collaborative Design

Crafts implemented using a collaborative design, reform craft education by giving future-oriented and participative perspectives. Design-Oriented Pedagogy (DOP) offers a pedagogical model and process together with the underlying conceptual system that is embodied when learning with collaborative design. DOP involves constructing artefacts, but it emphasizes working with knowledge embedded in or bound to physical artefacts. It is also embedded on building interpretations and combinations of the cultural resources, and its outcomes contribute to the larger community (see Liljeström et al., 2013a; 2013b; Vartiainen, 2014). DOP proposes a transformation from predetermined learning objectives, activities, and environment, to the creation of innovation, dynamic learning networks, and participating culture. According to Liljeström and colleagues (2013b, pp. 599–600), the focus is transformed into emerging learning ecosystems that offer students the opportunity to self-organize and utilize the community, technology, and information resources

to construct their own interpretations of their shared learning tasks and the co-development process.

Crafts implemented with design-oriented pedagogy come into being by addressing a real-world design challenge as a learning task. Designing a self-made toy that is functional by the standards of both usability and technical and esthetic qualities is a suitable learning task in the lower grades, while building and furnishing a house would be a suitable one in the upper grades. Open and complex tasks are often experienced as personally rewarding and cognitively challenging learning situations (Rule, 2006, p. 3). However, an open-ended learning task provides the basis for learning the necessary content, while engaging in the challenge provides a natural and meaningful venue for using new information and skills exploiting mediating technology (see Figure 1). In practice, this means that the members of a learning community negotiate common goals, divide their duties, examine prior experiences, knowledge, and skills, and investigate the means and actions available to them. Additionally, they relate their motives, goals, or means to the learning task and process. In any case, collaborative design puts students to work together in teams in pursuit of advancing their own understanding. This is to be shared with the extended community while working with domain experts (Vartiainen, 2014, p. 53).

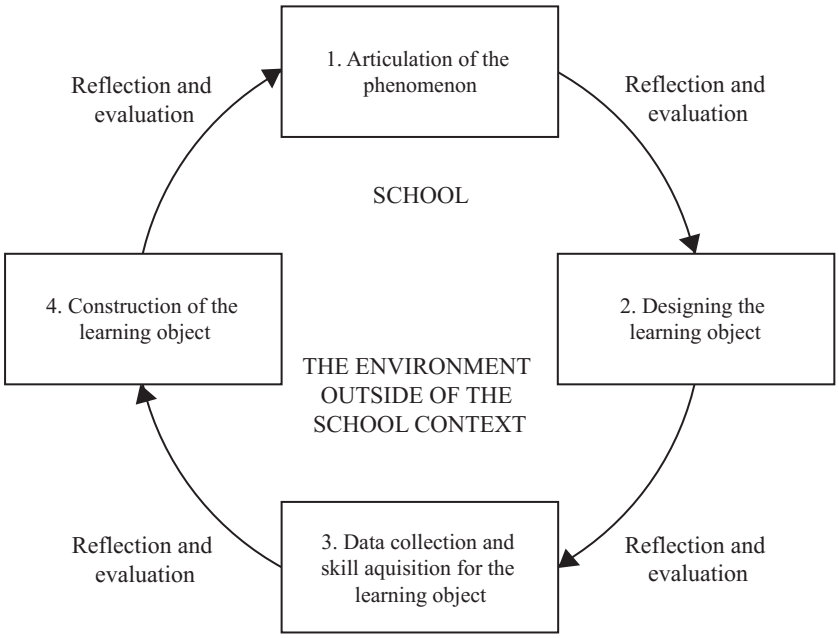

Figure 1. The Instructional Model of DOP in Crafts, as Modified from Vartiainen (2014, p. 43)

After defining a task as a learning object, the process encompasses all phases of the holistic craft process (Pöllänen, 2009, p. 256). A common stimulating theme can assist in creating associations and idea shaping. However, certain design constraints such as the user and the purpose of use and resources, can be defined in the learning task, while others that are related to design issues such as product quality, use, maintenance, and finishing, are specified as the design proceeds (see Kangas et al., 2013). When the learning object has been articulated, the students begin to define the type of knowledge and techniques required for the task. Literature, experimentation, and studying completed handicrafts or examples may be helpful in this phase (Pöllänen, 2009, pp. 255–257). The actual artefact can be realized from various materials and with different techniques.

The learning community may consist of students (two to six persons), teachers, and adults who are working with other students. It may also include domain experts in and outside the school context. Kangas and associates (2013) showed that when a professional designer worked with students in the classroom, the students acquired the experience of solving complex design problems according to the interdisciplinary nature of design learning. New technology, social media, and mobile technologies may provide tools for collaboration and data collection in addition to helping transform ideas into digital representations that can be jointly negotiated, developed, and shared with a wider community before and after the manufacturing process. The intentions of the learning community guide the process but may be transformed when it advances. To address a challenge, students develop designs, build prototypes, gather performance data, and use other resources to provide justification for refining their designs (Pöllänen, 2009, pp. 255–257). Students iteratively investigate, redesign, test, and analyze their ideas, and then make the artefact or a prototype. They articulate their understanding of the concepts, first in terms of the concrete artefact that they have designed and made themselves, then they transfer this understanding to similar artefacts or situations as well as to abstract principles of science (see Bereiter & Scardamalia, 2003, p. 59). Therefore, it is not simply an issue of interaction between subject(s) and artefact(s), but also a question of the process of perceiving the function and meaning of the selected materials, techniques, and tools in terms of achieving a particular goal (Vartiainen, 2014, p. 33).

The collaborative design can be organized as virtual co-design, in which case participants from different schools, districts, or countries can work together as a single group. The knowledge needed in the process is context embedded, formulated through searching and testing as both a group effort and individually. As the issue is about becoming intimate with the design process and, thereafter, preparing a new product, of which the student has no previous experience, the intent of confronting the design problems is to motivate inquiry into the underlying science rather than to simply acquire practical knowledge about crafts as materials, methods, and tools (Pöllänen, 2009, pp. 256–257). The teacher guides the teams toward self-motivated information retrieval and assessment. Instead of focusing on routine skills, the teaching aims at helping students learn more generic skills as well as the general principles of encouraging confidence and a willingness to take risks in innovation (Nickerson,

2004, p. 413). If needed, the teacher can assist by directing the learner's attention toward the essential issues, clarifying obscure bits, widening the perspectives, giving hints, presenting alternative solutions, or asking explanation-directed questions. When modeling or assisting students to find different solutions, the teacher can make the basis of the students' choices and actions visible by thinking aloud (van Oers, 1998, p. 482). The atmosphere and the assessment must be empowering, since the insecurity arising from the combination of the novel situation and the vagueness of the solutions presents the students with a challenging experience.

In any case, the process requires an assessment in which students may demonstrate their knowledge, skills, and strategies by creating an artefact in a manner reflecting a real-world evaluation process (see Lombardi, 2007, p. 3). Assessment may utilize other teachers' and students' peer-based evaluations, such as those made by an analogous craft group from the same school or by people from different contexts. The assessment may be based on an expert or panel assessment or, alternatively on the assessment made by a conference that focuses on the cooperative process (Pöllänen, 2009, p. 257). The work of the conference can include reflective analyses of thinking and learning for the purpose of creating metacognitive discussions and promoting self-reflection (Paris & Winograd, 2001, pp. 1, 15). One of the main ideas is that the learning results may be published and thus made accessible to a larger audience (Vartiainen, 2014, p. 40) through media such as web sites or blogs. Students may also organize presentations for a wider community, including parents, or for workshops for young children in day-care centers as well as for elderly people in residential care. Reciprocal conversations can encourage cross-cultural connections and build relationships (Hasio, 2010, p. 9).

Example 1: Forest-Themed Learning Games

One of the open learning projects assigned to the Finnish elementary school teacher students was to design and produce a textile-based and forest-themed learning game for elementary school craft education. Initially, all students took a field trip to the Forest Museum and the Research Park of the Forest Research Institute. The purpose of the trip was to provide a forest-themed framework and promote awareness of sustainable development through multidisciplinary cultural, economic, and ecological discussions.

Students worked in teams of three to five students. The groups had to co-design a joint learning game and practice the basic craft techniques needed for the games, with the teacher assisting when necessary. When the students began to gain expertise in the targeted skills and practices, they also serve as models for and coach their peers. During the project, the students were encouraged to exploit the knowledge of existing experts in fields such as craft science, educational sciences, psychology, forest science, museology, and economics inside and outside the university.

Designing the games required discussion and clarification of goals, possibilities, resources, problems, sub-problems, constraints, and activities in both face-to-face

and technologically mediated interaction. Students processed the esthetic and technical characteristics of the games throughout the entire design process. Making the games involved refining ideas over several design cycles and acquiring craft skills. This process involved preparing sketches and prototypes, retrieving knowledge, articulating ideas, and presenting them. The students learned the techniques and skills necessary for their process, – felting, sewing by hand and with a sewing machine, crocheting, embroidery, textile-printing, sun-painting, stringing, frame-loom weaving, string-making, tassel-making, simple beading, whittling, nailing, drilling – collaboratively. They used various types of materials such as textiles with different characteristics as well as wood, metal, and recycled materials.

The games incorporated ideas from most academic subjects, orienteering, and various other activities. The games dealt with real-life questions, some of them containing historical dimensions of forestry, forest conservation, and public rights of access. Only a few games were based wholly on imaginary stories. However, imaginative elements underlie real-life questions. Thus, mostly facts, but also fiction, new information, and earlier experiences all appeared as an integrated whole in the games. The story was usually integrated throughout the game, for example, in different details. Often, a question-and-answer format was chosen. Some games involved memory or functional tasks. Only a few games were based purely on chance.

Piloting the games to other students and subject experts and publishing the games in an open portal were important reflective evaluative features of the learning process (see Pöllänen & Vartiainen, 2013). Afterward, the same type of process was put into practice with a mixed group of elementary school children from the third to the sixth grades. The students were given the same assignment, but they first examined these earlier games before they began designing their own.

Example 2: The Chair Project

The projects requiring the students to remodel worn chairs cooperatively using different techniques and materials were organized in Finland and Latvia. The selected chairs had to be dismantled and repaired – spliced, sandpapered, painted – by the students. Then different kinds of measurements and computations were conducted to produce both an applicable visual and technical design as well as the coating material for the chairs.

The designs of the coating material produced by the students contained diverse thematic and abstract compositions. Several compositions were made containing geometric shapes such as crocheted circles, rectangles, and hexagons. Different color schemes and details were used to interpret the appearance of the chair to create a certain atmosphere or convey the user or viewer a message. In Latvia, almost all students combined several types of crocheted stitches, threads, yarns, and fabrics. Crocheted columns might be mutually interlaced or used as appliqué on the fabric. Some chairs had a removable, washable seat cushion. In Finland, students applied different textile techniques and materials to implement their themes such as the forest or the seasons.

Alternatively, the students might have emphasized the characteristics of the room in which the chair would be placed. As a result, the students gained co-designing skills, sustainable perspectives, and creative experience in restoring furniture.

Crafts Implemented with Self-Expression

Crafts as a process of design and manufacturing may serve as a self-expressive form of craft-art. In crafts, new forms of expression have become parallel to traditional techniques and materials. Any kind of material can be used, and the products of amateurs and experts are presented side by side (Ihatsu, 2006, pp. 20–26). Craft-art can be a process or product of deliberately arranged elements based on holistic craft. The relationship to tradition in craft-art is future oriented and renewing, following new trends and seeking influence from different cultures and phenomena. This type of self-expressive craft may be a way to grow sensitive to oneself and to different cultural or ecological phenomena, as well as to reflect on culture and society (Pöllänen, 2011, p. 116). Therefore, participatory learning may be just one instructional model to activate students to take a position and seek a meaningful common goal (Reilly et al., 2012). In crafts, this model may be implemented in an individual or team-based self-expressive process. In practice, however, the starting point is a common theme, co-learning, and shared expertise during the making process. Eventually reflections and discussions at the end of the process integrate the learning process and experiences (see Figure 2).

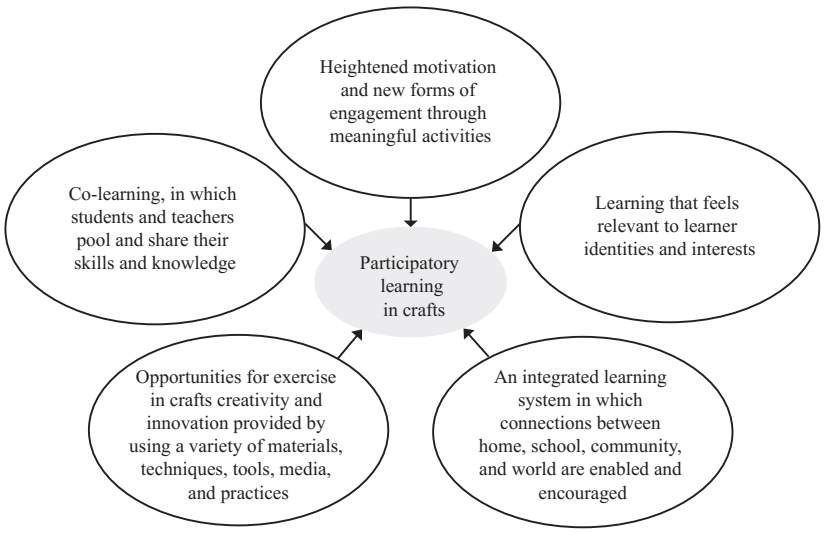

Figure 2. The Instructional Model of Participatory Learning in Crafts, as Modified from Reilly (2014, p. 3)

Craft as an act of expression is realized not only through the production of crafted items but also by the demonstration of one's skills, knowledge, thoughts, experiences, perceptions, and emotions (Karppinen, 2008, p. 85). Making, creating, and producing are powerful paths to deeper learning and understanding. They are achieved by having students engage in hands-on experiments and maintain an active and entrepreneurial attitude in their learning. This will enable them to recognize the importance of such an approach for well-being and success in work (see Seitamaa-Hakkarainen, Viilo, & Hakkarainen, 2010; Pöllänen, 2015b). Therefore, this type of craft may be implemented through generative understandings of touch, fantasy, and performance that allow for tactile knowledge. Expressing and articulating thoughts by concrete action as well as through an artefact all work together to create a natural way for both exploring one's self and sharing experiences through social interaction. This can happen through means such as masking and clothing to reveal one's multiple selves, but it can also be embedded in the narrative of a live-action role-play or in collaborative ecological art pieces (Pöllänen, 2011, p. 118).

Self-expressive crafts may be parallel to Mäkelä's (2011, p. 237) description of communicative crafts. This description is characterized by the deliberate expression of an attitude or a message, or by some other mediatory element. For example, craftivism means positive activism that brings crafted items as visual recognitions out of their usual environment bearing some kind of message. According to Garber (2014, p. 55), the main point is to connect people and to contribute to social change. Craftivism helps to expand one's state of awareness and to take account of daily actions. Additionally, it provides individuals and communities with opportunities for a richer spectrum of experience (see Greer, 2014). Satisfaction from accomplishing something successfully together with feedback from others both support the individual's sense of uniqueness, since they strengthen the student's identity as an independent actor while creating a positive self-image. Self-expressive tasks that call for insight into different life situations and cultures create a better understanding of the variety of different cultures and human experiences. Finally, as a consequence of improved self-esteem, craft as self-expression can enhance one's overall joy of living (Pöllänen, 2015b).

The goal of students' self-expressiveness is to improve creativity with projects and products, and to develop technology skills by using a wide range of media. These can include text, still images, audio, and video, utilized to produce a variety of creative works and creative processes. Activities may begin with a central theme or content area. Possibilities include focus literacy for storytelling, journals and publications, science and mathematics for reports, arts through digital images, and video production. The task can be defined as a theme (e.g., water) alone or together with the product. The task can be oriented to use concrete materials (e.g., natural or artificial) or means of artistic expression (e.g., lines, colors, textures), or techniques (Urdziņa-Deruma, 2001, pp. 102, 116, 177).

At the core of the learning task is the personal and active processing of a mental image or association. Students may work individually or in groups. Self-expression

is elicited in the students' own active process with the teacher assuming only an assisting and facilitating role. Associated activities support students' self-expression and progress in the process. Collaborating and taking another person's point-of-view provide valuable guidance for self-expression and reflection, as they stimulate the students to see things from new perspectives and in new ways (e.g., for a life role-game, see Pöllänen, 2011). Participating emphasizes students' self-organization in co-creation as well as other activities that utilize common themes or ideas (Lewis, Pea, & Rosen, 2010, pp. 8–10).

The assessment is based on the process as well as on creativity (see Nickerson, 2004). In the school context, it is necessary to realize that the artefacts do not always have to be original or unexpected. Instead, creativity consists of a creative process, a creative person, and a creative product. It also requires a creativity-enhancing environment (see Mayer, 2004). Reflection focuses on learning from the craft process, on self-orientation and working, as well as on the experiences and emotions that are meaningful for the learner. Karppinen (2008, p. 87) stated that activities such as artistic self-expression, introspection, and reflection help students find an individual and balanced relationship between the outer and inner worlds of the self. One of the aims in assessment is to strengthen students' personal growth, self-regulation, and self-empowerment. Students can evaluate their own process and common result, and all participants can discuss collaboration, co-design, and the artefacts. In the first grades, the teacher asks questions connected with different stages of the work process, collaboration, and product, later giving the criteria and structure for assessment (see Pöllänen, 2011). Students may also develop their own criteria and assess their work as part of the collaboration. The craft-art thus produced can be assessed by the criteria of originality, experimentation or risk taking, composition, the principles of design, and the elements of art (Dorn, Madeja, & Sabol, 2004). The assessment may take into account the technical quality, functionality, and conformity to the task (Urdziņa-Deruma, 2001, pp. 77–78, 114). Thus, all creative assessment possibilities may be taken into account. Students might write stories, poems, narratives, and diaries, take photos, or draw cartoons, or keep portfolios or blogs about their artefacts and the relevant processes. The process may be described using drama or performance, possibly accompanied by music. In addition, social media with different applications offer opportunities for delivering and publishing photos for a wider audience.

Example 1: Crocheting "Mold"

Students were presented with an open question asking them to take a position on a topical phenomenon using a type of yarn narrative technique. The learning task made students experiment, be hands-on, and active. As a result, the students depicted their worries about indoor air-quality problems (e.g., mold growth), which was then a problem in schools. Thus, the students decided to obtain information about the phenomenon and cooperatively crochet an interior textile as a textile graffiti. Its

the shape and color elements were to refer to mold. The theme activated students to take this very same phenomenon as a common learning task in another course, where the open learning task was to organize some kind of craft-related pavilion for an educational conference using their shared expertise. The main objective of the course was to understand the importance of distributed expertise and the emergence of creativity in co-learning and cooperation. The interest-derived learning task recognized the students' expertise and helped them to be entrepreneurial and academically oriented in their learning. Effective communication was supported by use of technological devices (e.g., Moodle, blogs).

The students decided to create a performance and organize a workshop for the conference participants. Students asked the participants to take part in a joint textile graffiti design. The idea of the performance and workshop highlight indoor air-quality problems and the significance of craft education. It was also hoped that the conference participants' former unpleasant experiences with school crafts could be reduced by the notion that "mold" cannot be crocheted in the wrong manner, and crafting together may be a pleasant experience. Thus, the common theme inspired students to co-develop and transfer their message to other students and other courses. The theme also seemed to expand the conference participants' awareness while they actively participated. The completed "mold" web was hung at the entrance of the teacher education building, and the social and printed media gave accounts of the learning process in articles and photos.

Example 2: Textile Dialog

The Textile Dialogue project was based on virtual co-design and intercultural interaction among Finnish, Latvian, and German students. In total, thirty-four students participated in the two-month project. They co-designed patterns for textiles in small groups, two or three students from different countries. Using a wiki platform, each group member created material in a collective folder and edited the page content in real time. At first, the students presented themselves with two symbols from their culture. The symbols were a starting point for the co-design process: to design an intercultural pattern together. Then each team member created designs on the basis provided the symbols and worked collaboratively toward the final product. During this phase, the students also monitored each other's design process to see the chosen symbols, patterns, and templates.

In the groups, the students discussed their digital intercultural patterns: the meanings of the original symbols and the new co-designed intercultural symbols, compositions, colors, and technical challenges. Then the students determined their final versions. In the middle of the project, lectures and workshops were held in Finland and Latvia. Teaching was also implemented virtually, but in this project, the lectures and workshops were organized as part of the teacher exchange. After the workshops, each student chose the technique and the type of the product for realizing the chosen co-design. As a result, diverse designs and implementations with different

types of symbols and sources of inspiration – nature, culture, designers' work – were materialized in forms such as a window decoration in a silk painting, small bags made with appliqué, and a crocheted pad. In the last stage, the students wrote reflective essays about the project. Despite the different interpretations, the symbols were sufficiently similar to serve as a means of working together, communicating, and understanding each other. In sum, co-designing on a wiki platform enhanced intercultural learning in crafts (see Kröger & Urdziņa-Deruma, 2015, pp. 3–13).

DISCUSSION

In this chapter, two countries, Finland and Latvia, whose educational and cultural histories differ, have served as an example of countries having historically different educational policies. Nevertheless, in today's conditions they are making similar efforts to organize craft education at school and in teacher education.

The meaning of craft has undergone many social and cultural changes in these countries, and these changes can be seen in the objectives and implementations as well as in the position of craft education over time. In technologically advanced urban societies, handicrafts have not been valued in the same way: The more society has developed industrially and technologically, the less it has relied upon crafts in daily life (Garber, 2002, p. 139; Pöllänen, 2011). However, in the 2000s the value of craft education must be re-evaluated, since it has been linked more to the creativity, problem solving, self-expression, sustainability, well-being, and social development than to practical utility of products (see Kangas, 2014; Pöllänen, 2009; 2015b).

Today, the learning objectives of the entire compulsory education system have been challenged. The curricula do not give strict instructions for pedagogical models, the prepared handicrafts, or the materials and techniques to be used. The objectives are general and provide teachers with flexible pedagogical possibilities. Although uncertainty regarding how to educate our students to confront the future successfully seems to prevail, there is also widespread recognition that the traditional defining of school subjects and as main subjects in university studies has raised the question of what should be taught to prepare students to be part of a knowledge-creating society (Schank, 2011, p. xvi; Thomas & Brown, 2011, p. 47; Ito et al., 2013, pp. 227, 324). It has become evident that students are growing up in rapidly changing times, particularly because of the increasing pace of knowledge development and technological advances. Sawyer (2004, p. 18) even insisted that the traditional implementation of a curriculum with scripted instruction emphasizes lower-order skills, the teaching of which does not rely on teachers' creative potential or their expertise in the subject matter.

Thus, the main challenge is for educational institutions to recognize current educational patterns. In so doing they must take into account the pedagogical strategies that may promote the development of generic skills, lifelong learning, innovation, and participatory culture in authentic learning contexts. Thus, the need exists to shift the focus in craft education to collaborative learning, active

participation, and the use of different tools and technologies to create new knowledge if complex problems in diverse situations are to be solved (see Binkley et al., 2011). In a sense, the pedagogical models presented in this chapter, along with their case examples, may serve as encouragement for teachers to incorporate more of the thoughts and interests, ideas, emotions, and sensations experienced by their students into the learning process. It has been demonstrated with certainty that when the topic in the learning task is interest-driven and relevant, students achieve far higher-order learning outcomes (see Ito et al., 2010; 2013, p. 22; Freeman & Brett, 2012, pp. 1038–1040). New pedagogical approaches may help teachers and students develop their design thinking and see new possibilities in craft (see Karppinen, 2008, pp. 85–87; Syrjäläinen & Seitamaa-Hakkarainen, 2014; Veeber, Syrjäläinen, & Lind, 2015, p. 24).

Accordingly, the research-based pedagogical models presented with the case examples may be useful in reforming craft education not only within compulsory education but also in teacher education. Designing, creating, problem solving, experimenting, producing, and making all encourage active skills acquisition for lifelong learning in multiple settings. This kind of hands-on tinkering leads to minds-on (heads-in, reflection) "thinkering" (see Anderson, 2012) through direct experience with materials helping students to take ownership of their learning in the form of the tangible product created by the experimentation and cooperation.

The pedagogical models also bring out a profound change in the ways we perceive the role of teacher and students, learning, learning environments, and contexts. It also influences our perception of the role of craft as an activity. Networking also brings new devices as well as a richer spectrum of experience for individuals and communities (see Greer, 2014). These models may help to expand craft education outside the classroom and connect people from different socio-cultural contexts (see Garber, 2014, p. 59). Cooperation and cross-cultural connections with students from different schools, districts, and countries may help students to be sensitive to themselves and to different cultural or ecological phenomena, as well as to reflect on culture and society (Pöllänen, 2011, p. 122; Kröger & Urdziņa-Deruma, 2015, pp. 7–13).

To sum up, there is a need for new pedagogical models and new visions of learning better suited to the increasing complexity, connectivity, and speed of the knowledge society. Notably, these examples of crafts implemented with collaborative design and self-expression may introduce pedagogical models that can enhance deep learning outcomes in cooperation with peers and experts in authentic contexts. They embrace the main principles of connected learning. This calls for interest-powered and shared purpose, as well as for production-centered, peer-supported, openly-networked, and academically-oriented learning (see Ito et al., 2013). It is also hoped that these pedagogical models and craft science-based orientations serve as a starter for professional development and intellectual growth through recognition and reflective practice in craft education.

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ANNA-LIISA ELORINNE, NORIKO ARAI, & MINNA AUTIO

6. PEDAGOGICS IN HOME ECONOMICS MEET EVERYDAY LIFE

Crossing Boundaries and Developing Insight in Finland and Japan

INTRODUCTION

The purpose of this chapter is to describe home economics as both an academic discipline and a science. First, it provides insights into home economics education in the Finnish and Japanese contexts by giving examples of both cultures. Second, it reviews the previous research on improving the quality of learning in an academic context (i.e., in higher education) by stressing the pedagogical and science educational approach. The authors present the following research projects:

1. Science Integration Studies in Home Economics Teacher Education (Rauma & Väisänen, 2003a; 2003b; Rauma, Himanen, & Väisänen, 2006);
2. Student Beliefs Concerning the Nature of Scientific Knowledge in Higher Education; and
3. Reflective Thought and Practical Reasoning Methods in Home Economics (Arai, 2014).

HOME ECONOMICS AS AN ACADEMIC DISCIPLINE AND A SCIENCE

Development from a Practical School Subject to an Academic Discipline

Home economics is constructed and developed as both a practical discipline and as a human science. The field of home economics has a specific cultural research object: the household and its activities. The activities of the home, the household, and homemaking are the particular phenomena under observation in this discipline, which focuses on the interaction between individuals, families, and society. Household activities comprise all material and immaterial modes of action that are linked to

E. Kimonen & R. Nevalainen (Eds.), Reforming Teaching and Teacher Education: Bright Prospects for Active Schools, 145–168.

housing, housekeeping, care, and economics (Rauma, 2005, p. 199). There are many ways to define, understand, and practice home economics. Turkki (2005) described the core idea of the subject: "[T]he field works for human basic needs such as food, shelter and care" (p. 273). Moreover, the ultimate goal of the subject is to improve the quality of everyday life for individuals, families, and households in society. The subject of home economics also serves the aims of gender equality, a democratic upbringing, and multiculturalism (Janhonen-Abruquah & Palojoki, 2005, p. 363).

Historically, major shifts had taken place in Western societies (e.g., the U.S.A., the U.K., Germany, and Sweden) by the end of the nineteenth century. These shifts created a basis for establishing home economics as a discipline. The household had traditionally been a site of production, but industrialization (e.g., technology and new products) and growth of the markets associated with it transformed the home into a site of consumption (Goldstein, 2012, pp. 98–100). Hence, women needed new skills and competences to become knowledgeable consumers. An increasing number of women also began to work outside the home, which required education and counseling in cooking and nutrition for families. Thus, one aim of introducing home economics into the school curriculum was to provide knowledge and skills that could be used to reduce poverty and malnourishment (Håkansson, 2015).

The first home economics conferences, which were held in Lake Placid, New York (1898–1908), had a marked effect on home economics education and research. The field of study known as home economics was formally established in 1909 with the founding of the American Home Economics Association during the tenth Lake Placid Conference (Richards, 2000, p. 81). Today, home economics is studied as an academic discipline under names such as human ecology, consumer and family sciences, home science, family and consumer sciences, home science education, and home and consumer studies. In Finland and Japan, the academic discipline in the local language translates literally as "home economics."

Home economics was developed as a field of study in the late nineteenth century in many countries, including Finland and Japan. It was based on the desire to teach young women to apply science to the management of their homes (Sysiharju, 1995, pp. 72–76; Yoo, 1999, pp. 1–2; Richards, 2000, p. 81; Soo & Chua, 2014, pp. 69–72). The mission of home economics education is to promote the welfare of both individuals and families (Gillespie, 1991, p. 173; Kellet, 1994, p. 85; Yoo, 1999, pp. 1–9; Green, 2001, p. 1). Hence, home economics education is firmly connected to the development of society and well-being of families. In Finland, for example, home economics and crafts became elementary and secondary school subjects at the end of the 1800s when the community began to take responsibility for elementary education (Sysiharju, 1995, pp. 72–76). The Finnish Society of Home Economics was founded in 1918.

In Japan, the compulsory education system was started in 1872. Initially, the curriculum made no gender distinctions; however, in 1879, the practical subject of sewing was introduced only for girls in order to increase their school attendance rate. Until the end of the Second World War, girls were encouraged to study the subject

"homemaking and sewing" in order to become a "good wife and wise mother," which aligned with the paternalistic family structure of the time.

In Japan, home economics education started in 1947, two years after the end of the Second World War, in a period when the new values of democracy were starting to spread throughout the country. Home economics, along with social studies, was included in school curricula as a mean of spreading new values, thus playing a vital role in advancing the concept of a democratic home and society. The school subject of home economics thus began to nurture homemakers who managed safe and healthy households in equal partnership between females and males. However, during the economic revival of the 1960s and 1970s, the slogan, "Men at Work, Women at Home," was used to rally industry and the country to achieve rapid economic growth. This notion certainly influenced the education system: at the senior high-school level, home economics was forced to be a girls-only subject. In the 1980s, there were active movements by citizens and teachers who wanted co-educational home economics. Finally, the Ministry of Education announced "the 1989 Course of Study for Senior High Schools." Home economics then became a required subject for both sexes under the strong influence of "The Convention on the Elimination of All Forms of Discrimination against Women," which was led by the United Nations (Arai, 2012, pp. 31–34).

In Finland, the clear need for home economics research was stated in the committee report published by the pre-independence Finnish government in 1915 (Sysiharju, 1995, p. 72). However, research related to the field of home economics began only in the 1940s when two new professors in the nutrition and household economics sciences were appointed in 1946 to the Faculty of Agriculture and Forestry at Helsinki University. Later, in 1969, a professor of household technology was appointed to the same faculty. In 1995, household economics changed under the name of consumer economics.

Actual home economics research and teaching, however, did not occur at the academic level until the 1970s when teacher training colleges became part of the faculties of education at Finnish universities (Antikainen & Pitkänen, 2014, p. 8). Home economics (*kotitalous*) became a separate academic discipline, and the name was changed to the science of home economics (*kotitaloustiede*), which clearly designated it as an academic discipline. At both Helsinki University and the University of Eastern Finland, students can take a master's degree in home economics, and both universities have appointed full-time professors in home economics (Kaukinen & Rauma, 1998, pp. 3–4).

Several Japanese researchers went to universities in the United States to study home economics. One of them, Mr. Jinzo Naruse, a pioneer in the field of higher education for women, founded the Japan Women's University in 2001, where scientific theory and laboratory research were introduced into the study of home economics. Many graduates of the university went on to become teachers in the advanced schools for girls throughout the country, where they introduced scientific approaches to homemaking and family resource management.

After the Second World War, the Japan Society of Home Economics (JSHE), which was founded in 1949, focused on home economics as an academic discipline. The JSHE described home economics as an integrated, practical science oriented toward family life. Research then was conducted to determine the interaction between humans and their environment. The results were used to improve living conditions and promote welfare. The Japan Association of Home Economics Education was established in 1958. Since then, theoretical research, historical analysis, and action research have been conducted on home economics education by researchers, teachers, and graduate students throughout Japan.

The Scientific Aspects of Home Economics

The scientific approach to home economics, which was derived from the theoretical models of home economics, allows the use of different research paradigms. The scientific aspects of home economics can be examined and defined from at least three different perspectives. Home economics can be viewed as an applied science, a human science, and an integrative new science (Rauma, 2005, p. 199).

The history of home economics education in Finland, as well as in many other countries, is based on the concept that home economics is a practice-oriented science that was originally developed to promote the professional interests of home economists (Richards, 2000, pp. 81–82). The material and educational care of households was regarded as a useful skill for which teachers needed an academic education. In this sense and context, home economics belongs to the applied sciences (Davis, 1993, pp. 27–32; Yoo, 1999, pp. 3–4; Rauma, 2005, p. 202).

The existence and justification of modern applied sciences, such as nursing science, meat technology, craft science, and industrial design emerged from using scientific theories (Niiniluoto, 2003, pp. 136–137); the focus of research in these fields is of a pragmatic nature. These sciences developed as design sciences in which the skills and techniques used were tested by scientific research methods. A typical feature of design science research is that it does not problematize its' aim because the ideal is to be free of values. In this respect, home economics is not a pure design science because everyday life is not solely technical; on the contrary, our activities are always value dependent (Peterat & Smith, 2000, p. 4). Based on this fact, home economics researchers (Baldwin, 1991, pp. 42–48; Vaines, 1993, p. 21; Craig, 1996, pp. 147–150; Yoo, 1999, pp. 7–8) have emphasized home economics as a practical applied (design) science rather than a technical science because human actions and ambitions are always associated with the question of the common good.

However, home economics can also be seen as not only a design science, but also as a science with a clear cultural object, which has become an emerging research topic: the household and its activities (Rauma, 2005, p. 199). Hence, home economics can be regarded as a human (cultural) science that studies the construction of the household and its interaction with different environments.

The scientific aspect of home economics has also been explained through the integration of the sciences (Darling, 1995, pp. 371–377; Yoo, 1999, pp. 4–5); specifically, in order to explain, understand, and reveal the existence of an action in a household, it is necessary to use the perspectives of different sciences. For example, preparing food requires both scientific (e.g., cooking temperature and chemistry) and cultural (e.g., Eastern food and Christianity; traditional Japanese food, religion, and historical tradition) understanding. This interdisciplinary aspect of home economics is similar to new modern sciences, such as family research, gender studies, science studies, peace research, youth studies, and research on the future.

Similar to an educational scientist, the home economist can be orientated philosophically, psychologically, or sociologically. The scientific scope of home economics is similar to the interests of the social sciences in which the researcher examines the interaction between the individual, the family, and the society. In teacher education, home economics is similar to the behavioral sciences, specifically the scope of human science, which entails connections to practical philosophy, educational sciences, sociology, and applied economic sciences, such as Consumer Economics. Because it has strong roots in design science, home economics research can also include applied natural sciences such as nutrition and household technology.

The home economist is interested in the cultural, economic, and social action of households. Ontological questions raised by researchers include the following: What is home like? How do the household and its members work both together and separately? What kinds of interactions do households have with their environment? How are the home and home economics valued? What is the household culture like? What kind of education is given in homes and families? Because of its theoretical background, relevant research topics for home economists are the household's material and immaterial resources, consumerism, sustainable development, gender, and family issues.

Paradigms and Methods – Crossing Boundaries

Searching for an appropriate paradigm of home economics has been one of the most challenging tasks for every home economist throughout the history of this field (Yoo, 1999, p. 1). Because the scope of home economics is broad, there are many potential areas of research. Hence, it is not sensible to restrict research to gaining knowledge about a certain paradigm. Instead, based on practice, the knowledge of home economics can be technical, theoretical, hermeneutic, or emancipatory, depending on the research questions. In this sense home economists need quantitative, qualitative, and contextual research methods.

The technical-empirical approach (Vaines, 1993, p. 21; Tuomi-Gröhn & Palojoki, 2000, pp. 113–120) originated from the positivist research paradigm. This approach is feasible in the research of daily activities if new and better instructions for these activities are to be found. An example is sensory evaluation research, which emphasizes home economics as a technical design science.

The theoretical approach differs from the technical approach in its attempt to point out the laws and theories that explain phenomena in the effort to understand the research object. Theoretical interest in knowledge broadens understanding and develops the ability to think. The researcher is not merely interested in knowledge that improves instructions (what and how); instead, the aim is to determine the reason (Haaparanta & Niiniluoto, 1986). An example of this is experimental cooking. In this approach, home economics can be regarded as an applied natural science that focuses on explaining the reasons behind the phenomena. Nonetheless, cooking practices can been seen a culturally embedded subject (e.g., traditional Finnish and Japanese meals).

Thus, understanding the behavior of people in households necessitates the use of a human-based approach with its roots in hermeneutics and phenomenology (Tuomi-Gröhn & Palojoki, 2000, pp. 113–120). This approach makes home economics a cultural human-centric science in which the researchers' interest lies in human intentions, meanings, values, practices, and other human and socio-cultural aspects that construct the actions of individuals (ibid.) and families.

In using the critical emancipatory approach (Vaines, 1993, p. 23; Darling, 1995; Yoo, 1999, p. 8; Tuomi-Gröhn & Palojoki, 2000, pp. 113–120), the researcher aims to increase the awareness of the common good in all everyday activities. The main idea is the quality of human interaction. In this paradigm, home economics approaches the paradigm of critical social science in which the objective is to make people question their own actions and look critically at the interaction between households and the community (Green, 2001, pp. 3–4). Vaines (1994, p. 62) suggested that the empowerment orientation is most appropriate in home economics because it is consistent with the mission of the field, an example of which is action research (Tuomi-Gröhn & Palojoki, 2000, pp. 113–120).

PEDAGOGICS IN HOME ECONOMICS

Home Economics Curriculum, Learning Concepts, and Environment

In both Finland and Japan, teacher education in home economics is situated in the context of teacher education. In Finland, university curricula are revised every fourth year and basic curricula are revised every tenth year. The most recent curricula reforms took place in 2014 in both home economics teacher education (*UEF// Opinto-opas 2015–2016*, 2015, pp. 70–75), and in compulsory education (FNBE, 2014). In Japan, elementary, lower- secondary, and upper-secondary school curricula are revised approximately every ten years. The most recent curriculum reforms were made in 2008 and 2009. Curriculum reforms are made even less frequently at universities that are authorized to issue teaching certificates. The new curricula reforms at the elementary, lower-secondary, and upper-secondary education levels have been discussed by a special educational committee and will be announced in 2016 or 2017.

Because of the wide extent of the sciences on which it is based, the home economics curriculum is wide in scope. In Finnish secondary schools, practical everyday management is emphasized and is an important part of the pedagogical content of home economics lessons. In university curricula, practical skill training comprises only some five percent of the student workload. In contrast to this, students in teacher education study the basics of sciences, pedagogy, and theory in different areas of home economics. Home economics education at the school level and at the university level includes courses and thematic entities in food culture, housing, and consumer studies (*UEF//Opinto-opas 2015–2016*, 2015; see FNBE, 2014, pp. 437–440).

In Japan, the contents of home economics curricula at the elementary (grades 5–6), lower-secondary (grades 7–9), upper-secondary (grades 10–12), and university levels are based on wide and holistic perspectives. The content is significantly influenced by home economics education in the United States, including the following: (a) family resource management (including family relations and household economics, and consumer issues), (b) textiles and clothing (including clothes making), (c) food science (including dietetics, sitology, and food preparation), (d) housing and environmental science, and (e) the science of child development (including practice and home care). At the university level, students are required to study various kinds of pedagogy and teaching practices as well as the theoretical and practical bases of each specialized field of home economics (Yanagi, 2012, pp. 85–90).

According to the current concept of learning (Yilmaz, 2008, pp. 168–170), the learner is an active participant who works either alone or in collaboration with other learners in setting goals or solving problems. Learning topics that respond to real-life issues as well as guidance by emotionally intelligent teachers nurture the learner motivation and delight in learning. The study of larger theme entities is encouraged because in problem solving, learners need to combine their knowledge of different fields.

The use of different environments, such as homes, shops, museums, work places, forests, cities, social media, and the Web, as learning environments is encouraged. Examples of constructivist learning models are the following: experiential learning, self-directed learning, discovery learning, inquiry training, problem-based learning, and reflective practice (ibid., p. 169). Design Orientated Pedagogy (DOP) was recently developed to enhance collaborative learning activities both in and outside school (Vartiainen & Enkenberg, 2013, p. 59). In DOP, the learning community is large, and mobile technologies, especially social media and mobile technologies, are used to collect data and share ideas.

High-Quality Learning and University Teaching

In university teaching, a frequently discussed problem is the inertness of knowledge (Vermunt & Verloop, 1999, pp. 257–280). This concerns the issue of the knowledge

domains acquired through education are often studied in isolation from the context of knowledge use and are therefore difficult to access (Gallagher, 2000, pp. 310–318). The inertness of knowledge also refers to problems in the practical application of knowledge. Although students might have acquired considerable knowledge, they may not be capable of solving problems in practice.

To avoid this problem, Biggs (2000, pp. 40–43) suggested that university teaching should facilitate the learning of functioning knowledge, which requires a solid foundation in declarative knowledge (i.e., "knowing-what"), but it should also involve knowing how to do things (i.e., "procedural" or "knowing-how") and when to do these things (i.e., "conditional" or "knowing-why").

Furthermore, one of the most demanding challenges in higher education is to create learning environments that encourage students to become active learners who develop professional competence and generic skills. Väisänen and Rauma (2003, pp. 1–2) suggested using meaningful learning activities that correspond to real-life problems, in addition to problem-based learning and learning portfolios, both of which require the learner to have high levels of cognitive and metacognitive skills. Because home economics is a skill subject, university teaching should also emphasize the importance of functioning knowledge.

In addition to practical skills, home economics has developed a scientific approach (e.g., methods and a paradigm) that emphasizes the importance of science education. Van Dijk (2014, p. 398) stressed the role of science education and literacy in developing the manner in which students understand the nature of knowledge. This leads them to become critical thinkers who master and increase scientific skills and resources (Smith & Siegel, 2004, p. 553; Zhou, 2012, p. 109). In the context of higher education, including home economics, science education refers to the process of understanding the scientific epistemologies of knowledge (Siegel, 2014, p. 373) and different paradigms, such as those offered by hermeneutics and the critical emancipatory approach. Furthermore, in the process of creating scientific knowledge, home economics should provide the pedagogical skills and competencies (e.g., inquiry and problem-based methods) necessary for creating subject matter (e.g., family meals, healthy eating, and financial literacy).

As argued above, one function of home economics as an applied science is to build bridges between the natural sciences and the social sciences. The following sections will elaborate on how science teaching can be a part of home economics learning within the context of chemistry and biotechnology, and on how science teaching can be combined with the epistemic beliefs and scientific knowledge of those been taught. We also introduce the principles of the practical reasoning method. This method is a suitable pedagogical model for home economics because its' objectives are to help solve problems and improve lives.

The Scientific Teaching Method as a Means of Professional Learning in Home Economics

In the science of home economics various phenomena, observations, and incidents are explained based on both behavioral and natural sciences (Davis, 1993, p. 27). The Finnish home economics curriculum emphasizes practical everyday management, which is an important part of pedagogical content. However, the broad scope of home economics also provides the teacher with opportunities to orient students to science education.

The teaching methods in science education, such as using projects, experiments, and models to explain phenomena, are suitable for application in home economics, where traditional learning has been strongly related to practical action. During a home economics lesson, scientific information can thus be integrated naturally. At its best, learning is both comprehensive and experiential (Barkman, 1996, pp. 44–48). Moreover, the home economics curriculum emphasizes problem solving, critical thinking, and the perception of entities (FNBE, 2014, p. 438). Kivilehto (1998, pp. 56–60) presented a special approach to science education in the home economics context. While teaching baking, she studied the development of scientific thinking and deductive skills in her students.

In Finnish secondary schools, food preparation is nearly always included in home economics courses (Hokkanen & Kosonen, 2013, pp. 1–2). Food preparation is a project, a theme entity, which is planned, carried out, and evaluated together. When preparing food, the students have to measure, mix, and heat substances. Changing the conditions allows students to follow reactions and make observations. However, deeper understanding of reactions and phenomena requires that students master the basics of chemistry, biology, and physics. Therefore, it is also necessary for the teacher to first master the basics of these sciences and know how to integrate the elements of these subjects into home economics teaching. Thus, the requirements for the pre-service and in-service education of home economics teachers are set accordingly.

Two studies were conducted concerning science education in home economics. The first study was an intervention study. It was implemented in an in-service training course for home economics teachers and was aimed at fostering their competence in integrating science into home economics teaching (Rauma & Väisänen, 2003a, pp. 97–98; Väisänen & Rauma, 2003, pp. 1–12). The second study examined how Finnish home economics teachers were integrating science and mathematics into their general teaching practices (Rauma et al., 2006, pp. 27–36).

Theoretical Foundations of the Chemistry and Biotechnology in Food Preparation Courses

Experts in food chemistry and nutrition taught the one-semester, three-credit course, Chemistry and Biotechnology in Food Preparation. The course was part of a project administered by the Finnish Board of Education, the aims of which were to enable

teachers to increase their knowledge of natural sciences and mathematics. The course was based on the principles of andragogy and social constructivism, with the emphasis on problem-based learning, experiential learning, and collaborative learning. It was an effort to produce high-quality learning. Active and enthusiastic learners, proficient questioning, and generalized tutoring, as well as collaborative working methods were the objectives of the teaching and learning situations. The learning activities and settings were planned to be meaningful, problem oriented, and contextual so that they would correspond to real-life problems in the setting of home economics (Rauma & Väisänen, 2003a, pp. 73–74; Väisänen & Rauma, 2003, pp. 1–12).

The exercises included experiments in kitchen chemistry: making popcorn and ice cream, in order to study the evaporation and freezing properties of water molecules; cheese-making to demonstrate how casein can be isolated from milk; and bread-making to demonstrate the formation of the gluten structure and enzyme activities. Traditional Finnish foods, such as sour whole milk (*piimä*) and a special pudding-like dish made from rye flour (*mämmi*) were prepared in order to follow the activities of lactobacilli and natural enzymes. The plan was for the teachers to do the same exercises with their own students before the next contact-education day.

All participants (N=18) were women. Seventeen were home economics teachers, with one being a chemistry teacher. Most (16 in all) were between the ages of thirty and forty. Nearly all participants taught in secondary schools; one taught in a vocational institute. The participants completed the questionnaire concerning their knowledge of chemistry and microbiology. They were also requested to keep a learning portfolio.

Lessons to Learn

According to the results of our study, integrating science education with home economics promoted high-quality learning and knowledge of pedagogical content. The home economics teachers were active in expanding their knowledge, and their independent learning received the support of those teaching them. Tutors, these being teaching experts participating in this project, learned that a problem-centered and experience-based style of learning requires much from teachers. Not only do they have to be able to accept uncertainty and master their own field, but they must also be pedagogically proficient.

The participants were highly motivated to learn how to integrate chemistry and microbiology into home economics. The previous inertness of their knowledge had complicated this integration. Their portfolios revealed that they had regarded their studies in pre-service teacher education as being too theoretical due to its lack of links to the practice of teaching and learning. The reasons that they had difficulty in remembering the basics of these sciences at the beginning of the course was explained by the teachers as follows:

> The problem with the chemistry courses related to the master's degree was that teaching did not proceed from the atom and molecule level to the level of practical life, and the

> points of connection with reality were not explained. Most chemistry teachers lack the ability and skills to do this.
>
> The four-credit chemistry course during my studies nearly ten years ago was very limited. As a matter of fact, the course consisted only of an exam on a thick package of books and contained almost no practical chemistry exercises. During the course, I also wanted to get tips and practical examples of how to use chemistry and microbiology in home economics teaching.

After the course, the participants thought they could use what they had learned to solve problems in practice. This was because a main principle was followed in teaching the course: the integration of the declarative, procedural, conditional, and functioning domains of knowledge (Biggs, 2000, pp. 40–43). The aim was for the participants to produce rich, interwoven, and complex memory representations (Prawat, 1989).

When the participants were asked about their knowledge of a few basic concepts in chemistry and microbiology, two of them mentioned the following in their portfolios:

> I noticed already after the first time that I have terrible gaps in the basic vocabulary of chemistry alone. Sometimes I felt a subject surpassed my comprehension totally, when I started to think of a term I did not understand.
>
> To my satisfaction, I can state that the words and phenomena, such as enzyme, flavonoid, fermentation, and so on, do not sound strange any longer and I can give them some kind of a "scientific" explanation.

The portfolio work helped the teachers attain a high level of self-assessment and a more holistic view of their learning and teaching. Two teachers wrote about integration, suggesting that choosing the perspective of instruction is not easy because home economics as a discipline is wide and interdisciplinary in nature.

> In cooperation with my home economics colleagues, I have noticed that, in particular, the use of the perspective of chemistry in the observation of the subjects taught is very limited. The teacher herself chooses the observation perspective: for example, whether to observe the baking of buns from the standpoint of economics or food preparation techniques, from the perspective of role division within a family or of human relations, or from the perspective of the chemical reactions taking place in the dough. I have often also offered the latter aspect and thus integrated chemistry into home economics lessons.
>
> My objective was also to create functioning prerequisites for the integration of education of chemistry, biology, and home economics. Also, this objective was achieved even better than expected. Already in the spring term we will start experiments, and in the next school year we will offer our students the elective course Natural-Scientific Phenomena of Everyday Life in which home economics will be one part, together with chemistry and biology.

The teachers also expressed their willingness to cooperate with science teachers. The experiences gained from the course strengthened the preconceptions held by the

tutors that the integration of science into home economics is meaningful and easily applicable. The participants in the course were volunteers and the evaluations of the learning outcomes were based on their self-ratings. Nevertheless, the data and open discussions indicated that home economics teachers in general would feel that home economics lessons should have more science education content. The results of the study suggest that in pre-service teacher education, the integration of science education into home economics teaching should be the focus of more attention.

The results of the survey (Rauma et al., 2006, pp. 29–41) supported the findings observed in the pilot study (Rauma & Väisänen, 2003a, pp. 97–98). Although home economics teachers sometimes integrate science and mathematics into their subject, in most cases, the forms of integration are not developed or planned well beforehand. The teachers who were prone to integrate such material had a deeper background. Consequently, they were more self-confident about their teaching. They also used student-centered working methods, and they based their teaching on both national and local curricula.

The results of our studies reflect the importance of pre-service training, and they provide a basis for further developing university pedagogy. The results also suggest that integration should be used in university teaching. Teachers should be provided with home economics textbooks that include information on kitchen chemistry experiments. This could more effectively motivate teachers to integrate and students to learn. Finally, based on their research on home economics, Hokkanen and Kosonen (2013, p. 284) suggested that the more textbook exercises should promote cooperation and focus on the environments in which adolescents live.

Students' Beliefs in the Nature of the Scientific Knowledge Used in Higher Education

When home economics became an independent discipline at Finnish universities, the science approach was stressed (i.e., the name was transformed into the science of home economics) (Rauma & Väisänen, 2003a; Rauma et al., 2006). In Japan, scientific theory and laboratory research have been emphasized in home economics studies since the beginning of the twenty-first century. The importance of understanding the nature of science and scientific knowledge is now emphasized in the educational system from elementary school to university. Science education at the university level should include analysis of how students think about science at the early stage of their studies and how this scientific knowledge develops over the course of their higher education. This line of research is epistemological by nature (Hofer & Pintrich, 1997, p. 88).

The epistemological beliefs of teachers, students, and children have been the object of research (e.g., Delandshere & Petrosky, 1994; Yang, 2005; Tucker-Raymond, Varelas, Pappas, Korzh, & Wentland, 2006), but this research has emphasized the natural sciences, such as biology and physics. Only a few studies focused on the scientific mind-set of university students in the human and social sciences. However, in the Finnish context, Kaartinen-Koutaniemi and Lindblom-Ylänne (2008, p.

179) studied the personal epistemology of students of theology, psychology, and pharmacy. This study focused on how the students understood knowledge, thinking, and reasoning in science. Specifically, it analyzed the development of their scientific thinking from absolutist knowing (e.g., facts and objectivity) to evaluative knowing (e.g., alternatives, evidence, argument, and reflection) (see Table 1) based on the arguments presented by Kuhn, Cheney, and Weinstock (2000, p. 311) regarding students' understanding of knowledge. In other words, they studied what students think science is about and how students construct the knowledge and understanding of the world over the course of their studies.

Table 1. Reality, Knowledge, and Critical Thinking in Absolutist and Evaluative Knowing

Level	Reality	Knowledge	Critical Thinking
Absolutist	Directly knowable	Comes from an external source and is certain	A vehicle for comparing assertion to reality and determining truths or falsehood
Evaluative	Not directly knowable	Generated by human minds and is uncertain	A vehicle promoting sound assertions and enhances understanding

In practice, the home economist should be knowledgeable about issues such as nutrition and healthy diets (Janhonen, Mäkelä, & Palojoki, 2015), family structure, or financial literacy skills for young people (Autio, Wilska, Kaartinen, & Lähteenmaa, 2009, p. 413). Furthermore, students should understand the differences between the natural sciences and the human sciences in knowledge production (McGregor, 2011, p. 566). Such understanding is also relevant to the questions of how researchers and students of home economics produce scientific knowledge of those issues, and how they use theoretical standpoints to do so. Based on the results of their study, Kaartinen-Koutaniemi and Lindblom-Ylänne (2012, p. 7) argued that if teachers want to promote the development of reflective and thoughtful students, they should use teaching methods such as argumentative debate, cooperative learning (Janhonen-Abruquah & Palojoki, 2005, p. 361), practical research assignments, and reflection in their own work. Otherwise, students rely on authorities such as teachers or the course literature. Furthermore, they hold a conception of knowledge that emphasizes the importance of the knowledge transmitted by teachers. Hence, students do not become critical thinkers (see Table 1). According to Håkansson (2015), teachers of home economics often see their work as a matter of transferring social norms to their students (Höijer, Hjälmeskog, & Fjellström, 2011, p. 515), in addition to which they see themselves as conveying a pessimistic view of consumption.

As previously argued, the discipline of home economics emphasizes both social and humanistic approaches as well as the natural science perspective in the development of student knowledge (e.g., Rauma et al., 2006; McGregor, 2011), which is intriguing. The natural sciences focus on the relation to truth, its correspondence to reality, and causal explanations. Similarly, the social and human sciences emphasize interpretations of the world that are constructed socially, historically, and linguistically. The latter approach uses discussions of hermeneutics, phenomenology, and cultural studies (e.g., stories, pictures, discourses). Scientific realism relies on empirical results (e.g., truth, facts, testing, and models) that are obtained by using objective approaches and the positivist research paradigm (Tuomi-Gröhn & Palojoki, 2000, pp. 113–120).

These two scientific standpoints in home economics signify that the focus of interest should not only be what students personally think about scientific knowledge but also what they should learn about the scientific (epistemic) nature of home economics. For example, this means that preparing food requires both scientific (e.g., cooking temperature and chemistry) and cultural (e.g., religion, historical tradition, and national food culture) understanding and skills that are usually used simultaneously. Students should understand that a vegetarian diet can be religion based (cultural), and a gluten-free diet can be health or allergy based (i.e., fact based). Furthermore, the Finnish and Japanese food cultures have similarities, such as eating raw fish, cultural differences, such as familial structures, understanding healthy eating (e.g., milk versus soya) and the appreciation of the visual aspects of food (which is highly important in Japanese culture). When home economists, whether in Finland, Japan, or another country, teach their students how to prepare healthy and tasty meals, they need the knowledge of chemistry, physics, measurements, the local culture, as well as pedagogical skills. Thus, both science education and cultural (practical) understanding are required in home economics learning and teaching.

Lessons to Learn – The Scientific Mind-Set of Students in Higher Education

According to Zhou (2012, pp. 120–125), science education takes place in a hybrid space of the everyday culture, traditional culture, and science culture. He argued that students' preconceptions are a product of their everyday life experiences and, combined with their traditional culture, constitute their life-world view. Science education, which has traditionally been pictured as a relatively objective discipline, aims to develop students' knowledge, skills, and scientific attitudes. Zhou also suggested that many students experience a conflict between their everyday and traditional understandings of life and the scientific norms, conventions, and thinking (ibid., p. 113). Schutz (2001, p. 271) observed that science as it is usually taught can easily become a "strange world" with little or no relation to the lives of students or everyday experiences. As a practical discipline, home economics relies on everyday culture, which reinforces the pragmatic views of science and the discipline held by students, which may cause conflicts in their minds.

A few studies have dealt with the issue of the scientific mind-sets of university students (e.g., Yang, 2005). According to Rauma and colleagues (2006, p. 30), teachers of home economics have often noticed how students have negative science learning experiences because they felt that science was too abstract and distanced from everyday life. These results raise questions about what students think that science education should be in the context of home economics and the kinds of thoughts they have about scientific knowledge.

Because studies on the scientific thinking among home economics students are not yet available, the present chapter utilizes "My understanding of science" narratives. These narratives were written by students in consumer economy (first year, N=64) in Finland and business studies (second and third year, N=57) in Sweden. The present study was guided by the assumption that students of home economics share thoughts on science and scientific knowledge that are similar to the thoughts of students of consumer economy, business studies, and theology (Kaartinen-Koutaniemi & Lindblom-Ylänne, 2008; 2012). The standpoint of this study is that the teaching and strengthening of scientific thinking and learning in home economics requires an understanding of the student scientific mind-set. As argued above, teachers of home economics experience science education as being too abstract and distanced from their everyday lives. Thus, it is essential to gain knowledge about how university students understand knowledge, thinking, and reasoning.

Science narratives provide important information concerning the beliefs about science held by students within the context of higher education. The research data were analyzed to determine the kind of understanding that students have about science, and whether they rely on truth and facts or see scientific knowledge as uncertain and generated by human minds (see Table 1). The essays written by the students revealed that they see the nature of science as abstract and challenging: "Science is intended for wise people" and "Science is an abstract concept that is difficult to understand. ... Science frightens me." In their narratives, the students described the principles of science, such as methods, data accumulation, and openness. Their narratives included the understanding of knowledge, such as absolutist knowing (e.g., facts and objectivity) and evaluative knowing (e.g., alternatives, evidence, argument, and reflection), as Kuhn and colleagues (2000) argued. The following is a treatment of the three categories the present research found to reflect how students conceptualize science.

Science is Facts and Objective Reality – "The Truth about a Phenomenon"

As Kuhn and associates (2000, p. 311) argued at the absolutist level, students see the products of knowing as facts that are objective, certain, and derived from an external reality that they depict. As Zhou (2012, p. 121) pointed out, science is pictured as a relatively objective discipline. In the category of "science is facts," students in higher education presume that scientific knowledge is the reflection of facts about external reality and truthfulness (see Table 1), and is essential. The following examples illustrate this category:

> I understand science as facts that I can trust without knowing the background information... Scientific research is carefully and faithfully conducted experiments, observation and so on. Its aim is to answer research questions. (Finnish narrative No. 1)

> Science is often something that is very "stable." By this I mean that what has been found is pure fact that will always stay as it is. (Swedish narrative No. 40)

> Science is the most likely explanation for something. The truth about a phenomenon that is the most likely at that point. – An attempt to objectively study reality. (Swedish narrative No. 47)

Students not only see knowledge as certain but also as stable. They might think about the "laws" of mathematics or chemistry that they learn in secondary school and in high school. This viewpoint follows the idea of natural science, which assumes that human influence does not exist. Sawyer (2006, p. 41) pointed out that very few schools teach students how to create knowledge; instead, students are taught that knowledge is static and complete, and they become experts at consuming knowledge rather than producing knowledge.

It is notable that students of consumer economics and business study the social sciences as well as home economics. The view that scientific knowledge is certain and stable indicates that in their personal epistemology (thinking) students rely on absolutist knowledge and at any natural science that might evolve during their studies. As Kuhn (2001, p. 5) argued, the absolutist conception of knowledge is most likely transformed to a relativistic one.

The Reconstructive Nature of Science – "People Can Be Fallible"

In the second category, the "reconstructive nature of science," students realize that knowledge is uncertain, and that gaining real facts about reality is difficult. They recognize how human influence affects the production of knowledge. They understand that interpretations of the world change over time, and that scientists create new knowledge and methods. Scientists can also be fallible, which reinforces the conception of human influence. The following examples illustrate this category:

> Science is facts and knowledge. Scientific knowledge needs to be verified. ... Science is a tool that people use to explain the world around us. People can be fallible, and thus scientific knowledge is not about absolute facts. Specific to science is the updating of knowledge. ... Scientific research aims to be exact, and it explains phenomena as accurately as possible. (Finnish narrative No. 61)

> Rarely can [science] be applied broadly, because it depends on the time it is created: The society that creates it influences [science] with the scientific findings that are thought to be "valid" at the time, as well as with the assumptions that are made are based on knowledge people have. Probably, new science will replace what we now have as new phenomena are discovered in the future. (Swedish narrative No. 49)

Students have more reflective thoughts than scientific thoughts. In this category, their mind-sets approach evaluative knowing, which focuses on alternatives and

arguments. They also recognize the reconstructive nature of science. Moreover, students believe that science aims to discover reality and facts about life.

Science as a Discussion – Real Facts and Knowledge Do Not Exist

In the third category, students have belief systems that are in contrast to the first category. They stress discussion as an integral part of scientific knowledge and an understanding the world. They also emphasize the process of creating new knowledge and studies, something that can be contradictory. The many schools of thoughts and different theories in the social and human sciences yield conflicting results. In addition to discussion, students write about understanding the world rather than explaining it, although the latter is typical of the natural sciences.

> In science as a whole, the aim is to understand the world around us, and life... ”real” facts and knowledge do not exist; rather, there are only a viewpoint and attempts to understand. ... Discussion is the most important thing between scholars. (Finnish narrative No. 7)

> Science necessitates strong willpower and a passion to discover new things. ... It is important for us not to simply believe what is claimed in the name of science. It is better for science that people do not have faith in it. ... Actually, science is discussion... different research results are inconsistent with each other. (Finnish narrative No. 13)

> Science to me is when you try to dig deeper into a subject. It is not accepting a fact, but instead trying to understand why and how something is what it is. (Swedish narrative No. 17)

Students have belief systems that are based on evaluative knowing, in which alternatives, arguments, discussion, and reflective thinking are part of the understanding of science. This reinforces the aim of critical thinking in higher education by which students develop scientific skills and resources in order to understand different paradigms, such as the positivist, hermeneutic, or critical emancipatory approaches. According to Palmer and Marra (2004, p. 333), the development of personal epistemology shifts from simple views to multiple perspectives and is more likely to occur among students of the humanities and social sciences than among students of science.

However, the first category of student thinking raises a question about how to develop an understanding from absolutist knowing to evaluative knowing. Furthermore, if no research is conducted on the epistemological beliefs of home economists, teaching science education without knowing which categories of knowledge characterize their mind-sets would be difficult. Based on the narratives illustrated above, it is most likely that students of home economics also have different kinds of belief systems. Nevertheless, most important is that they learn over the course of their studies that home economics is a multidisciplinary subject (Rauma, 2005; McGregor, 2011; Tuomi-Gröhn & Palojoki, 2000), one that uses many paradigms and theoretical standpoints, and includes a variety of epistemological belief systems. In other words, home economists use both the “laws” of chemistry and their knowledge of culture in

their teaching. Furthermore, the scientific understanding of knowledge nurtures both problem-solving skills and critical thinking.

Reflective Thought, Critical Literacy, and Practical Reasoning in Home Economics

Today's world is rapidly changing. Environmental problems, such as global warming and acid rain, economic issues, such as the gap between rich and poor, the severe competition caused by the global economy, and social problems, such as human rights violations and gender discrimination, have all become more complex than ever before. The solutions to such problems require a new kind of development in which the emphasis is on protecting and harmonizing with the natural environment and ensuring social justice – in other words, pursuing sustainable development.

Home economics education is closely related to these issues because the important objectives of the field are not limited to the acquisition of knowledge and skills, and their application to everyday life. The goals of home economics include performing tasks, solving problems, and improving lives creatively. Critical literacy is required to identify the exact problems, examine them, and find plausible solutions.

The concept of "critical literacy" originally evolved from the theoretical writings of Jürgen Habermas. It involves powerful thinking, reading, speaking, and writing habits which are used to probe beneath the surface of the meanings of words in order to comprehend the root causes of problems. Critical literacy takes into account the contextual factors that influence our lives. It reflects on consequences with respect to the world around us (Brown, 1980; Rehm, 1999). To foster critical literacy in students, the new curriculum theory of practical reasoning in home economics was first proposed by Marjorie M. Brown. She declared that home economics needed to develop an attitude toward, and competence in, seeking out the implications of existing social conditions. Additionally, it needed to ask whether alternatives would be better for those we seek to serve (Brown, 1980). Brown's discourse was further developed and applied to curriculum theory in several states in the United States. Janet Laster, who developed a practical reasoning teaching strategy in Ohio based on Brown's theory, indicated the following: "Through questioning and practical reasoning, critical literacy promotes reflection, especially self-reflection, transformation, and action." "In home economics and family and consumer sciences education, critical literacy processes are nurtured through practical problem-based curriculum experiences" (Laster, 2008, p. 262).

All previous research and curriculum theories demonstrate that the subject of home economics makes students examine their private and public lives, both identifying their problems and trying to solve them. Therefore, home economics can nurture the problem-solving literacy of students to improve their well-being through practical reasoning processes (Arai, 2014, p. 229).

The most exciting feature of practical reasoning is that reflective deliberation is taken very seriously in each of the following four learning steps (Laster, 1998, p. 53):

1. Analyze the problem, including context and value conflicts between and within the various perspectives involved.
2. Set values and goals that form an acceptable standard for judging alternative actions.
3. Take possible actions.
4. Reflect on the consequences of these actions.

The core part of this problem solving and learning process is the questioning between teacher and student, between students, and within the student. These questions include the following: "What is the problem?" "What is the reason for the problem?" "What kinds of choices do we have?" "Is this information reliable?" "Are there any facts and/or opinions that support your choice?" By building on the experience of repeatedly asking these questions, students can deepen their thinking, comprehend the context of problems, and empower their decision-making skills and critical literacy. Thus, teachers need to prepare effective questions for students at each learning step.

As argued above, teachers should promote the development of reflective and thoughtful students by using argumentative debate, cooperative learning, and practical research assignments (McGregor, 2011, p. 566). The use of practical reasoning is one method of strengthening the critical literacy of home economists, as well as their competence in scientific thinking, and thus in home economics literacy (e.g., food, consumer issues, clothes, social media, household management, gender, sustainable society, and multiculturalism).

FUTURE CHALLENGES

In the future, students will need different sets of knowledge and skills. Home economics serves as a platform linking theory to practice. It can thus play a critical role in imparting these competencies (Soo & Chua, 2014, pp. 72–73). However, home economics pedagogics faces many challenges. These include determining the most effective way to use IC technology, developing the spirit of innovation and enterprise, and incorporating specific twenty-first-century skills, such as civic literacy, global awareness, and cross-cultural understanding into curricula (ibid., p. 73). Several policy makers and educators have discussed this issue. These include the U.S. Department of Education (the Partnership for 21st Century Skills and the Metiri Group [enGauge 21st Century Skills]) (ibid., p. 63).

One competency framework that influences the educational goals and methodologies in every country is "key competencies." This was designated in 2003 by the Definition and Selection of Competencies (DeSeCo) program, one of the educational projects of the Organization for Economic Cooperation and Development (OECD). In this framework, individuals nurture the following three key life-long competencies that are required if they are to face the complex challenges of today's world successfully (Rychen & Salganik, 2003, pp. 85–104):

1. using tools interactively (language, symbols, and texts; knowledge and information; and technology);
2. interacting in heterogeneous groups (relate well to others; cooperate and work in teams; and manage and resolve conflicts); and
3. acting autonomously (act within the big picture; form and conduct life plans and personal projects; and defend and assert rights, interests, limits, and needs).

All three competencies are closely related, with "reflectiveness" (reflective thought and action) being situated at the center of each. Reflectiveness implies the use of metacognitive skills, creative abilities, and taking a critical stance. This enables individuals to reach a level of social maturity that allows them to distance themselves from social pressures, have different perspectives, make independent judgements, and take responsibility for their actions.

How then does home economics relate to these key competencies? The relationship between the three competences and the basic aims and concepts of home economics education can be described as follows:

1. *Use tools interactively*. Use knowledge and technology interactively, which is necessary in daily life.
2. *Interact in heterogeneous groups*. Relate well to family and close members of society. Cooperate and manage family issues and daily life.
3. *Act autonomously*. Think and act in ways to improve life. Ensure well-being and the basic needs of human life.

From this point of view, home economics has the potential role of nurturing active and thoughtful citizens with well-balanced competencies, especially in their daily living (Arai, 2014, p. 230). Furthermore, strengthening critical literacy skills and science education among home economists and in home economic studies will foster the development of the key competences that are required in the twenty-first century.

Based on these key competencies in home economics pedagogy, we need to emphasize the ability of students to create knowledge, work collaboratively in acquiring and creating knowledge, and use reflective practices if they are to acquire critical literacy and become critical thinkers.

CONCLUSIONS

The empirical task of home economics can be regarded as a traditional mission that combines university teaching with societal tasks. Home economics education aims to promote the welfare of both individuals and families, and it has traditionally been linked to the paradigm of sustainability (Vaines, 1994, p. 59). At the primary level, home economics education has a social, cultural, and economic mission, particularly in today's changing societies, where the effects of global incidents are felt in households and families. This interconnectedness requires university pedagogics and home economists to study the interactions between individuals, families, and society in areas of everyday life, such as housing, housekeeping, and care.

This review discussed the scientific nature of home economics, and it explained the pedagogical models used to improve the quality of learning in higher education. The following recommendations are based on the lessons learned from previous studies: First, the development of academic thinking and research skills in home economics students needs to be strengthened in order to achieve the aim of critical thinking. We encourage teachers of home economics to study the epistemological beliefs of their students. Their scientific skills can be improved if their teachers are aware of the current mind-set in this respect. In formal learning, the integration of different subjects and the use of the practical reasoning method will increase the effectiveness of learning. Since the learning environment in home economics is the same as the living environment, we should use informal learning more often. The focus in home economics research should be on everyday activities.

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ANNA-LENA ØSTERN, TAPIO TOIVANEN,
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7. *DRAMA BOREALE* – PERSPECTIVES ON DRAMA EDUCATION IN FINLAND AND NORWAY

Struggling for a Place in the Educational System

INTRODUCTION

This chapter will explore how drama education has been developed within two Nordic educational contexts during the past four decades. It provides an overview of the extensive attempts carried out for the purpose of establishing a place for this art subject throughout the school systems in Finland and Norway. It describes how a knowledge base for drama and theater education is constructed: through political work aiming at including the subject in school education through practice and research, through associations for drama and theater education, and through the development of study programs and curricula. This analysis introduces drama as an art form and a pedagogy with the specific aim of supporting learning and contributing to the exploration of the human condition.

Finland has a long and quite strong tradition of school theater and amateur theater. Even longer is the oral performative tradition of reciting poetry (*runolaulu*), with the performer singing lyrics from the national epic *Kalevala*. Norway also has a proud tradition from Nordic mythology, but this has been a reading drama or a storytelling tradition. In Norway the tradition with school theater and adult amateur theater can also be identified as characteristics of theater art brought into educational contexts. In both countries the strong performative traditions from the indigenous Sami people are attracting renewed interest as part of world cultural heritage. Until not so long ago, however, this story was also a narrative about the oppression of such cultural values as the Sami languages, Sami drums, shamanistic drumming, the song tradition called *joik* or *juoigan*, and the Sami tradition of clothing and crafts called *duodji*. These cultural traditions combined with a strong influence from some sections of the Lutheran church have been discussed with a high level of engagement, focusing on such aspects as the corporeality of drama and dance.

E. Kimonen & R. Nevalainen (Eds.), Reforming Teaching and Teacher Education: Bright Prospects for Active Schools, 169–192.

When drama was introduced into educational settings the progressive pedagogy of John Dewey was a great inspiration. He emphasized that education is education for democracy, and he wanted children and young people to learn about democratic values by participating. Dewey was a spokesperson for child-centered education and promoted inquiry-based learning. One of his core notions is experience, and especially the transformation of perceived reality into an experience by elaborating it using esthetic means, thus making it an esthetic experience (see Dewey, 1934/1980; 1938/1963; 2009). During his lifetime Dewey was much debated in the United States, as was also the place of drama in educational settings. This issue continues to be questioned, debated, and appreciated.

Another debate, which is more Anglo-American, is based in the name of the subject in educational contexts. This debate has to do with the introduction of "drama" as the name of the school subject instead of the name "theater." The discussions, battles, and understandings of what drama and theater are, or could be in children's and young people's lives in the educational and arts educational context, has been very engaged from those involved. We juxtapose the presentation of two images of drama education: one from the 1970s and the other from the present, soon two decades into the twenty-first century. The battle for drama in education is a battle that is highly western and international, but necessarily also gradually more global. This is clearly echoed in Nordic voices about drama in education (see Rasmussen & Østern, 2002).

PERSPECTIVES ON DRAMA AND THEATER EDUCATION

In 1979 Gavin Bolton from the United Kingdom published *Towards a Theory of Drama in Education*. There he distinguished four different ways of using drama in an educational context: short drama games, dramatic playing, theater, and drama for understanding.

Drama for understanding can imply use of the three aforementioned forms of drama, but the main point with drama for understanding is to reflect in action, and on action regarding the process drama elaborated based on a pretext. Learning through drama for understanding is focused on transformation of the participants' attitudes regarding a phenomenon, toward a new and more complex understanding. Bolton was strongly inspired by Dorothy Heathcote's design of explorative drama forms summed up as Drama in Education (DiE). In DiE different conventions were used in order to obtain insight and find "brotherhoods." This kind of montage was quite stylized and built on cooperation. It should always include meta reflection both within a role and outside of it. Process drama is a genre based in this drama form. It is assumed that Heathcote was inspired by Berthold Brecht's notion of *Verfremdung* (alienation), as well as his political ideas about becoming aware of how society functions, and thus possibly participating in change. Another genre is devising, which is (more) product oriented, and where the collage forms from process drama are developed with some kind of narrative thread. In devising the group participates in the production of the performance, which is often site specific and community based.

The other image from the period we wish to bring forward is from the twenty-first century. What has happened since Bolton wrote his book? According to him it is quite clear. In 2000 Bolton gave a keynote speech in York titled "It is all theatre!" that was subsequently published in *Drama Research* (2000). He had then also published a popular version of his doctoral thesis *Acting in Classroom Drama* (1998). The positioning of drama as an arts subject has been a main trend in drama education throughout the beginning of the twenty-first century as illustrated by the following examples.

At Aarhus University in Denmark more continental influences are visible in thoughts regarding drama pedagogy developed and inspired by performance theory, dramaturgy, theater anthropology, and system theory. Janek Szatkowski, Ida Krøgholt, and Niels Lehmann have all promoted these traditions in their thinking and writings. It is not unexpected that Jan Fogt and Charlotte Fogh from Metropolia Polytechnic in Copenhagen in 2015 describe theater as a dying art form. They are engaged in the ongoing rapid changes in society that already have shown how fictionalizing, staging oneself, and using different kinds of autobiographical material in performance question what kind of theater that has something to say to people in contemporary time (Fogt & Fogh, 2015). This is called a performative turn and is connected with a focus on corporeality and a new emergent esthetics (see Fischer-Lichte, 2008), where the theater is no longer dominated by text. It is called post dramatic (Lehmann, 2006). Different kinds of concrete actions and multimodal symbols have taken the place of the verbal. Cross over and fusion of different art forms are also prominent in schools. Kristian Knudsen in Trondheim in his Ph.D. project elaborates a possible renewal of drama pedagogy connected to how young people stage themselves in social media. He wishes to renew drama education, re-conquer its artistic potential, and include fragments, episodes, a mixture of the virtual, and the "real" into a drama pedagogy for contemporary time (Knudsen, 2015).

With these short overviews of a landscape in flux and change, this chapter will turn to look at the development of drama in educational settings during the last fifty or so years in Finland and Norway. Initially the focus is on the level of national frameworks for both school and teacher education. Then it shifts to the work done by individuals and associations to promote drama in education. This is followed by a look at how drama is implemented in the school curriculum in elementary and lower-secondary education. Intermediate studies in drama and theater focused on education are then treated, this being followed by a survey of research done or in the making on drama and theater education. We conclude with a discussion regarding how our chosen contexts connect with or are different from each other, even though both exemplify the Nordic community (called *Drama Boreale*) in drama education.

METHODOLOGY

In the next sections of this chapter the exploration is guided by the following problem formulation: How has drama education been included in education in Finland and

Norway over a time frame extending from the 1970s to 2016? The main problem thus leads to an examination from the perspective offered by the following four subproblems: Who is to be taught drama education? Who has the right to define drama education concretely in the light of national and local curricula? What role is drama thought to play in young people's lives inside school, or, perhaps, does it play any role at all there? Who has the right to teach drama and with what competence?

In an article in the journal *Research in Drama Education* regarding Nordic curricula for drama and theater at different educational levels, Österlind, Østern, and Thorkelsdóttir (2016) did a document analyses of the art subject drama/theater in the Nordic countries. The subject status for drama is so far achieved only in Iceland in compulsory education as part of the key learning area in the arts. At all other stages drama is an optional choice or integrated as a means of promoting learning in other subjects.

This study presents the state of the drama education field in Finland (with an aside to theater education), and in Norway (where drama and theater education are included within the same frames). It draws its conclusion with a discussion of what has been achieved and what could be the options in a future perspective. The methods used for analyzing and finding answers to the research problems are document analyses, and experience-based narratives about the development, including conversations with some of the key persons in the field under study. This study utilizes experience-based narratives because all three authors are also participants in the story they are about to relate.

The present study establishes the limits of its analysis to elementary and lower-secondary education as well as teacher education including drama as a subject. Thus, upper-secondary education will not be included, even if it is interesting that students can choose to specialize extensively in drama/theater during their upper-secondary education. In Norway there are twenty eight upper-secondary schools offering drama as a study program throughout that level. In Finland theater art can be chosen in several upper-secondary schools with from two to about ten courses in theater art leading to a diploma in theater art. Another rather extensive arena for theater studies is the optional extra-curricular activity called cultural school in Norway and basic arts education in Finland (see Österlind, Østern, & Thorkelsdóttir, 2016).

The authors notice the limitation of perspectives on the theme studied, having clearly focused on two universities in Finland. The picture given of Norway is also limited, but more general, it being based on available information on the Internet. This was combined with critical reading of the Norwegian parts by key persons in Norway.

DRAMA AND THEATER EDUCATION IN FINLAND

School theater has been a part of the Finnish school culture, although neither school theater nor drama has status as a subject in the core curriculum in comprehensive school. In the national curriculum from 1982, an optional subject called "expressive

skills" was introduced at the upper-secondary level. The Ministry of Education approved intermediate studies for becoming a qualified teacher in expressive skills. This instruction was started at the University of Jyväskylä and the current studies in drama education have evolved from this.

Several attempts have been made to suggest drama as a subject in elementary and lower-secondary education; one such attempt was made around 2000 to form a subject called "drama," which was seriously debated and had sufficient support from the ministry, but not enough in the parliament. An expert group working on the document *Perusopetus 2020* (Basic education 2020) has formulated a proposal for the national core curriculum (OKM, 2010). One of their proposals was to improve the status of and training in drama. They proposed drama as a new school subject in the Finnish school system for the next national curriculum. The main objectives for this subject were to encourage, promote, and develop students' skills in expressing themselves through drama and theater, in addition to being able to interact constructively with different people and groups. For the purpose of developing drama and theater education as well as students' skills in a systematic and meaningful way, drama was to be separated from mother tongue instruction. The expert group's proposal for drama as a subject was not implemented due to political resistance. However, the teaching of drama remains an issue in Finland. In the current *National Core Curriculum for Basic Education 2014* (FNBE, 2016) for grades one through nine drama has its own important role and learning goals. The transformation of Finnish schools in general is also a frequent topic of international discussion (Lankinen, 2010).

The Role of the Finnish Drama and Theater Education Association FIDEA

In 1972 an association called the Association for Creative Activity in School was founded in Finland. This association changed its name in 1991 to ILKA, an acronym for expressive education or drama pedagogy, and in 2001 its name became FIDEA, as part of the world association IDEA. FIDEA does not have many members, their current number being approximately 200. Nevertheless, it has had an impact, being the contact link to the Finnish National Board of Education (FNBE) and to the Ministry of Education. After the *Drama Boreale* conference in Jyväskylä in 1997, the association formulated an appeal to FNBE and the Ministry of Education, stressing the need for a professorate in drama pedagogy, a need for drama teacher education, and a place for drama as both an art subject and a form of work in elementary and lower-secondary education. In 2009 the association renewed the appeal to the same instances, now claiming a place for theater art as a subject at these levels.

A special feature of the Finnish attempts to develop drama in education stems from a tradition with lecturers of speech expression in teacher education. Some of these lecturers were often interested in developing their positions into lectureships

in drama. This was particularly the case in Jyväskylä and Vaasa (see Arnolds-Granlund, 2009; Laakso, 2004). A local drama curriculum has been developed and applied in Oulu (Laukka & Koponen, 2014). A proposal for a complete national drama curriculum for the comprehensive school grades one through nine has been developed in Helsinki (Toivanen, 2015, pp. 239–271).

Drama in the Current National Curriculum for Finnish Comprehensive Schools

Drama in the current Finnish national core curriculum is mainly connected with teaching literature and interaction skills in the Finnish (or Swedish) language, but it has also been proposed as a teaching method for many other subjects (e.g., history, language subjects) (FNBE, 2016). In Finland drama is defined both as an art subject and as a teaching method or a pedagogy. The current curriculum underlines interaction, collaboration, creativity, and students' active role in learning (ibid.; Toivanen, 2015). The concept of drama in education in the Finnish comprehensive school system (grades 1–9) includes all forms of theater for educational purposes: performing theater, participatory theater, and applied theater in use in the learning environment (Toivanen, 2012b; 2015).

The current curriculum framework emphasizes that active involvement of the participants in the drama process is essential. Drama uses elements of the theater art form for educational purposes for students of all ages, from first to ninth grade. In drama all students work as a group using the conventions or strategies of drama in devising short pieces of fiction (e.g., freeze-frames, teacher in role). Fictional roles together with time and space help learners to communicate their understanding in an esthetic way, to themselves and their fellow participants (Neelands, 2009; Neelands & Goode, 2015; Rasmussen, 2010). Drama incorporates elements of theater to facilitate cognitive, physical, social, and emotional development and learning, it being a multisensory mode of teaching and learning (Bolton, 1998, pp.198–200; Toivanen, 2012b). Drama work covers a wide range of techniques, incorporating physical movement, vocal action, and mental concentration. The current Finnish national core curriculum confronts teachers and teacher education with a challenge. A group of teachers can acquire the competence needed for teaching drama through their own efforts. However, the majority of teachers lacks studies that would give them the competence needed to teach drama effectively.

Drama Teacher Education in Finland

The ideas of drama education spread to Finland from Great Britain and Scandinavia in the early 1970s, gradually becoming a part of teacher education at the Universities of Jyväskylä and Helsinki, and at Åbo Akademi. However, it took nearly two decades to establish the subject as an academic discipline, and the first Ph.D. students in drama and theater pedagogy graduated at the turn of the twenty-first century.

This section focuses on drama education, primarily concentrating on two universities, Jyväskylä and Helsinki, which are central in the development of teacher education with studies in drama education. Some other universities, including the University of Oulu, the University of Tampere, the University of Eastern Finland, the University of Lapland, and Åbo Akademi, also offer basic studies in drama education. The University of Tampere offers a master's program in drama and theater research. This program can include studies in Finnish language and literature and thus also be combined with pedagogical studies for teacher qualification. Two universities of applied sciences (*ammattikorkeakoulu*) in Finland offer a four-year education for instructors in theater expression. These four-year studies qualify the students as teachers in the extra-curricular activities in theater education.

A master's program including pedagogical studies has been offered at the Theater Academy of the University of the Arts Helsinki (TeaK) in Helsinki since 1997. Seventy three students have thus far completed their master studies and been qualified as theater teachers.

In drama teacher education the idea of an "integrative pedagogy" throughout the studies for achieving professional competence is the primary focus of attention at the University of Jyväskylä. The applied educational methodology of a subject area, including theoretical reflection, is currently at the center of teacher training at the University of Helsinki.

Drama Education and Research at the University of Jyväskylä

The strongest period of establishing studies in drama education at the University of Jyväskylä took place during the teaching career of Lecturer Erkki Laakso. As an educated actor and teacher, Laakso had been impressed by the courses taught by Brian Way in the 1970s. Laakso brought the ideas of drama education into his own teaching and managed to include drama education in the study program of the Department of Teacher Education. This new program was to concern every student in the 1980s. At the end of the 1980s the Ministry of Education appointed the Faculties of Education and Humanities of the University of Jyväskylä to organize the national education of drama teachers. As a result, basic and intermediate studies in drama education started in 1990, thus giving drama education status of an academic discipline. In addition, two qualifying training programs were established to produce the necessary number of qualified drama teachers.

The 1990s and 2000s were decades with strong development in drama education at the University of Jyväskylä. The first lecturer in drama pedagogy in Finnish teacher education was appointed in 1995. The teaching program included process drama and theater work. In 1997 the first Nordic *Drama Boreale* conference convened in Jyväskylä, Finland (Teerijoki & Taskinen, 1997). Several highly esteemed international drama pedagogues, including Pamela Bowell, Nils Braanaas, Sandra Hesten, David Hornbrook, Andy Kempe, Jonothan Neelands, Cecily O'Neill, Allan Owens, Janek Szatkowski, Bjørn Rasmussen, Kari Heggstad, Stig Eriksson, John

Somers, and John O'Toole, visited and held courses in the 1990s and 2000s. With the establishment of a chair as professor in drama education in the 2000s drama education seemed poised to become an essential part of teacher education.

The advanced studies and Ph.D.-level courses in drama education were started. Nearly one hundred master's theses and several doctoral theses were produced with a drama education theme. Eventually research and publications in drama education remarkably increased (see Østern, 2001; Østern, Teerijoki, & Heikkinen, 2003). For example, Østern (2004) contributed to the development of a theory of drama education, introducing the construction of a metaphor for drama, classification of genres in drama, as well as developing analytical dramaturgical thinking. The research on serious playfulness by Heikkinen (2002) was also an important step in this development, especially in the Finnish language literature of drama education.

Since 2009 the organization for teaching drama education at the University of Jyväskylä has been the Open University of the University of Jyväskylä. The drama teachers at the Open University had had intensive cooperation with colleagues at the Department of Teacher Education and the Faculty during these years from the beginning of the curriculum planning for drama education studies in 1993. Ultimately the Open University could start offering basic and intermediate studies in the 1990s for teachers and others who were interested in drama education. Since 1993 the Open University has organized basic studies in drama education with their partner institutions in over forty localities, and since 1996 it has organized intermediate studies in ten cities. Annually, there are on average ten cooperative partners in addition to Jyväskylä and Helsinki. Until now, approximately 600 teachers have completed their qualifying studies as drama teachers at the Open University. It can be stated that the Open University of the University of Jyväskylä has been one of the most significant institutions in educating qualified drama teachers in Finland, as the required intermediate studies have not been available in any other University, apart from the Theater Academy, Åbo Akademi University in Vaasa, and before 2009 the Department of Teacher Education at the University of Jyväskylä. In recent years the intake of students in drama education has increased rapidly at the Open University, since teachers wish to improve their teaching to become more comprehensive. In addition, they have taken into account the national core curriculum for 2014.

In addition to the extent of the availability of drama education studies, the Open University has been developing the formula and the content of drama education in cooperation with the Department of Teacher Education. This has also included careful quality control. All the teachers in the partner institutions have to be approved by the Faculty. The curriculum and the required assignments are equal in all teaching localities, and the Open University takes care of the coordination. The students have to apply for these studies, showing their suitability for teaching drama. As the studies in the Open University are addressed to people in full time work, the contact courses have to be arranged in the evenings and weekends. In this pedagogic and content development the starting points were the model of experiential learning in arts and the ideas of adult education (Kolb, 1984; Sava, 1993; Malinen, 2000). In addition, the

four basic elements of professional expertise, which are theoretical, practical, self-regulative, and socio-cultural knowledge, are taken into account (Tynjälä, Häkkinen, & Hämäläinen, 2014, pp. 992–994).

The main aim of the studies is to develop the competence and identity of a person who is an artist, teacher, and researcher. To achieve this goal, practice and theory are combined in a way that contact courses include active drama work when practicing drama skills and drama teaching skills. The experiences and knowledge thus gained are linked to theory by applying assignments with relevant references. In addition, the students' own projects in authentic learning environments, essays, network courses, and learning diaries play a central role. In all teaching and activities the core aspects are: (a) to find the connections between practice and theory through multilevel reflection; (b) to develop artistic-pedagogical thinking and skills; (c) to develop self-regulative knowledge, including metacognitive and reflective skills; and (d) to both understand and benefit from their socio-cultural knowledge. These aspects represent the model of integrative pedagogy (IP model) (see ibid., pp. 992–994). They have also been the core lines in teaching future drama teachers.

Contemporary society, with its various ways of using social media and constantly improving educational technology, is under continuing attention in the development of the curriculum for drama education. For example, the ideas of flipped learning, where the core theoretical and/or guiding knowledge is mediated before the contact courses by videoclips, are part of the syllabus (Bergmann & Sams, 2012). In addition, the relevant use of such digital resources as short film courses with tablet computers or peer-based learning in virtual environments, and some applications of social media, are used to enhance learning.

Societal interaction has long and strong traditions in drama education at the University of Jyväskylä. Cooperation with the Jyväskylä City Theater was established already in the 1980s with various kinds of cooperation, such as artists as teachers for students in drama education and students creating workshops for the audiences of the theater pieces. Cooperation with schools around the province has also been intensive throughout. The teacher students have taught process drama, Theater in Education, and so on not only for their students, but also for school teachers as a form of in-service education. As a current example of school cooperation seven so-called UNESCO schools are cooperating with drama students of the Open University in Jyväskylä. These prospective drama teachers are conducting their project studies by teaching process drama in those schools with themes such as child rights, human rights, and cultural education. In addition, cooperative projects inside the university have increased across faculty borders. Alongside these numerous projects, research in drama education has also been carried out. These research results have been disseminated through scholarly as well as popular publications.

Research in Drama Education at the University of Jyväskylä

As mentioned before, the University of Jyväskylä has been an active contributor to research in drama education from the 1990s upto the present. The doctoral theses have covered such topics as laughter in the theater (Herstad, 2001), serious playfulness (Heikkinen, 2002), the learning potential in process drama (Laakso, 2004), and drama as rehabilitation for speech and intellectually disabled people (Pulli, 2010). Recent research has focused on interactional procedures in teaching drama (Solin-Lehtinen, 2013; Jyrämö, 2013; Viirret, 2013; 2016) and in philosophical aspects of drama education (Uusitalo, 2016).

Connected to or inspired by the milieu at the University of Jyväskylä, several doctoral theses on early childhood education (Heinonen, 2000; Walamies, 2007), in process drama (Asikainen, 2003), and youth theater (Aaltonen, 2006) have also been defended. In fact, a recent overview made by Østern (2015, n.p.) based on a literature search resulted in a list of forty-two doctoral theses from different universities in Finland from the period 1995–2014. As of 2016 some fifty doctoral dissertations connected to drama and theater education, including at least eleven theses from the Theater Academy in Helsinki (University of the Arts Helsinki), have been published. Untamala's doctoral dissertation (2014) contains an overview of theater and drama education research in Finland.

Teacher Education and Drama Research at the University of Helsinki

The program of basic studies in speech and expressive education began in teacher education at the University of Helsinki in 1990 and this development has continued without interruption. At the beginning the basic studies were titled Speech and Expression Skills. In 2005 it was changed, becoming Drama Education. This subject has become an essential part of teacher education with research and publications. All elementary school and kindergarten students at the Department of Teacher Education have three ECTS credits of drama in their studies. Drama education is very popular as a topic for master's degree research. At the moment (2016) five doctoral theses are in preparation.

Drama Education Research Projects at the University of Helsinki

One of the research projects undertaken at the Department of Teacher Education tries to find answers to some of the challenges of drama teaching. Pedagogical interactions between teachers and students are very complex in all real-life teaching-studying-learning situations (Toivanen, 2012a, pp. 231–234). The potential complexity and diversity of creative processes in classroom drama make it even more challenging for teachers especially at the beginning of their drama teaching careers. In most other school subjects, the ways students work, move, and interact in classrooms are controlled by the teacher's actions. The teacher controls students' behavior by the layout of desks,

the choice of teaching materials, and scripted teaching methods. Movement around the classroom is restricted by the teacher's instructions. In contrast, classroom drama teaching usually starts with moving the desks aside. Working in drama takes place in open spaces. Open space, fiction, and drama techniques, as well as students' and their teacher's actions are the basic materials for the drama lesson. The aims of the current research project are to develop a theoretical framework for drama pedagogy.

The following interpretation of the three aspects of drama education is based on Kansanen's (1999; 2009) triangle model of education. According to Toivanen (2012a, p. 229; 2015, p. 18), the model for drama education takes into account the specific nature of drama education and its working modes in three realities. A teacher using drama needs to be able to manage time, space, and people and to do so in both the social dimension (pedagogical level) of the classroom and the instructive level of education. The latter is connected to teachers' decision making in the teaching-studying-learning process interaction (making pedagogical decisions in action, managing fictional time, space, tools, etc.) and post-interaction (reflection). At the pedagogical level, teachers need to be able to relate to students, both individually and in groups within in the social dimension of education. The esthetic dimension of the drama art form includes esthetic doubling (fiction, creative actions, and reflection).

In the first studies of drama pedagogy at the University of Helsinki, Toivanen and his research group have conducted research on the relationship between drama and creativity, aiming to construct a theory of teaching supporting children's creativity in the context of drama education and classroom drama (Toivanen, Halkilahti, & Ruismäki, 2013; Toivanen & Halkilahti, 2014; Toivanen, Salomaa, & Halkilahti, 2016; Lehtonen, Kaasinen, Karjalainen-Väkevä, & Toivanen, 2016). The objective of the first theory-based article was to characterize the terminology used regarding creativity in drama education. Toivanen and associates (2013) delineated the context of classroom drama teaching (a creative environment) as a stage where there is space for individual creativity and, particularly, for collective group creativity to emerge.

The second and third studies were based on observed, videoed, and analyzed lessons. Their purpose was to determine whether teacher trainees and teachers specializing in drama education have succeeded in supporting student group creativity in drama lessons. In these studies the analysis was carried out by dividing the drama lessons into sections according to the drama work form used (warm-up game, concentration activities, used drama techniques, and ways of ending the lesson) (Toivanen & Halkilahti, 2014; Toivanen et al., 2016). Group creativity was simply defined as a process with the characteristics of group creativity (improvisation, collaboration, and emergence) presented by Keith Sawyer (2006; 2011; 2014). Although this study had only sixteen observed drama lessons, the conclusion suggests that drama teaching could support the student group creativity, since creative group work took up from thirty-four percent to ninety-one percent of the active working time in the observed lessons (Toivanen et al., 2016, pp. 50–51).

The fourth article brought together three doctoral studies of teaching drama (Lehtonen et al., 2016). This article presents three different approaches to how a

teacher could support student creativity in a drama class. The writers suggest that it might be beneficial for teachers teaching drama to have training in improvisation, to pay attention to the holistic presence and to focus on student perspectives, agency, and ownership in teaching. Developing the skills of disciplined improvisation in teaching should be part of drama teacher education. According to the research project conducted by Toivanen and associates (2016, pp. 41–44), one way to improve the skills of teacher students and teachers in creative teaching seems to be making use of drama and improvisation in teaching. The goal of the drama educational process in teacher education is to develop skills in drama methods as well as in teacher–student interaction. These skills are to be part of both the dialogue and of the broader group dynamics of listening to the group.

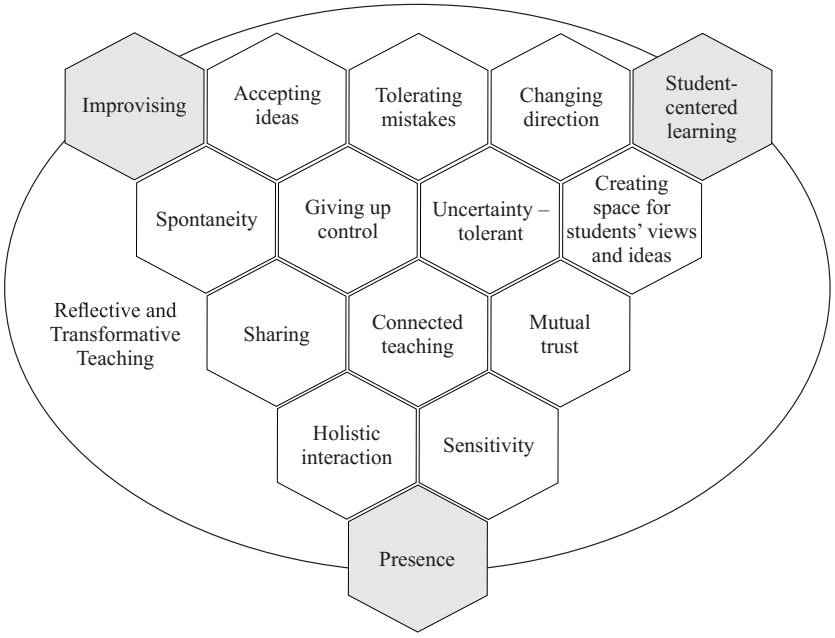

Figure 1. Aspects of Creative Teaching in the Drama Class (Lehtonen, Kaasinen, Karjalainen-Väkevä, & Toivanen, 2016, p. 564)

In Figure 1 the model titled Aspects of Creative Teaching in the Drama Class, Lehtonen and associates (2016) put together the central elements of creative teaching that have evolved from the aspects of three approaches: presence, student-centered learning, and improvising. These are elements that the research group suggests should be taken into consideration when aiming to improve the practices of creative teaching in drama. The model and teaching of drama should be approached as a playful space that teachers could participate in with an orientation of serious

playfulness (see also Heikkinen, 2002; Huizinga, 1949). The elements can be used as pieces of playful culture and the participants in the playing need to consider what they have in their hands and what they should focus on. If they play with all the pieces simultaneously, they probably will not be able to manage the game and will lose. This seems to indicate that teachers must be encouraged to participate in the creative game of teaching drama, to take risks and throw themselves into the process, to critically reflect upon their experiences, and, finally, to develop their own ways to teach drama in creative ways.

DRAMA AND THEATER EDUCATION IN NORWAY

Educational Policies and the Role of the Association for Drama and Theater in School, and of the Journal Drama

The Nordic drama pedagogic journal *Drama* (from 1963) is now in its fifty-second year of existence, and it is in a way important to start there, because the main editor for the first thirty years of this journal was Nils Braanaas (Rasmusson, 2000). Braanaas was active in articulating the path for drama in education in Norway. He was active in the association for drama teachers and motivated by the fact that many of the members do not work in schools, but in the cultural field. This association was first called the Association for Theater in School (*Landslaget teater i skolen*). The name was subsequently changed to the Association for Drama in School (*Landslaget drama i skolen*), and then again to the Association for Drama and Theater Pedagogues (*Drama og teaterpedagogene*) in 2014. The persons promoting drama and theater in education have been interconnected through the association, the journal, and the developmental work done on intermediate studies. The association has, among many other appeals, delivered a text regarding a White Paper about the school of the future to the public consultation round (NOU, 2015).

The journal *Drama* has a Nordic editorial board. It is currently distributed to 1,350 members (and institutions). The journal has had such themed issues as the importance of audience, space, drama in elementary and lower-secondary education, criticism, drama work with asylum seekers, the drama programs in upper-secondary education, passion as a driving force, drama work in health institutions, Germany for inspiration, and performativity in youth culture. Developing a national drama network, a Nordic *Drama Boreale* network, and an international community (IDIERI and IDEA) have promoted the identity of drama and theater teachers and researchers.

Many persons have contributed to the political work carried out in order to try to include drama and theater in the national curriculum framework. It has been quite close several times, but so far drama/theater has not been an obligatory subject as part of the curriculum in elementary and lower-secondary education (grades 1–10). In 1985 it was "almost" included in the curriculum framework. In the 1997 curriculum drama was included as a part of the curriculum in Norwegian language. A "victory" was then that all teachers for grades one to ten starting from 1999 had to have a

minimum of thirty hours of drama in their education. Sæbø (2003) studied the impact of drama in elementary and lower-secondary education after the national curriculum framework of 1997. This curriculum included drama as one form of work. It was also named as a specialization area within the subject Norwegian. Sæbø wrote about the identity of the drama subject in the curriculum. She concluded that the core of the subject lies in theater art, but progressive humanistic pedagogy has contributed to the evolution of the subject in many ways: the art content from theater, the art-educational content from art education, the personal and social aspects from the general school curriculum, and, finally, the thematic content from different school subjects (p. 11).

The framework for teacher education of 2003 no longer included any art subject as a necessary part of the teacher education. The obligatory thirty hours of drama became optional. This has proved to have negative effects in terms of regarding drama as an important part of teaching in grades one through ten.

The national curriculum framework of 2006, called the *Knowledge Promotion* (KD, 2006), proposes of free choice of methods in education. In this document drama was mentioned as a form of learning and thus marginalized in the curriculum.

These changes emanated from the so-called PISA shock in 2001, when Norwegian teenagers scored only in the middle range among European and other international comparisons. Stress was then put on fundamental skills in reading, writing, speech, numeracy, and computer literacy.

In 2015 the White Paper called the *Fremtidens Skole* (the school of the future) was delivered to the Knowledge Department (NOU, 2015). This document has been discussed extensively and a new possibility seems to be available for including such arts subjects as drama and dance in the curriculum for elementary and lower-secondary education, perhaps as a learning area called Music, Drama, and Dance. This is because of the White Paper and the statement made there that more stress should be put on deep learning and esthetic issues. Practical subjects such as food and health, physical education, and movement should also have a more prominent place. Regarding the problems that the schools of the future will face, the expert group concludes that the challenges posed by climate change, multiculturalism, and incipient adulthood will dominate.

Drama in School Education in Norway

Drama/theater has not yet achieved the status of being a subject in elementary and lower-secondary education. It is an elective in upper secondary with an extensive curriculum (around 1,000 hours during three years). This has led to a quite impressive development of course books for the different minor subjects in drama and theater at the upper-secondary level. This is also the case for course books in teacher education. A few notable examples are Hammer and Strømsøe (2015), Heggstad (2012), Ibsen, Ibsen, and Ilsaas (1988), Reistad (1991a; 1991b), and Sæbø (2010; 2016).

The national curriculum framework for elementary and lower-secondary schools, which is called the *Mønsterplan 87*, mentioned drama as a method. It also suggests the possibility of drama serving as a link between subjects.

An elective choice called Audience and Stage (*sal og scene*) comprising fifty-seven hours a year has been available to secondary school students since 2012. This course may embrace different kinds of activities involving a stage and an audience, such as a musical, a performance of music or dance number, film making or an exhibition, or a drama club. Curricula for elementary and lower-secondary schools have been developed on a more local basis.

The municipality for a certain school can decide to have drama in the school curriculum. One example is Okstad School in Trondheim. Here, drama is a subject in grades one to four. The school has made this possible in Norwegian, physical education, religion, and music by slightly reducing the number of hours. The school has a drama teacher with competence in drama and theater, as well as extensive experience of using drama as a form of learning in other subjects. The drama teacher stresses cooperation among the students. The principal of the school considers the character-forming aspects as central when introducing drama as a subject in the school curriculum. Part of the motivation mentioned is that drama seems to enhance surprise, curiosity, and spontaneity among the students. Drama makes difficult themes accessible by a form of work based on exploration and understanding of the premises of young people. The students learn to give each other positive feedback. The teachers acquire valuable experience of students managing social interaction in different situations.

At present a group of drama and theater educators is working on a suggestion for inclusion of drama and theater as a subject in elementary and lower-secondary education. They negotiate on issues such as which would be the key elements of the subject – dramaturgy, staging, improvisation, and changes of perspectives – so that it would optimally promote empathy, mastering, and empowerment.

Drama and Theater Education at Universities and Teacher Colleges in Norway

As the analysis has shown so far, drama was an obligatory subject in teacher education for elementary and lower-secondary schools from 1999 until 2003, thus providing some basic insight into drama as an art subject and as a form of learning. Even if drama does not have status as a subject in the school curriculum, and is no longer in teacher education, the practices in different teacher education programs vary considerably.

One of the most extensive projects was carried out in order to raise the level of drama competence among teachers. This was a consequence of the place drama held as a method and a subject area within Norwegian language and literature in the national curriculum framework of 1987, called the *Mønsterplan 87*. Teachers were offered a two-year project with further education in drama.

In 1974 the first university-level studies started in Trondheim. Nils Braanaas was an actor and a teacher, who had been teaching at a progressive upper-secondary school in Oslo (*Forsøksgymnaset i Oslo*). Since 1974 Braanaas served as a university lecturer in the University of Trondheim at the time, when it began to offer intermediate studies in drama, theater, and film. He designed lectures on drama pedagogical theory and history. These lectures were developed into an influential course book that has been revised many times (Braanaas, 2008). Another prominent initiator from the field of theater science was Jon Nygaard, who was an active designer of studies in Trondheim in the initial phase. His idea was to combine theoretical and practical studies of the craft (e.g., to stage theater performances). He also published books on theater history based on his lectures in the 1970s in Trondheim (Nygaard, 1992–1993). Gradually, film emerged as a separate university subject.

The first professor of drama, theater, and film in Trondheim was Viveca Hagnell, a Swede, who was appointed in 1978 (Hagnell, 1983). The advanced-level studies in drama, theater, and film started in 1979. In 2000 the professor of drama and theater, Bjørn Rasmussen, was appointed at the University of Trondheim, now called the Norwegian University of Science and Technology (*Norges teknisk-naturvitenskapelige universitet*, NTNU). Drama and theater studies are placed in the Faculty of Humanities. Several associate professors and professors are at the unit today.

Another important site for drama pedagogy is Bergen University College. Actually, the first intermediate studies in drama pedagogy in Norway were launched there in 1971. Gradually Bergen has become a central place for drama education with a national hub function. The drama unit is, from a Norwegian perspective, quite big, with around ten people working there, including for the time being, two doctoral students. Similarly, quite many universities and university colleges have developed drama and theater studies in Norway.

In 2012–2013 the Association for Drama and Theater Pedagogues distributed a survey in order to map the amount of drama teaching in the institutions preparing elementary school teachers (Strand & Krosshus, 2013). The responses from eighteen teacher education institutions show great variations: seven of the institutions offer from thirty to 125 hours of obligatory drama teaching for the teacher students, while eleven of them offer up to twenty-seven hours of drama teaching. Several of the teacher education institutions report the introduction of two forms of teacher education. One of them is used in grades one through seven, the other uses five to ten hours with the material integrated into other subjects. This has led to a closer cooperation between the drama units and subjects. Many places offer teaching about drama as a form of learning integrated into subjects such as pedagogy, teacher's background knowledge of individual students, and Norwegian (ibid., pp. 3–12).

Master's and Bachelor's Studies in Drama and Theater Education in Norway

Master's Studies

Norway offers several master's and bachelor's programs, the names of which differ:

- Drama and theater communication (Oslo and Akershus University College);
- Drama and theater (NTNU, Faculty of Humanities);
- Arts education (NTNU, teacher education program in cooperation with the DMMH kindergarten teacher education university college);
- Drama pedagogy and applied theater (Bergen University College);
- Arts subjects with in-depth study in dramatic art (Agder University); and
- Creative subjects and learning processes (Stord/Haugesund University College).

A professor of the field is usually in charge of the master's studies.

Bachelor's Studies

The aforementioned institutions with a master's degree in most cases also offer bachelor's-level (BA) studies. The names of the master's programs differ. The University College in Volda provides a BA in drama/theater. The Arctic University in Tromsø provides a BA in drama and theater. The kindergarten teacher education university college DMMH in Trondheim provides a BA in kindergarten teacher education with a specialization in drama, arts, and craft. The institutions mentioned previously also offer a one or a half-year study in their specialities. In the University College Oslo Akershus these include dramaturgy, story telling, masque work, figure theater work, and theater direction. In addition, the University of Stavanger offers sixty study points in drama.

This wide range of studies implies important things regarding quality and qualification. The teachers and artists who work at these institutions of higher education have a degree at the level of Ph.D. Chairs for professorates in drama/theater education have been established in Trondheim (NTNU and DMMH), Bergen, and Kristiansand. Due to a system offering possibilities to seek promotion to professor based on qualifications, Norway currently has about ten professors. The number of possibilities for studying drama/theater education in teacher education also implies that the competence level among drama and theater teachers is high. Finding qualified persons for the professorates remains a problem, but on the other hand too many qualified persons might apply for the other positions offered at teacher education institutions. This might be because of the changes in both the qualifications for becoming a teacher (no arts subject is required) and in the political focus being on core subjects such as mathematics, Norwegian, English, and science.

Research and Development Projects in Drama and Theater Education in Norway

The research in drama and theater education has so far resulted in about thirty Ph.D. dissertations in Norway. The central institution offering doctoral studies in drama and theater is the Nogwegian University of Science and Technology (NTNU).

Hovik (2014) at the University College for Early Childhood Education (DMMH) has promoted artistic research in her Ph.D. project at NTNU, thus inspiring other colleagues to promote more artistically-oriented research. She is currently exploring interactive dramaturgies for children in the project SceSam. Reistad (1991a; 1991b) has written about children and theater, and Guss (2000) has studied children's dramatic playing from a performance perspective.

Engelstad (2004) at the University College South East has promoted forum theater in education, likewise Songe-Møller at the University of Stavanger in cooperation with Bjerkestrand at Oslo and Akershus University College. Aune (2010) has studied youth theater, Haagensen (2014) has written about devising, and Ulvund (2013) studies the teaching artist concept with Volda University College as her working place. Rasmussen and Kristoffersen (2014) have studied drama as character forming in secondary school.

An umbrella project embracing many teachers and researchers within the field (34 projects in progress) is called Drama/Theater and Democracy 2014–2017. This project is coordinated by certain professors at Oslo and Akershus University College, Bergen University College, NTNU, the University of Stavanger, and North University.

The Nordic Conference Drama Boreale and the IDEA World Congress

In this subsection the role of Nordic and international cooperation will be presented, because Norway and Finland are active in this networking. In the 1970s some important Nordic gatherings took place at the Nordic Folk High School on Biskops Arnö island in Sweden, and two Nordic courses about "body and articulation" were arranged at the Nordic Folk High School in Kungälv in Sweden. The first Nordic *Drama Boreale* conference was held in Gothenburg, Sweden in 1994. Since then this conference has been organized in every Nordic country at three-year intervals. In 1997 the venue was Jyväskylä, Finland, in 2006 it was Trondheim, Norway, and in 2009 it was Vaasa, Finland. These conferences have become important for the dissemination of good practices as well as for providing information about artistic and scientific research within the field of drama and theater education.

The Nordic Educational Research Association (NERA) is also a meeting place for arts education through the special interest groups (see Østern, 2004). The Nordic Conference plays a similar role in Subject Education (NoFa). Both of these work through annual conferences. The International Association of Drama and Theater in Education (IDEA) celebrated its first world conference in Porto, Portugal in 1992. The University College in Bergen hosted this world conference in 2001 (see Rasmussen & Østern, 2002). IDEA world conferences have been arranged every third year.

COMPARISON AND CONCLUSIONS

This chapter would have benefited from a contribution from the other Nordic countries, since we have a good Nordic network, *Drama Boreale,* developing knowledge and inspiring colleagues within the field. This chapter has focused on two of these countries, because its authors have contributed to and are working in these two countries. There are many similarities between Finland and Norway regarding the development of drama and theater education. The development in Finland has also been supported by visits from Nordic colleagues. Especially Norwegian Nils Braanaas has had an impact in Finland through his book about the history and theory of drama, which Erkki Laakso has unofficially translated into Finnish for his students (Braanaas, 2008). When the Faculty of Education of Åbo Akademi in Finland accepted a study plan for a master's degree in drama education, it was planned in cooperation between Åbo Akademi University, Gävle University College in Sweden, and the Drama and Theater Unit at NTNU in Trondheim, Norway. These studies were, however, never realized because of a lack of funding. A master's degree program in drama and theater education, organized by the School of Education at Aarhus University in Denmark, was active for a few years.

With our descriptive analysis as a backdrop, we have made some concluding remarks concerning the findings. The obvious similarity between Finland and Norway is that drama has not yet achieved the long sought for status as a subject in the curriculum. The gatekeepers have mostly been political, but in both countries the already established art subjects of music, and arts and crafts might have been protecting their own status, at least earlier in Finland. Now there seems to be a change in attitudes. In Finland the current curriculum clearly supports drama as a form of learning in other subjects and in projects. In Norway a revision of the national curriculum framework, called the *Knowledge Promotion* of 2006, is making a difference in favor of the learning fields connected to drama and dance.

Another obvious similarity is the sharpening of the contours of the art subject drama, omitting many aspects connected with the pedagogical reduction of drama to one method. The importance of drama in education is connected to the power of the art form, and this has led to a change in the wording used when drama supports learning in other subjects and fields. The concepts used regarding drama for learning are at least drama methods (in the plural), but preferably drama as a form of work, or a mode of work, and in Norway the concept used is drama as a form of learning.

In Norway the number of positions in drama and theater education is far beyond that in Finland, and they cover the country well. In Finland the situation is more complex. At the University of Jyväskylä a professorship in drama pedagogy was established, but subsequently withdrawn. The Theater Academy (now the University of the Arts Helsinki) has professorships in dance or theater education and in artistic research. An adjunct professorship in drama education has been established at the University of Helsinki. It is notable that in Finland the decision has been made that theater teachers can only be educated at the master's level at the Theater Academy in

Helsinki and at Tampere University. Such restrictions do not exist in Norway, where different universities and university colleges also offer studies in drama and theater education at the advanced level.

The number of master's theses with the relevant themes of drama and theater education is quite high in both Finland and Norway. Finland has produced many more doctoral dissertations and from many of its universities than Norway has. As many of the Finnish dissertations are written in Finnish they are not so easily accessible for an international readership, and they are not included in the list of Nordic Ph.D. dissertations published by the Norwegian Association for Drama and Theater Pedagogues.

In Norway the Association for Drama and Theater Pedagogues has been and still is quite strong. It has contributed in substantial ways to the discussion on educational policies. Its national network contributes information regarding the status of drama education using the channel of the journal *Drama* as well as annual network meetings. In Finland FIDEA does not have so many members, but the association has actively contributed to the discussion on educational policies.

In both countries the impact of key persons has been huge. Most of them started without a doctoral degree, and they were driven by their ideological wish to promote democracy, equality, and solidarity. They were also driven by their educational ideals and their passion for drama and theater as a central part of a character-forming education. To a high degree, these persons have started to conduct research, but they have achieved a doctoral degree quite late in their career, or even after retirement. This tells a story of its own, specifically that these central contributors have learned that it is necessary to have a solid research-based foundation if they are to have a say when decisions are made regarding place and impact in education.

This chapter has focused on drama and theater in school education, on opportunities for drama and theater education, and on drama teacher education in two countries, Finland and Norway. It has not described the whole array of drama and theater educational practices in cultural schools, kindergarten, upper secondary, amateur theater, other professions, or in different cultural contexts outside school. A huge and influential field still remains to be described and explored. What connects all these cultural contexts is the wish to investigate the human condition and thus contribute to the development of society. The present chapter has elaborated the guiding questions posed in the paragraph about problem formulation. This study suggests that drama education be thought of as something for all school students. The right to define drama education concretely regarding national and local curricula depends on educational policies more generally. The role drama is thought to play in young people's lives inside school, or if it is to play any role at all inside school, is still under debate. What has been achieved is a common understanding of the need for subject specific competence for drama teaching.

As a concluding remark, the authors wish to note that a space still remains to be filled for Nordic cooperation regarding research and development within the field of drama and theater education.

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PART THREE

RECULTURING SCHOOLS

RAIMO NEVALAINEN, EIJA KIMONEN, & THOMAS L. ALSBURY

8. EDUCATIONAL CHANGE AND SCHOOL CULTURE

Curriculum Change in the Finnish School System

INTRODUCTION

This chapter will examine educational change from the standpoint of curriculum change. It focuses particularly on the implications of the changes for different dimensions of school culture. The study considers the manner in which the changes in the Finnish national curricula for the comprehensive school can be seen in school pedagogy and teachers' work. This is analyzed in the context of results from the previous qualitative research projects (Kimonen, 2015; Kimonen & Nevalainen, 2005; Webb et al., 2004a).

This chapter explores educational change by means of a qualitative methods. Data collection involved interviews, observation, and document analysis. The research data were analyzed qualitatively. Use of inductive analysis of the research data, description, and interpretation produced an integrated entity. The aim was to develop a grounded theory, when the data were systematically and intensively analyzed by constant comparison, collection, and coding (see Glaser & Strauss, 1967; Strauss, 1987).

FUNDAMENTAL EDUCATIONAL CHANGE

The Concept

Beginning in the 1980s, a new wave of educational reform and change was sparked both in the United States and across the world. It would continue into the 2010s. The concept of educational change was indeed so prevalent that it spawned a distinct field of study and even a notable research handbook (Hargreaves, Lieberman, Fullan, & Hopkins, 2014).

Changes in schools have often been merely gradual attempts to develop the current system in order to eliminate insufficiencies manifested in operating principles and

E. Kimonen & R. Nevalainen (Eds.), Reforming Teaching and Teacher Education: Bright Prospects for Active Schools, 195–224.

practices. The aim has been to make the operations of the organizations more effective and to develop its special characteristics without actually addressing the principles of operation. The educational reforms that focus on changing central structures and processes of school organizations have generally been unsuccessful. A challenge for the future school is to develop change attempts that have fundamental effects on school culture using such means as identifying new objectives, structures, and roles (Cuban, 1992, pp. 218–219).

The emerging new focus on educational reform is now delineated into individual lines of research focused on educational change at distinct system levels (school, district or municipality, state, federal or province). Uniquely, this era of educational change created a resurgence of reforms that were initiated outside traditional school systems as well as inside. These reforms promised to produce broad improvement in student achievement (Kretchmar, Sondel, & Ferrare, 2014; Mette, 2013). Outside influences included the growth of private and home schooling, corporate infusion into school reform, and a broadening accessibility to on-line instruction from a variety of external, private, and corporate sources (Saltman, 2014; Sementelli & Garrett, 2015; Waks, 2007).

The United States and other countries have seen this current era of fundamental educational change to be typically marked by a general consensus that reforms initiated since the 1980s have largely failed (Good, 2011; Guthrie, 2012; Hargreaves et al., 2014; Strain, 2009). Current educational change, largely targeted standardizing curricular content and raising teacher "accountability" through mandated central government accountability measures. These reforms generally did not produce the desired and promised reduction in the achievement gap among students, while conversely promoting negative outcomes such as narrowing curriculum and discouraging teacher experimentation and innovation (Bisland, 2015; Ehren et al., 2015; Erskine, 2014; Olivant, 2015).

Waks (2007) contended that the lack of improvement in student performance through mandated reforms can partially be explained by the realization that educational innovation is rarely implemented as intended. Even when curricular reform is implemented "with fidelity," it frequently fails to produce the predicted rise in standardized test scores, especially among the neediest students (Bye, 2015; Taylor, 2005). According to Cuban (1998), the criteria used to determine success in reform actually differs between policymakers (effectiveness, popularity, and fidelity) and practitioners (adaptability and longevity).

In addition, new curricula, programs, and processes have been largely unsustainable (Cheng, 2009). Reform initiatives have even been added at an unrelenting and rapid rate and without consideration for systemic congruity or an objective assessment of their effects (Chitty, 2012). Fullan (2001) called this phenomenon "projectitis"; a "churning" of new initiatives (p. 105). Cuban (1992) proffered that school organizations, when faced with a barrage of mandated reform initiatives, absorb change into current practice in order to maintain organizational stability, and thus little "deep, second order change" actually results (Waks, 2007, p. 284). Most

reforms in the current era can ultimately be characterized as mere incremental changes intended to enhance, but not fundamentally alter, existing organizational policies and procedures. Changes of this type generally do not effect students and leave many core functions of the organization unaltered. Waks (2007) noted that Cuban argued "in a judo-like fashion, organizations respond to external forces by converting changes meant to be fundamental into minor, or incremental, changes compatible with existing organizational structure" (p. 2).

Many believe the reform barrage that characterized this era of educational change succeeded more in creating frustration and anger among overwhelmed school faculty than to help needy children learn (Bacon, 2015; Brandt, 2012; Kim, 2004; Manhong & Lo, 2007). The suggestion has even been made that reform initiatives in this era were mainly created to highlight the supposed failures of public education for the purpose of political leverage or expanding the control of state and federal governments over education (Koyama & Kania, 2014; Mehta, 2013).

During this most recent era of educational change, several competing forces were at work shaping the directions taken. These included a focus on standardization over contextualization, on efficiencies over human agency, on centralized over localized locus of educational control, on policy-oriented over empowerment-oriented teacher professionalism, and on school choice.

Competing Forces of Change

Standardization Over Contextualization

The past few decades of education reform in the United States have been characterized by English and Papa (2010) as a period of "scholasticism, standardization, and stagnation" (p. 2). Scholasticism is described by Collins (1998) as when an intellectual field becomes stagnant when its principle goal is to collect, codify, and protect compendia. In the educational vernacular, we would call these compendia common core or standardized curriculum, standardized assessment, and instructional best practices. One fundamental change in education from the 1980s to the 2010s was the focus and mandated use of singular and standardized curricula and assessment vetted not through exploration and research verification but through anecdotal case studies highlighting isolated successes. The purpose of the standards movement was to improve teacher quality and raise academic opportunities for all students. Unfortunately, scholasticism of this type did not lead to the promised reduction in the achievement gaps.

The current trend to identify and standardize a knowledge base through a common core of curriculum assumes that one "knowledge set" is necessary and adequate to provide all students and schools what they need to succeed. The presupposition that we have identified what all students need to know both for now and in the future simply cannot be supported by either logic or evidence. English and Papa (2010) deemed indefensible the argument that "the current state of knowledge was

completely adequate for resolving all of the outstanding issues of education in our society" (p. 6). Feyerabend (1993) cautioned that "the belief in a unique set of standards is nothing but a chimera" (p. 160).

The standardized movement in education can also be seen by the adoption of what was characterized as "common instructional practice." This practice was intended to "teacher-proof" curriculum so that all students could receive superior instruction despite the presumed broad variation in teacher quality. This approach carries several presumptions with it, including the belief that we have finally found the one way to teach that works best for all students. Indeed, many found that the practice primarily attempts to normalize teacher behavior for the purpose of high-stakes evaluation while limiting teacher creativity and innovation. Unfortunately, the reform movement neglects to recognize that no one instructional approach is highly effective for every student. Neither is one set of curricular content most suitable for every student need is every student ready to receive the same content at the same moment in time or at the same pace.

The standardization movement supposes that homogeneity equates to excellent. In fact, these "best practices" are mainly supported through anecdotal stories of success in isolated contexts and not broadly supported by research. Pierce (1955) noted that a "[d]irect experience is neither certain or uncertain, because it affirms nothing – it just is" (p. 67). What these approaches did achieve was to homogenize curriculum and teaching approaches through controlling and codifying content and practice. The primary result of this standardization movement was a narrowing of the curriculum and the reduction of innovation and contextualized practice. Collins (1998) noted that when "a community is oriented toward innovation, great truths are not so much an advantage as an obstacle" (p. 32).

Efficiencies Over Human Agency

Many scholars believe that the current educational change era largely ignored the unmistakable and perhaps inconvenient reality that education at its very core involves the human element. Researchers argue that recent fundamental educational change ignored the importance of local context and the human agency inherent in all educational endeavors (English and Papa, 2010; Gonzales & Shields, 2015; Kliebard, 1988).

The concept of human agency can be thought of as the negotiation and balance between "educational approaches that not only rests on knowledge but also understanding" (English & Papa, 2010, p. 34). Carl Gustav Jung (1875–1961) described the differentiation between knowledge and understanding eloquently in the following (1958, p. 21):

> Scientific education is based in the main on statistical truths and abstract knowledge and therefore imparts an unrealistic, rational picture of the world in which the individual, as a merely marginal phenomenon, plays no role. The individual, however, as an irrational datum, is the true and authentic carrier of reality.

The current era of fundamental change focused largely on improving efficiencies within schools, as well as on standardizing content and processes, thus embracing a more rational problem-solving approach to ameliorate inequities among student performance. Unfortunately, this tends to ignore reform based on the relational and individualistic realities of human learning and the loosely coupled nature of educational institutions (Orton & Weick, 1990). Hargreaves (2005) noted that the field of educational change in the recent era attended primarily to structural and strategic aspects. He urged policymakers to focus more closely on emerging societal needs affected largely by cultural shifts unique to individual school contexts. He urged educational change to "move beyond images of change as linear, predictable, means-to-an-end process in favor of models of change as a complex and even chaotic process" (Waks, 2007, p. 278).

Centralized Over Localized Locus of Control

One trend in the current era of fundamental educational change is the reduction or elimination of local community control of curriculum. This shift in control was also borne out in the expansion of private schooling and charter schools. According to the OECD (2013), "many countries have pursued a shift in public and governmental concern away from merely controlling the resources and content of education and have focused increasingly on outcomes" (p. 37). The current analysis of international assessment reveals the changing locus of control for decision-making responsibilities in education. One trend is for school systems to devolve responsibility to local school districts or municipalities, encouraging responsiveness to local needs, and strengthening accountability. Conversely, some countries, such as the United States, moved to more centralized control of educational change, using the lure of federally funded grants to entice every state to adopt a national standardized curriculum and assessment.

An important fundamental change occurred within the organizational structure of school systems and the degree to which schools are considered autonomous entities allowed to make organizational decisions independently of district, regional, or national entities. The latest OECD report (2013, p. 37) noted that:

> [S]chool systems that grant more autonomy to schools to define and elaborate their curricula and assessments tend to perform better than systems that don't grant such autonomy, even after accounting for countries' national income. School systems that provide schools with greater discretion in deciding student-assessment policies, the courses offered, the content of those courses and the textbooks used are also school systems that perform at higher levels in mathematics, reading and science.

Policy-Oriented Over Empowerment-Oriented Teacher Professionalism

Teaching practices can change fundamentally and attitudes can comply with the reform efforts of the school only if teachers have first gone through a process of professional development. Viewed from this perspective, pedagogical change is a growth process that aims at a change in thinking and practices. Webb and colleagues (2004a) argued that "at the policy-level current conceptions of teacher professionalism in Finland and in England diverge markedly" (p. 87).

In Finland, the idea of the teaching profession is based on teacher autonomy, the emphasis being on commitment to making students active and independent learners. Further features of professionalism in the postmodern era also include teacher's commitment to lifelong learning and cooperation with interest groups. The aim is to empower teachers and give them the opportunity to influence educational reforms.

In England "the government is characterized as riding roughshod over the teaching profession through a kind of 'democratic totalitarianism' in which change is achieved by assertion and coercion" (ibid., p. 101). The policy-oriented view of professionalism requires total compliance to centrist demands. The national, standardized curricula and external accountability mechanisms, coupled with marketization, have turned teachers into technicians and officials. Ultimately this will lead to an erosion of teacher professionalism (ibid., p. 101; for a culture of dependence, see Hopkins, 2007, p. 42).

School Choice

One of the recent fundamental changes in education is the extent to which students are assigned to attend their neighborhood school versus those that allow students to choose from a variety of options. In recent decades, reforms in many countries gave greater choice to parents and students to choose the schools that meet their educational needs or preferences. This trend is predicated upon a market-driven conception of schooling; focused on the fundamental belief that competition between private and public schools and the expansion of choice creates incentives for schools to improve programs and teaching quality to better meet diverse student needs and interests. However, OECD (2013) reported that once the socio-economic status and demographic background of the schools and students are taken into account schools in most countries that compete for students tend to perform no better on average than schools that do not (p. 40).

In many school systems this competition has financial implications, with schools competing for enrollment and the associated funding formulated from such. The expansion of charter schools has been paralleled by the appearance of voucher systems that give money directly to students and their families to spend on the public or private educational institutions of their choice. Finally, the promotion of school choice has led to the expansion of laws permitting home schooling, including parental control of curriculum and assessment in part or entirely.

School choice has also been pursued or opposed based on the issue of equity. It is argued that competition could incentivize schools to provide greater access to students of low socio-economic status. However, in the United States the reverse has been argued; that more local autonomy has resulted in less social equity. The most common example cited is the era of segregation of African-American and Caucasian schools in the 1960s. This practice was largely perpetuated when local communities were given control of educational decision-making and was only altered by federal intervention. Such experiences have driven the policy shift to transfer the control of school decisions to federal entities.

However, OECD (2013) reported "a weak negative relationship between the degree of competition and equity" (p. 40). OECD further reported that countries with more competition among schools tend to show a stronger impact of students' socio-economic status on their performance. In general OECD (2013) noted that "school choice – and, by extension, school competition – is related to greater levels of segregation in the school system, which may have adverse consequences for equity in learning opportunities and outcomes" (p. 40).

Readjusting the Pendulum

Future educational change is likely to move in the opposite direction of current trends. It will focus more on local control of curriculum, on contextualization of curriculum to individual institutional needs, as well as on assessments that are adaptable, formative, and diagnostic. Additionally, diversity and equity are anticipated to continue to receive emphasis in educational change. Finally, future educational change is predicted to fundamentally change through the deep integration of burgeoning technology into educational reform efforts.

This chapter analyzes educational change in the context of curriculum change. The following examination considers the implications of these changes for different dimensions of school culture. The focus is on the manner in which the changes in the Finnish school curricula can be seen in the professional orientation of teachers and their pedagogic practices. Accordingly, the collaborative school culture is further studied particularly from the following three perspectives: student-centered active learning, the teacher's professional autonomy, and the contextualized school-based curriculum. This analysis is based on the results of the previous qualitative research projects.

DIMENSIONS OF SCHOOL CULTURE

The school organization can be examined as a collaborative system that gathers and integrates different resources in order to implement desired objectives (Harisalo, 2008, p. 31). Harisalo also stated that the theory of organizations as cultures opens up a new perspective on the internal reality of organizations. Every organization has its own mental deep structure that guides people's thinking, choices, and actions.

Culture represents an organization's prevailing ways of thinking and acting, which have been created and strengthened through shared experiences (ibid., pp. 40, 265–266).

The idea of schools as cultures has been applied to Finland's national curricula for the comprehensive school since the early 1990s, when the country adopted a school-based approach to the curriculum. Arends (2009, p. 488) defined that "school culture" consists of the philosophies with which the members of the school community justify their actions. It reflects their beliefs, values, and history. The following brief account shows how the *National Core Curriculum for Basic Education 2004* defined the concept of "school culture" as "operational culture" (FNBE, 2004, p. 17):

> A school's operational culture has a significant impact on education and instruction at the school, and thus on learning. The objective is that all the school's practices be developed uniformly, so as to support attainment of the objectives established for the educational and teaching work.
>
> The operational culture embraces all the school's official and unofficial rules and operational and behavioural models, as well as the values, principles, and criteria on which the quality of the schoolwork is founded. It also encompasses extracurricular school activities such as celebrations, theme days, and various events. The school's values, educational objectives, and cross-curricular themes must assume concrete form in the operational culture. The objective is an open, interactive operational culture that supports cooperation both within the school and with the home and the rest of the society. The pupils must also enjoy the opportunity to participate in the creation and development of the school's operational culture.

Halinen, Holappa, and Jääskeläinen (2013, p. 193) considered that the development of school culture is the essence of Finland's reformed national core curriculum, which was confirmed at the end of 2014. The following brief account clarifies the manner in which this curriculum defined the concept of "school culture" (FNBE, 2016, p. 27):

> The culture of a community comprises its practices that are shaped by its history and culture. The school culture may be developed and changed. It is an entity whose components are
>
> – interpretation of the norms that direct the work and the goals of the activities
> – leadership and the organization, planning, implementation and evaluation of work
> – competence and development of the community
> – pedagogy and professionalism
> – interaction, atmosphere, everyday practices and learning environments.
>
> The school culture is shaped by both conscious and unconscious factors. The school culture affects those who are within its sphere, regardless of whether its significance and impacts are recognised or not.

The objective of the curriculum reform is to contribute to a school culture that enhances learning, participation, well-being, and a sustainable way of life (ibid., p. 28). The goal is to develop schools as learning communities, typical of which is interaction, participation, and diverse ways of work (Halinen et al., 2013, p. 193). The changes can be implemented in practical school work – even though it may be

difficult because changing school culture calls for profound collaborative reflection on thinking and action models. In this process collegial cooperation and a shared vision are essential, and on the basis of these factors school culture develops and changes.

School culture is a multidimensional entity. Schoen (2013, pp. 13, 29–31) noted that the following four dimensions must be examined when changing a school culture: the professional orientation of the school staff, the structure of the school organization, the quality of learning environments, and the student-centered focus. The professional orientation and development of the quality of the learning environments are integral dimensions of the teacher's work. All staff members must participate in development work in order to achieve real changes in the school's internal reality as well as to develop the school organization and make its activities increasingly student centered.

The following sections explore the national curricula used in Finland for the comprehensive school from the 1970s to the present. The implications of curriculum reforms for school culture are simultaneously discussed from the perspectives of the various dimensions.

APPROACHES TO THE CURRICULUM

Definitions of "curriculum" have undergone change and transformation depending on the school system in force and on the general objectives of education. The twentieth century has seen the publication of over 1,100 curriculum books, each with a different interpretation of "curriculum." After all, the notion of a curriculum tries to answer three questions fundamental to formal schooling: What knowledge, skills, and values are the most important? Why are they so? How should young people acquire them? The "whats," "whys," and "hows" have produced a rich variety of responses over the purposes, content, organization, and implementation of curriculum over the ages (Cuban, 1992, p. 221).

The historical development of curricula can be presented as a simple bifurcation: a subject and teacher-centered tradition and a student-centered tradition. The subject and teacher-centered curriculum is closely associated with Johan Friedrich Herbart's (1776–1841) systematic curriculum concept of *Lehrplan*, the curriculum design of which emphasizes subjects and subject content. In the early 1800s, Herbart developed a philosophical basis for curriculum and distinguished the ends from the means (Herbart, [1902], pp. 136–141). The ultimate goal of education was moral. It aimed at training students for an ideal society. Correspondingly, Herbart chose some basic subjects and organized them into large, connected units to arouse and keep alive the learner's deep interest (Leino, 1995, pp. 2–3). Another comparably student-centered curriculum theory originates from John Dewey's (1859–1952) aim of developing a form of instruction based on the children's own activity (Kimonen, 2015, pp. 64–70; Malinen, 1992, pp. 11–15). Dewey (1950) considered that the concept of "curriculum" refers to the planning of a child's learning experiences (pp. 14, 16).

In the 1990s Finland officially abandoned the Herbartian *Lehrplan*-type national curriculum and adopted a Deweyan line of thinking with its decentralized local school-based curricula (Rauste-von Wright, von Wright, & Soini, 2003, p. 194). The teacher and subject-centered curriculum can be termed a "classical curriculum," and the child-centered an "idealistic curriculum." The essential features of classical and idealistic curricula are presented in Table 1 based on the summary by Lawton (1982, pp. 22–23).

Table 1. Features of Classical and Idealistic Curricula (Lawton, 1982, pp. 22–23)

Classical Curriculum	Idealistic Curriculum

– Subject-centered approach
– Skills
– Instruction
– Information
– Obedience
– Goals
  – Data collection
– Content
  – Subjects
– Method
  – Didactic teaching
  – Competition
– Assessment
  – Tests and exams
	– Child-centered approach
	– Creativity
	– Experience
	– Discovery
	– Awareness
	– Processes
	  – Attitudes and values
	– Experience
	  – Real-life themes and projects
	– Method
	  – Participation
	  – Cooperation
	– Assessment
	  – Self-assessment

Curricula are ever-changing social and cultural constructs that are practical and interactive by nature. The practical aspect of a curriculum is to be seen in the written curriculum in the school as well as in the interactive component of the student–teacher encounter (Cornbleth, 1990, p. 5; Hamilton, 1995, p. 218). The curriculum aims at giving a holistic picture of the purposeful learning experience (see, e.g., Marsh, 1997a, pp. 5–6). At the same time the curriculum reflects the concepts of the human being, the world, education, learning, and knowledge held by those compiling it. Since Herbart's time considerable variety has characterized the perspectives emphasized in the curricula and the associated guidelines.

This chapter will next give a brief overview of national curricula in Finnish comprehensive schools, and of the changes made in them since 1970. In Finland comprehensive schools provide a general education for all children between the ages of seven and sixteen, taking nine years to complete. Comprehensive school education consists of a lower level (grades 1 to 6) and an upper level (grades 7 to 9) (MoE, 1994, p. 21). The specific focus here is on the 1970 reports of the curriculum committee for the comprehensive school and the national curricula of 1985, 1994,

2004, and 2014. Special attention is paid to curriculum conceptions and the key aims, principles, and teaching methods of the different curricula. The analysis is partly based on an article by Nevalainen, Kimonen, and Hämäläinen (2001, pp. 123–141) in the publication *Curriculum Approaches*, edited by Eija Kimonen (2001). The features of the curricula and their impact on the various dimensions of school culture are commented on in the light of results from the previous qualitative research projects (Kimonen & Nevalainen, 2005; Webb et al., 2004a) and the curriculum analyses presented by Marsh (1997b).

CURRICULUM CHANGE: THE CASE OF FINNISH EDUCATION

Classical Curricula

Suggestions for educational reforms, especially concerning curricula, often appear in the professional literature. This might convince us that problems exist that require great effort to solve. The endless reform proposals suggest that previous reforms did not correct the problems (Marsh, 1997a, p. 173). Finnish comprehensive school curriculum reforms in the 1970s and 1980s were based on centralized planning and decision-making. The 1970 reports of the curriculum committee for the comprehensive school and the 1985 framework curriculum for the comprehensive school are classical by nature (see VN, 1970; OPM, 1970; KH,1985). Malinen (1985, p. 44) noted that these pedagogical-administrative plans reflect, to some extent, both the *Lehrplan* and the curriculum dimensions. According to the regulations, both documents are curricula on which the local curricula are to be based. In practice, the committee reports of 1970, in particular, but to a large extent the framework curriculum of 1985 as well, were planned and developed centrally. Malinen defined the concept of a "comprehensive school curriculum" as a document directing school education (ibid., pp. 41, 44). It does such things as set out the objectives and contents of instruction, teaching methods, means of evaluation, extracurricular activities, student welfare work, and subject-specific curricula.

The 1970 Reports of the Curriculum Committee

Structural planning for the comprehensive school began as early as in the 1950s, but it was not until 1965–1966 that a thorough curriculum development began. A detailed curriculum was presented in a two-volume report, totaling 700 pages, by the curriculum committee for the comprehensive school in 1970 (Malinen, 1985, p. 26; 1992, p. 15). Its first part defined the overall objectives for the comprehensive school, while the second part was concerned exclusively with subject-specific curricula. The original intention was to implement the curriculum reform flexibly according to local circumstances (VN, 1970, p. 57). However, in 1972 the reform became centralized due to the restrictive regulations of the National Board of General

Education (Malinen, 1992, p. 16). In practice, it was the 1970 committee reports and the subsequently appended subject curricula published by the National Board of General Education that constituted Finland's regional and school curricula.

The 1970 committee reports were somewhat ambiguous in their curricular thinking. The first part included various features of an idealistic curriculum. It stated that the primary responsibility of the school was to provide substance and stimulation to promote all-around development of student personality. School was to focus on students' individual abilities and their cultural environment. In learning situations the student was not to be the object of external influence, but rather the subject of the activities. Modern principles, however, were not fulfilled, either in the second, subject-specific part of the report or in any of the teaching guides specifically related to this report. The plans were quite comprehensive in their objectives and content. Furthermore, teachers felt that these plans were forced on them by the powers-that-be. As a result, instruction remained substantially behaviorist and its methods were mainly teacher and textbook centered (see Malinen, 1981, pp. 116–117; 1985, p. 52; 1992, pp. 16–17). Teachers' professional orientation emphasized a "transmission meta-orientation". According to this view, the primary duty of the teacher is to transfer information and supervise learning (Nevalainen & Kimonen, 2013b, p. 230).

The 1970 committee reports, and particularly instruction based on them, aimed at complying with the classical curriculum model presented by Tyler in 1949. This model was influential in the Finnish school system, especially throughout the 1970s and the early 1980s. According to Tyler (1969, p. 1), the curriculum includes the following four principles:

1. setting educational objectives;
2. selecting learning experiences to attain these objectives;
3. organizing learning experiences for effective instruction; and
4. evaluating the effectiveness of the learning experiences.

Marsh (1997b, p. 125) reported that the influence of Tyler's curriculum thinking was visible in the following features of school education:

- The objectives were expressed in terms of student behavior traits.
- The learning experiences required for the fulfillment of educational objectives came under ever-increasing scrutiny.
- In addition to the encouragement given to teacher-centered methods, emphasis was placed on the student's awareness of the objectives to be pursued and on the acquisition of concepts and their integration.
- Evaluation was based on curricular objectives, utilizing informal and formal methods, and focusing on the entire teaching period.

Tyler's curriculum model was applicable to all subject areas and at all levels of teaching. Due to its logical approach and step-by-step organization, the model was easy to implement. However, it did not offer any clear basis for the choice of objectives. Tyler's model ignored unintentional learning and over-emphasized the importance of measurable learning outcomes. Only a limited number of teachers utilized the objectives or phase-by-phase teaching as the premises for curricular

planning (ibid., p. 125). These weaknesses in the model eventually revealed themselves in the Finnish comprehensive school curriculum and its implementation.

The 1985 National Framework Curriculum

The new school legislation that came into effect in 1985 consolidated and clarified the role of the curriculum in school activities. Local authorities were increasingly able to make their own decisions concerning the curriculum. At the same time, their responsibility for curriculum development crystallized. Efforts were also made to provide local authorities and schools with more educational options (Malinen, 1985, pp. 65–66).

Local curricula were based on the 1985 framework curriculum for the comprehensive school (KH, 1985). Compared to the 1970 reports, it was noticeably more concise, totaling 328 pages. The 1985 curriculum was a national curriculum, the text of which could be used as a framework for local curriculum development. Local authorities could supplement the national curriculum to conform with prevailing local conditions (Malinen, 1992, p. 34).

Local curricula varied significantly. In some municipalities, the contents in particular showed a tendency to be supplemented by local issues. In most of them, however, the section on curriculum objectives was written completely in compliance with the national curriculum. Administrative solutions such as language policy and special education arrangements were individualized in each municipality (ibid., p. 34). Municipal curricula were approved by the Provincial Government Departments of Education. The principal or head of each school cooperated with the teachers to draw up its annual work plan, which was then submitted to the provincial government. This work plan specified how the school organized education, such as the division of students into groups, group sizes, and club activities. In addition, school-based pedagogical characteristics and topics to be emphasized as well as textbook choices were presented (Kosunen, 1994, p. 97).

Curricula were rapidly produced in the municipalities. Atjonen (1993) described that almost one third of teachers participated in compiling the local curricula. This process implied a shift from a nationally centralized curriculum toward a decentralized one that was considered to be individual. Participants developing the curricula reported their need to familiarize themselves with both the national and the local curricula, cursorily with the former and thoroughly with the latter. The local curriculum, however, appeared to be forced upon the majority of teachers by the powers-that-be. Teachers involved in developmental work benefited most from this system (pp. 175–177).

Teachers identified insufficient financial and human resources as the greatest problem in curriculum development and implementation. This was the reality, particularly in small municipalities. Teachers also reported problems related to their lack of experience in first-hand curriculum development, the extensive workload curriculum development demands, and the lack of time. Further obstacles were the lack

of local and student-centered learning materials and inexperience in using authentic, unedited resources in teaching and learning. More administrative and pedagogical training on curriculum development was needed. In the 1980s, the aim was indeed to pay more attention to pedagogical leadership in schools. A local curriculum offered an opportunity to take a sizeable step toward an idealistic curriculum: away from the teacher-centered, behaviorist approach and toward a student-centered, humanistic, and constructivist approach to learning (ibid., pp. 177–181).

In the 1980s, local curriculum work resembled the approach presented by Walker (1971), which was based on deliberation. The premise of Tyler's model was to piece together how curriculum work should be, whereas Walker's model focused on examining how the curriculum development process proceeded in practice (Marsh, 1997b, p. 129). Finnish researchers (e.g., Atjonen, 1993; Kosunen, 1994) were also interested in what actually happened in local curriculum work, not so much in what should have happened. To generalize, we can note that Walker's three-step naturalistic model for curriculum development began to influence curricular work in Finland in the late 1980s.

The model for curriculum development by Walker (1971) includes the following stages: platform, deliberation, and design. The platform comprises conceptions, theories, and aims. These three components imply profound "products of reflections on life and education." The act of reflecting is also connected to various less explicit expressions, in other words, mental "images" and "procedures." These provide detailed information on the development process (p. 56).

The second stage of curriculum planning consists of a negotiation process based on deliberation. Walker held the view that this development phase is complicated and challenging: the designers must be able to justify in practice their previously agreed principles. During the deliberation stage, the designers must also identify the problems existing in the circumstances for which the curriculum is being developed. Furthermore, they must realize how the curriculum can alleviate these problems (ibid., p. 55; for a closer examination of the Walker's model, see Reid, 1994, p. 20).

Finally, curriculum work leads to decisions about the measures to be taken. At this design stage a curriculum is created that contains such things as the subjects, learning materials, and recommended activities (Marsh, 1997b, p. 132). When applying these results in practice, some descriptions of curriculum work produced by Finnish researchers (e.g., Atjonen, 1993; Kosunen, 1994; Syrjäläinen, 1994) can be interpreted to include features of Walker's model. In Finland, curriculum development based on the naturalistic approach varied from municipality to municipality and from school to school. Atjonen (1993) noted that in some schools planning was largely done for the school's own benefit. In these cases the personal dialogue between participants was of primary importance. In some other schools, their curriculum was merely a document written to "appease the regional authorities" (p. 233).

Implications of a Centralized Curriculum for School Culture

Classical, centralized curricula represent the Finnish curriculum thinking prevalent in the 1970s and 1980s. At that time, some transition toward idealistic and decentralized curricula was naturally already to be observed, a trend that strengthened in the 1990s. This is how Finland gradually moved from a behaviorist teaching and learning mode of thinking toward a constructivist idea of learning. It is worth mentioning that while Finland was moving away from centralized curricula toward decentralized and school-based planning, many school systems, that of England in particularly, were moving in the reverse direction.

The era of centralized national curricula was a heyday for the classical curriculum in Finland. During the creation of the comprehensive school system, traditional curriculum thinking had several strengths. Its objectives included provision of a uniform foundation for the school system. Gradually, however, various recognized ontological and epistemological factors related to the Finnish system of values changed. As a result, concepts of the world, people, learning, and knowledge, to mention a few, received fresh emphasis and content. Classical curricula could no longer respond to the new challenges of a transforming world.

Marsh (1997b, p. 141) identified some advantages and disadvantages of a centralized curriculum. In the following these aspects will be explored from the perspective of the four dimensions of school culture presented by Schoen (2013, pp. 13, 29–31).

The Teacher's Professional Orientation

In the context of a centralized curriculum, the professional orientation of teachers can be called the narrow-band transmission of their meta-orientation. In compliance with this latter orientation, the key responsibilities of teachers include the transmission of information and the guidance of learning. This leaves teachers minimal room for their own initiatives. Teachers thus often assume the role of mere technicians lacking the possibility to participate in the planning of the activities of their school. In traditional school culture, teachers use a learning process that is reproductive. They react to changes in the internal and external operating environments at their schools chiefly by identifying and correcting errors. That is how they preserve the behaviorist thought and action models that stress the external control of learning. This kind of single-loop learning actually aims at preserving the prevailing school practices and routines.

The Structure of the School Organization

A homogeneous school organization that follows a centralized curriculum is highly hierarchic and bureaucratic. Its decision making is centralized and goal oriented. It emphasizes supervision. This model does not allow for the analysis of the local needs of individual schools. The purpose of an effective and easily controllable organization is to save time, energy, and money. The organization

often lacks implementation strategies, or insufficient attention is paid to them, even though the central administration monitors activities at individual schools, also requiring them to attain certain goals. This results in a uniform school culture in which schools are expected to be more similar than diverse. This may lead to limited goals. This type of rational organizational model expects school staff members to be willing to implement the operating principles created by the central administration.

The Quality of Learning Environments

A centralized curriculum favors traditional learning. Learning occurs mainly in closed environments in which studying is connected to a specific time and place. The pace of studying is strictly predetermined. Studying is subject centered, its contents include clearly defined problems and answers that are common to all learners. Learning is primarily based on external motivation. The classroom is the dominant learning environment in which students have only little or no contact with authentic alternative learning environments. The school culture does not allow concentration on local problems.

A Student-Centered Focus

Centralized curriculum thinking favors teacher-led and traditional methods that guarantee continuity but hinder diversity and creativity. In some subjects, they also reduce the opportunities to learn. Instruction utilizes technologically advanced methods and tools. At the national level, the methods used at different schools are mostly uniform.

Idealistic Curricula

The school system does not merely seek to adapt to ongoing changes – it aims at being an active agent in the development process. This was also the core idea of the curriculum reform in fall 1994. The intention was for schools to lead the change and not just follow it. Schools were to launch totally new a kind of curriculum work instead of merely updating existing curricula (FNBE, 1995, p. 8). The new school was described as flexible and analytical, and one of its major objectives was to encourage students to learn how to learn. Future schools were expected to produce intellectually curious citizens who could pose critical questions and find answers to them. A consequence of the renewals was that every school was allowed to create its own curriculum based on the general guidelines confirmed by the Finnish National Board of Education (Elo, 1994, p. 70).

The curriculum reform was connected to the change occurring in Finnish society at the time, which also implied a desire to develop educational quality and renew the concepts of curricular theory, learning, and knowledge (MoE, 1994, p. 65). Fundamentally, then, the approach of the 1990s curriculum represented a constructivist idea of learning and idealistic curriculum thinking. In the new school-

based curriculum, the student was seen as an active acquirer of information and creator of interpretations (Atjonen, 1993, p. 238; 1994, pp. 111–112, 118).

The 1994 Framework Curriculum

The *Framework Curriculum for the Comprehensive School 1994*, a report of 120 pages created by the Finnish National Board of Education, was considerably more concise than its predecessors. Its content supported the constructivist learning theory (FNBE, 1994). Consequently, Rauste-von Wright and associates (2003) considered that the aim of this report was not to create uniform and detailed curricula. The pedagogical implications of the approach actually suggested flexible curricula. It only prescribed the main points for curriculum work (p. 201). The following brief account illustrates the manner in which the framework curriculum of 1994 defined the concept and purpose of a "curriculum" (FNBE, 1994, pp. 10, 18):

> According to the present understanding, the curriculum is a dynamic process which is constantly reacting to the results of evaluation and the changes in the environment. The aims which have been set show the direction in which to go, but they are not to place restrictions on the tuition. ... The curriculum makes up the most important basis for the planning, evaluation, and implementation of work in schools. The guidelines issued by the National Board of Education are the foundation which is then interpreted, adapted, and added to at the local level in order to come up with a curriculum which is descriptive of, develops, and directs the practical work of teaching.

In compliance with the framework curriculum of 1994, school-based curricula were to express the mission statement, educational idea, and distinctive characteristics of each school. The objectives and content of topic units, school subjects, and integrated subjects were to be defined according to the guidelines set out in the national curriculum. The curriculum was also to cover the school's teaching methods and ways of working. All members of the school community, including students' parents and other interest groups closely involved in school activities were encouraged to participate in curriculum formulation. The process of actually writing the curriculum was regarded to be both active and continuous. The objective was to transform the school into a learning center with close relationships to interest groups in the local community (ibid., pp. 10–11, 15, 18–19). It was thus important to promote active cooperation between schools and the surrounding community, trade, and industry, as well as to develop teachers' work based on self-evaluation (FNBE, 1995, p. 9).

The summary provided below illustrates the process of curriculum change in one small school in Finland. This is based on the study *Towards Active Learning* by Kimonen and Nevalainen (2002, p. 99):

> Changes in the teacher's process of work and learning proceeded in phases. The process continued inductively through the comparison of individual experiences, which led to a decision of action. During the initiation phase of the change process, the teachers observed the needs for changes in the school curriculum, as well as in the practices

> and settings of action. They designed changes and tried out different realizations. Experiences gained during the implementation phase were analyzed with the school board, and the most essential features of the changes were then described at the parents' meetings. The models of action were compared, and their success was evaluated. During the continuation phase the observations and experiences gained over about five years, concerning the strengths and weaknesses of the process of work and learning, were discussed in detail at teachers' joint meetings. Finally, the new curriculum for the school was given its final form. This innovation process was naturally facilitated by decisions coming from the central educational administration.

The National Core Curriculum of 2004

The report *National Core Curriculum for Basic Education 2004*, drawn up by the Finnish National Board of Education, was externally clearly broader than its forerunner (319 pages). In terms of content, it intended to rely on a constructivist idea of learning. The act of 1998 for elementary and lower-secondary schools increased independent decision making in municipalities and schools (FNBE, 2004). Sahlberg (2011) observed that a new type of flexibility in the educational system also provided schools with the opportunity to learn from each other. In this manner the viable and innovative practices used at individual schools could be applied more broadly in development work (p. 39).

On the other hand, the 2004 national core curriculum increased the external control of teachers' professional activities, since it included detailed descriptions of students' good learner performance which teachers were to follow in student assessment (FNBE, 2004, p. 260). The contents of instruction were determined more closely than in the previous report of 1994. Rokka (2011, pp. 32–34) noted that this implied a return to more centralized regulation and steering. The new curriculum also defined concepts related to learning, learning environments, school culture, and working methods, aiming to make education more uniform at the national level. The curriculum was expected to include sections decided upon locally, but in practice these were mere details as the text was chiefly prepared at the National Board of Education.

The Finnish core curriculum is a national framework and norm, on the basis of which local curricula are created. Rokka also found that this centralized approach may have led to teachers' weak commitment and reluctance to change or develop pedagogical activities (ibid., p. 32). Halinen (2008) noted that municipal authorities in most cases have delegated considerable power to schools. The school-based curriculum provides the basis on which schools draw up their year plans, working plans for teachers, and potential individual study plans for students. The following description presented by Halinen (2008, p. 225) shows how teachers and the rest of school staff are actively involved in their process of curriculum development:

> When teachers discuss together issues relating to the curriculum, they have to think about all the basic things influencing their teaching and students' learning. Teachers

> decide on how to organise support for those with learning difficulties, how to organise multicultural education and special needs education, and student guidance and counselling, and how to take care of students' well-being. They plan cooperation between home and school, and draw up the knowledge strategy for their school, which defines how information and communications technology and virtual teaching are utilised in instruction, what kind of equipment is needed and how the ICT know-how of teachers is developed.

The 2014 National Core Curriculum

The Finnish National Board of Education confirmed the latest national core curriculum for elementary and lower-secondary schools in December 2014. In fall 2016, local curricula that comply with the new core curriculum was adopted in elementary schools (years 1 to 6). In years seven to nine, the new core curriculum will be put to practice gradually in 2017, 2018, and 2019. The actualization of the curriculum may be a significant challenge for teachers' basic and continuing education. Even physically, the core curriculum is an extensive document, with the English translation comprising 508 pages. In addition, its introduction presents some new concepts that were not included in the previous national curricula. These concepts include "school culture," which is based on a learning community, and "transversal competence," which refers to the competences needed in the future.

Halinen and colleagues (2013) stated that "the central idea of the curriculum reform is to be found in the change of pedagogy and the operating culture of schools" (p. 193). The reform is expected to transform schools into learning communities characterized by interaction, participation, and multifaceted ways of work. Such a community takes care of student well-being and safe daily activities. In addition, it considers cultural diversity, takes responsibility for the environment, and orients itself to the future. Additionally, this reform in teacher education must be taken into account if future teachers are to be provided with the professional competences necessary for developing schools into networked and team-organized learning communities (ibid., p. 193).

The *National Core Curriculum for Basic Education 2014* (2016) declared that school-based curricula define the organization and implementation of education, teaching, learning assessment and support, guidance and student welfare services, home–school collaboration, and related activities. School-based curricula complement and specify the local emphases of national curricular objectives, policies, contents, and similar issues related to the arrangement of instruction (FNBE, 2016, pp. 9–10). Furthermore, the national core curriculum defines the competences needed in the society and modes of employment of the future. The following seven interconnected competence dimensions underlie the concept of transversal competence: (1) thinking and learning to learn; (2) cultural competence, interaction, and self-expression; (3) taking care of oneself and managing daily life; (4) multiliteracy; (5) ICT competence; (6) employability competence and entrepreneurship; and (7)

participation, involvement, and ability to build a sustainable future (ibid., pp. 21–26). The conclusion could be made that the development of transversal competence in students, as well as the creation and implementation of local curricula, all require schools and teachers to promote a collegial and collaborative school culture.

The core curriculum is being reformed in order to enhance the prerequisites of schools for educational work, the meaningful learning of all students, and a sustainable future. Schools are guided to deepen their idea of learning and to develop opportunities for collaborative learning in multifaceted learning environments in which new knowledge is generated and students' needs are taken into account. The aim is to support local pedagogical development and to encourage education providers to integrate curriculum development with the strategic development of teaching and education at the local and national levels (OPH, 2015, para. 1).

Implications of a School-Based Curriculum for School Culture

From a teacher's perspective, the school-based curriculum no longer seemed to be something forced upon them by the authorities. Instead, it was a tool for schools to define their own objectives along with the associated means and contents (Välijärvi, 1999, p. 102). Syrjäläinen (1995) reported that teachers' experiences and views of the realization of school-based curricula have varied, depending on the school level. Elementary school teachers have mainly experienced the school-based curriculum as an inspiring source of new possibilities. At higher school levels, teachers report their experiences and views to have been less positive. In any case, school-based curriculum work has offered teachers opportunities for professional growth, development of awareness, and professional identity. It has forced teacher communities to become accustomed to teamwork and cooperation. Notable points of development included the non-graded schools, periodization of instruction, provision of elective subjects, personal study plans, teaching methods based on student activity, and qualitative evaluation (pp. 42–43, 115–117; see also Norris, Aspland, MacDonald, Schostak, & Zamorski, 1996, pp. 87–90). Marsh (1997b, p. 149) listed the following reasons for the adoption of school-based curriculum development:

- Curriculum design models managed from above do not function.
- School-based curriculum work gives schools more autonomy.
- Schools must be responsive to their environment, and in this process they need freedom, opportunities, responsibility, and resources in order to define and direct their activities.
- Schools are the most suitable bodies for designing and creating curricula and developing forms of teaching and learning in specific programs.
- Teachers' self-actualization, motivation, and sense of achievement are linked to decision making in curriculum work, this being essential for teachers' professional life.
- The school is a more stable and permanent institution for curriculum work than regional or national organs.

Teachers have also encountered difficulties in school-based curriculum work. These difficulties have led to problems such as burnout and exclusion of some staff members along with the formation of cliques and divisions within the work community. In addition, many schools have remained quite isolated from the surrounding society (Syrjäläinen, 1995, pp. 115–117). Marsh (1997b, p. 149) noted that commonly recognized obstacles to school-based curriculum work include a lack of time, expertise, and resources, as well as problems related to school atmosphere. However, even more serious problems arise from obstacles related to the professional development of the teacher, such as resistance to change both personally and in the environment. Marsh also identified some sources of the problems (ibid., p. 149):

- If the school is responsible for both the creation (planning) of the curriculum and the decisions on practical actions (implementation), considerably more financial resources need to be allocated to teachers' professional development and the hiring of support staff.
- Many teachers are not interested in school-based curriculum work because they feel that they are only implementing curricula created by others.
- Powerful lobbyists can sometimes bring about changes at the local level that lead to curricula that are overextended, biased, and no longer relevant.

The implications of a school-based curriculum for school culture are next examined from the perspective of the four dimensions presented by Schoen (2013, pp. 13, 29–31). These are Professional Orientation, Organizational Structure, Quality of Learning Environments, and Student-Centered Focus. The following analysis is based on the results of the previous qualitative research projects. The focus of these studies is on the following topics: students and teachers as active learners, curriculum change, teacher professionalism, and authentic learning environments (Kimonen, 2015; Kimonen & Nevalainen, 2002; 2005; Nevalainen & Kimonen, 2013a; 2013b; Vulliamy, Kimonen, Nevalainen, & Webb, 1997; Webb et al., 2004a; 2004b).

A Teacher's Professional Orientation

According to school-based curriculum thinking, teacher professionalism rests on autonomy. A teacher is committed to help students become active learners. An additional requirement is commitment to personal lifelong learning and cooperation with various groups. A teacher's professional orientation is based on emphasis on a broad-band transaction of his or her meta-orientation. This implies that students should be provided with learning opportunities based on active learning and cooperation in different learning environments. A teacher should participate in the development of teaching and other school activities together with colleagues, other staff, and different interest groups. Central characteristics of the profession would include enthusiasm and participation in continuous learning and skills improvement.

A teacher's learning process and the associated school development are closely interconnected. The transformation of a traditional school context requires teachers to critically reflect on their own operating principles and practices as well as to renew them, in other words, they have to create a new school context. For teachers,

the change in their work and the management of change imply a holistic learning process in which the prevailing school culture is internalized and changed through externalization. A school culture based on progressive pedagogy and a constructivist idea of learning presumes "transformative" learning. If they are to change the school context, teachers must acquire new models for thought and action that will facilitate changing the basis of action so that it becomes a double-loop learning process for them. Transformative learning also includes "reflective" learning, this being based on deliberation and discussion.

The Structure of the School Organization

A school organization that follows a school-based curriculum has its own culture that can be changed and improved. This requires collegial cooperation and in-depth reflection on thought and action models. The objective is to empower teachers to influence the direction and development of reforms. However, forced cooperation in order to achieve externally determined goals can suppress the desire of teachers to cooperate and develop school culture.

The Quality of Learning Environments

A school culture that is implementing a school-based curriculum gives preference to open and contextual learning environments. The responsibility, inner motivation, and self-direction of students are emphasized. Learning is oriented toward authentic learning environments that are connected to physical, mental, and cultural dimensions of the reality outside the school. IC technology is frequently utilized in learning and teaching. School culture supports the utilization of local resources in teaching.

A Student-Centered Focus

School-based curricula provide teachers with considerable freedom to test alternative pedagogical methods. The curriculum reform favors approaches of active learning, including collaborative research and problem-solving projects, theme-based learning, inquiry-based learning, as well as on small-group discussions of phenomena. Active learning is based on personal, action-based experiences, accompanied by reflection on them. Inner motivation and a genuine interest in exploring one's own environment are essential. Self-direction and cooperation as well as initiative data collection and the ability to process data are emphasized in the learning process. Active learning takes place in an environment that is open and also allows the learner to participate in planning, implementing, and evaluating the learning experience. According to Kimonen and Nevalainen (2014, p. 122), active learning is characterized by the following attributes:

– *Utilization of concrete materials in authentic learning experiences*. Active learning requires conditions that allow immediate and meaningful experiences in genuine learning situations. Learners create new knowledge by utilizing prior learning when they reflect on their experiences gained through concrete activities.

- *Utilization of methods based on research and problem solving*. Learning is active when the material to be learned is expressed as problems and questions for which students look for solutions guided by their inner motivation, independently or in small groups.
- *Utilization of collaborative small groups*. Of prime importance in the work and learning of the small groups is interaction, discussion, and joint reflection.
- *Learner participation in planning the objectives, activities, modes of study, and evaluation of the learning process*. The possibility to make choices at the various stages of the learning process is essential for the learner to be empowered as a result of the activities.
- *Personal meaningfulness of the learning process and activities for the learner. Active learning should develop self-knowledge in students*. Throughout the learning process, students must be able to evaluate how well they have attained their own objectives. Furthermore, they should be able to evaluate the validity of information and the development of learning skills in their group.

Active learning implies that students are mentally and physically active. They guide their own learning, invent solutions to problems, define and interpret concepts, as well as reflect on their mutual interrelations. Interaction with their environment is also important for students. Through active learning, students enhance their reflective thinking as well as their metacognitive knowledge and skills. For example, students conducting a research project define a problem, make observations on phenomena, collect information, classify and interpret the observations, form and test hypotheses, and make conclusions and generalizations.

TOWARD THE SCHOOL OF THE FUTURE

Curriculum thinking in Finland has shifted from a nationally controlled and subject-centered curriculum model toward one that is school based and student centered. The two models have occasionally overlapped, which has led to an inconsistent use of concepts and a lack of coherence in curriculum development (Malinen, 1992, p. 27). Centrally steered comprehensive school curriculum work in the 1970s relied on the ideology of mastery learning. This ideology was still present in the 1980s, when a so-called pedagogical-administrative curriculum model was adopted. An innovative feature of this model was its emphasis on local planning. The curriculum reform did not radically change the pedagogical design processes used by teachers (ibid., p. 21; see also Atjonen, 1993, p. 231; Syrjäläinen, 1994, pp. 11–12).

However, the reform gave rise to strong criticism of classical curricula. Their cumulative nature, stability, and alienation from the surrounding reality were considered to be problems in a changing world. A common ideas were that the traditional curricular model represented a static view of knowledge, a superficial view of learning, a mechanical view of humankind, a linear concept of time, and a distorted view of reality. Its foundation was built on a behaviorist approach, according

to which reality could be split into separately learned parts and their measurable partial objectives (ibid., pp. 13–14; Välijärvi, 1991, pp. 60–61).

The transition to school-based curricula in the 1990s was, according to Syrjäläinen (1995, pp. 6–43, 115–117), a remarkable change for most schools. It was associated with changes on the administrative, structural, and pedagogical levels, as well as with those affecting human relationships and work communities. At its best, the curriculum became an explicit document guiding school operations, one that was read and considered to contain ideas worthy of being put into practice. Although the school-based curriculum could provide teachers with an opportunity to develop their school, the required changes were not necessarily realized, with many of the plans remaining as mere rhetoric. In reality, insufficient time and other resources as well as the lack of expertise and training often prevented teachers from fully implementing curricula. Other problems might also have resulted from a lack of sufficient dialogue, reflection, or activities.

Despite its advantages, the period of school-based curricula demonstrated itself to be burdensome for many teachers. The decentralization of administration to the school level was often experienced as a failed solution because teachers and principals were used to following centralized management practices in their activities. The freedom to do and decide independently was felt to be abandonment, and the resulting insecurity was an obstacle to successful reform. Syrjäläinen concluded that strong support for teachers had to be an essential element of the new situation. If teachers feel that they have been left alone in their work and development efforts, the situation is inadequate (ibid., p. 112). Norris and associates (1996) noted how crucial it is to harness, direct, and efficiently utilize existing structures and resources if the reform is to be given adequate support (p. 77).

The 2014 national core curriculum for elementary and lower-secondary schools aims at providing better prerequisites for educational work at schools, for joint meaningful learning, and for a sustainable future. It emphasizes the joy of learning, an active role for students, interaction skills, and collaboration. The goal is to respond to future challenges by enhancing students' transversal competence (see OPH, 2015, para 1). The curriculum is perceived as a learning tool for the school organization in the effort to create the school culture of a learning organization. Understood in this way, the curriculum is a tool for shared expertise in a school community requiring a reflective approach from all members of the organization (Rauste-von Wright et al., 2003, p. 203).

This chapter examines educational change from the standpoint of curriculum change. It focuses particularly on the implications of the changes for school culture. Many researchers believe that implementing curriculum reform will be a formidable challenge for the schools of the future (see, e.g., Marsh, 2009, p. 170). This transformation should also be visible in practice as a change in the different dimensions of school culture. This change process requires teachers to master new pedagogical models and have strong support when adopting new work methods and models. They must also have the relevant in-service training as well as sufficient resourcing (Jordman, Kiili, Lonka, Schneiz, & Vauras, 2015, pp. 79, 81, 82).

The starting point for changing school culture comes from teacher professional orientation. Motivated and committed teachers can achieve a profound change in school operations. A shared view on the direction of the change is essential. To implement a successful change, teachers must have relevant professional knowledge and skills. A further crucial factor is steadfast support from the work community. The transformation of organizational culture requires that teachers change their thought and action models in compliance with the school-specific shared educational philosophy and operating strategy. Strong and inspiring pedagogical leadership is also needed if teachers are to be sincerely motivated to change school culture. Development of the school organization calls for detailed strategic co-planning and precise monitoring of progress. From the viewpoint of learning environments, enthusiasm for learning new material is an important objective. It can be achieved when students also have the opportunity to carry out their study projects in authentic contexts outside the school (for more details, see Schoen, 2013, p. 29).

The following is a brief outline of an ideal school that has successfully undergone an educational reform. This includes three modules concentrating on student-centered active learning, teacher professional autonomy, and local school-based curriculum. The ultimate objective is the transformation of school culture:

1. *Promoting student-centered active learning*. The aim is to enhance the processes of active learning. Teaching and education are connected with situations of social reality in which learning can be connected to each student's life, experiences, and practical problems. In this manner learning can be linked to its natural context. Ideal instruction is actively problem oriented, holistic, and life centered (see Kimonen, 2015, pp. 260–261).
2. *Encouraging professional autonomy with a collaborative culture in schools*. Core factors in the teaching will be promotion of social orientation, cooperation, and continuous work development. The enhancement of teachers' commitment to work with their colleagues in a school culture based on cooperation is of the utmost importance. This problem solving process involves mutual help, support, and shared expertise (see Goodson & Hargreaves, 2003, p. 132).
3. *Enhancing the balanced local school-based curriculum*. Future educational change will focus more on local control of the curriculum. In so doing fundamental change will place a curriculum in the appropriate context of an individual school. A school-based curriculum is designed by teachers together with their interest groups. It focuses on twenty-first century skills and has equal weight in all learning areas. Through contextualizing a curriculum teachers anchor their instruction to the context of students' lives.

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EIJA KIMONEN, RAIMO NEVALAINEN, & LA TEFY SCHOEN

9. ACTIVE LEARNING FOR EDUCATIONAL CHANGE

Finnish Students and Teachers as Active Learners

FOUNDATIONS OF ACTIVE LEARNING

Core Assumptions

Active learning refers to an approach to education built on a pragmatic philosophy of the nature of the learning process. The active learning approach is comprised of a set of loosely connected guiding concepts about teaching and learning. The central unifying notion is based on the idea that thought processes are developed and concepts are constructed as a result of human activity and interaction. Thus, the aim of active learning is to provide students with a series of experiences that facilitate cognitive growth. The genesis of active learning can be traced to a fusion of a branch of applied psychology known as social cognitive constructivism with concepts espoused by the twentieth century educational philosopher John Dewey.

Implementation of the active learning approach calls for a creative synthesis of constructivist and pragmatic principles, resulting in learning processes that are substantively different than classrooms organized around the more traditional behaviorist principles. The underlying philosophical assumptions upon which a classroom, school, program, or system is built define the desired outcomes of education, as well as multiple aspects of operations and processes. Table 1 contrasts some of the core assumptions about learning of constructivism and behaviorism, two competing paradigms in education and learning theory.

Origins of Active Learning

Active learning assumptions are derived from a variety of sources in cognitive psychology, learning theory, and educational philosophy. The loosely linked set of beliefs is closely associated with social cognitive constructivism, but it also carries

E. Kimonen & R. Nevalainen (Eds.), Reforming Teaching and Teacher Education: Bright Prospects for Active Schools, 225–252.

Table 1. Core Assumptions about Learning in Constructivism and Behaviorism

Aspect	Constructivist Assumption	Behaviorist Assumption
Nature of the learning process	Learning occurs when new concepts are explored and related to prior knowledge. Discussion, manipulation, and trial and error are integral to learning.	Learning occurs when knowledge and processes are shared with an individual and the individual studies and practices the material until achieving the ability to execute it correctly independently.
Goal for learning activities	Building progressively complex thinking and problem-solving ability	Mastery of prescribed content
Role of the learner	Active engagement in interactions with others and the environment in order to build concepts and skills	Passive and compliant recipient of information to be learned through practice and study
Role of the teacher	Planning activities that will help students better understand and apply new concepts and skills	Sharing and explaining of information, assigning independent practice, and assessing mastery
Role of the parents and community	Integrated into student learning activities to a large extent	Separated from in-school activities, with parents and the community being periodically informed of accomplishments

strong remnants of pragmatic approaches advocated by American philosopher John Dewey (1859–1952) and later by proponents of authentic learning and reflective practice.

John Dewey

Dewey was an American social philosopher whose writings on education were very influential in the early part of the twentieth century. He focused on the pragmatic or practical aspects of schooling, which he viewed as essential to developing a better society. In 1899 he released *School and Society,* which expressed his views on curricula, teaching, and schools as organizations. Subsequent books on education included *Schools of To-Morrow* (1915) and *Democracy and Education* (1916). These are not Dewey's only writings on education, but they collectively express the central elements of his philosophy of education, which were reiterated in such works as, "My Pedagogic Creed" (1897), *The Child and the Curriculum* (1902), and *Moral Principles in Education* (1909) (Maxcy, 2002, pp. xxi–xxii). Dewey's ideas about education were widely and hotly debated because they expressed a sharp departure from the scientific rationalism (e.g., behaviorism) that dominated traditional approaches to education at the time.

Dewey espoused a child-centered, rather than a curriculum-centered (or teacher-centered) approach to education. A laboratory school was established at the University of Chicago, and it was tasked with implementing some of these core concepts. This ushered in the progressive school movement in America. This movement had as its primary aim to produce democratic citizens that were socially minded and better prepared to function in an industrial age culture. Progressive schools sprung up everywhere in the United States in the early 1900s. However, even Dewey himself criticized much of what he saw going on in the name of progressive education. Dewey, a true pragmatist, expressed in *Experience and Education* (1938) that many had taken his ideas out of context or implemented some in the extreme to the exclusion of other important factors (Maxcy, 2002, p. xxii). The popularity of progressive education diminished surprisingly rapidly soon after the end of the Second World War.

Remnants of Dewey's influence on active learning can be found in the following beliefs: Firstly, students need to do something with knowledge in order to truly learn it. Secondly, the content of the curriculum should incorporate aspects that empower students to function as productive members of society. Thirdly, learning should be child centered rather than curriculum centered, and it should not focus on cognition to the exclusion of physical and affective domains (Garrison, 1998, p. 43). Dewey felt that schools should be democratic to the extent that students should have some say in what they were supposed to learn and how they were supposed to learn it to insure that content would be relevant to the lives of the learners (Schoen, 2008, pp. 33–34).

Authentic Learning

Authentic learning is a concept that has evolved around Dewey's principle of relevance of content (Schoen, 2008, p. 35). Current ideas of active learning also include notions that the content of the curriculum, learning processes, and products of learning should have value and merit beyond the walls of the classroom. Authentic instruction and evaluation methods are believed to have a positive impact on student motivation and engagement. Thus achievement is higher because students view their school work as more meaningful. Newmann and associates conducted a five-year study funded by the U.S. Department of Education in which they concluded that reform efforts fail when inadequate attention is paid to the intellectual quality of teacher and student activities in the school (Newmann et al., 1996, pp. 286–301). They defined intellectually challenging activities as "authentic learning activities" performed by students and have merit in the real world, mirroring similar activities to those performed by adult professionals in that field.

Reflective Professional Practice

The foundations for the conditions necessary to sustain a professionally stimulating work environment characterized by continuous intellectual growth and refined practice were outlined in Schön's book, *The Reflective Practitioner: How Professionals Think in Action* (1986). This framework is not specific to the field of education. Nevertheless the fundamental principle of routinely reflecting on the effectiveness of professional practices and continuously evolving the manner in which we deliver services, based on collaboration, professional knowledge, and observation of results, has firmly taken hold in education. Professional reflection is widely supported by proponents of active learning because this approach is conducive to establishing and maintaining a learning environment that is specific to the learners' needs. A child-centered active learning program requires a large amount of professional judgement and flexibility, since the notion that "one size fits all" is widely rejected by proponents of active learning. Maintaining a school culture that values continual learning and encourages teachers to practice professional reflection can be an integral part of an effective active learning program.

Social Cognitive Constructivism

Cognitive constructivism is a branch of psychology concerned with the development of thought processes in humans. Numerous influences have contributed to the development of cognitive constructivism, prominent among the cognitive constructivists having been the work of Piaget on developmental stages and learning through action (Piaget, 1952; Piaget & Garcia, 1986; Wadsworth, 1996). Piaget's work was pivotal because it focused on the thought processes required of learners when engaged in various activities and thus tied learning to doing (Berk, 1997, p. 244; Schoen, 2008, p. 28).

Other important research contributing to the cognitive constructivist theory includes the work of Bloom on the complexity of thought processes, the work of Bruner on the role of schemas in learning, and Perry's insights on the importance of fluid grouping with post adolescent learners. All of these early cognitive constructivists helped shift the focus of educators onto the process of thinking. This emphasis on the importance of the manner in which the individual interacts with the environment in the development of thinking skills contrasts sharply with the assumptions and focus of educators holding a behaviorist orientation with its related assumptions (ibid., pp. 26–32).

However, the most influential voice amongst the cognitive constructivists in the development of current active learning approaches was Soviet psychologist, Lev Vygotsky (1896–1934). Vygotsky demonstrated that children can achieve a great deal more when their initial independent efforts are followed by opportunities to receive feedback from or to work alongside a more experienced learner. This learner can scaffold and model effective strategies, which the less mature learner then

internalizes and is able to utilize in subsequent independent activities of the same sort. In his work concerning the zone of proximal development, Vygotsky asserted that higher mental functioning first emerges in collaboration with others, before it exists in the individual.

Vygotsky (1978) stated that "human learning presupposes a specific social nature by which children grow into the intellectual life of those around them" (p. 88). Vygotsky's writings have important implications for instructional planning, social interaction in the classroom, monitoring of learning processes, and overall evaluation.

Components of an Active Learning Environment

Since active learning is based on a different set of core assumptions about learning, it follows that active learning environments operate differently than traditional schools built on behaviorist assumptions. This section will outline some of the areas in which active learning programs may exhibit a departure from more traditional approaches to education. Some of these distinguishing features are easily observed, such as the activities of the teacher and the students in the classroom. Others may escape the attention of the casual outside observer, but are extremely important from an operational standpoint. These include adjustments to instructional planning processes, the way in-school time is used, and adaption of the curriculum. It is important that educational entities wishing to adopt active learning take these considerations into account because they are needed to maintain fidelity to the approach.

A Philosophical Approach versus a Packaged Curriculum

Active learning refers to a flexible way of delivering schooling that adheres to core constructivist and pragmatic principles. The specific curriculum, methods, materials, processes, and procedures will vary across contexts. There may or may not be a pre-planned text to follow or fully developed materials for all aspects of the curriculum. This means that there will necessarily be a great deal of variation in the implementation of active learning approaches across school sites. However, it is important to note that while active learning classrooms may look and function differently from one another, there are common threads that are similar in active learning environments across settings.

Student In-Class Activities

One of the hallmarks of active learning, and the one from which the name is derived, is that students primarily learn by being actively engaged in interactions with their environment. By engaging in semi-structured activities, students construct new and more complex ways of thinking. This constructivist approach to learning contrasts with more traditional behaviorist approaches where students are passive recipients

of information. Consequently, active learning classes may appear louder and have a greater degree of student movement. This does not mean the classroom is more chaotic. It is a reflection of beliefs about how students learn.

Constructivists believe that interaction and manipulation are integral to thought development. Therefore, it is common in active learning environments to see students out of their seats moving around and talking. Interactive activities are intentionally designed to help students explore and utilize concepts. This method of learning can be traced back to Dewey, who encouraged "learning by doing" as a means of engaging the affective and physical domains, as well as the cognitive. He believed that education should "involve the body, its actions and passions" (Garrison, 1998, p. 60). Such a child-centered approach would motivate students to learn. Many of Dewey's writings on education were in opposition to the behaviorism-based schooling of his day, which he accused of delivering a curriculum that was "cold" and "dead." Active learning proponents of today similarly believe that engagement of the learner is central to higher levels of achievement.

Instructional Planning

While exploration and investigation may be natural ways of learning, there is no certainty that students will stumble into discovering the foundational information that they need to know if they are to pursue subjects in greater depth. The learning activities must be structured in a manner that allows students the freedom to interact and investigate, but guides them in definite directions, particularly as concerns younger students. Consequently, the role of the teacher in active learning approaches is also transformed.

Careful planning is required to deliberately involve students in interactive activities such as experimenting, discussing, interviewing, and evaluating. These activities will facilitate cognitive growth in targeted knowledge and skills. Typically, whole-class activities as well as small-group or individual activities are planned, depending on the subject area, educational objectives, and student abilities and needs. Instructional differentiation is frequent in active learning classes, because as pragmatists, contemporary teachers concur with Dewey's teachings according to which the more relevant the learning activities are to the life of the student, the more students will be motivated to learn. This is known as the principle of relevance.

Likewise, there is increased demand on the classroom teacher to actively monitor student activity, provide feedback, and redirect students as needed to both keep students focused and further learning. Effective instructional planning is needed to find ways to meet the needs of students who may be functioning on a variety of levels. This is frequently done through use of peer-coaching, inclusion of resources outside the school, or suggestions for extension or modification of assignments to fit students' interests and ability levels.

Time Adjustments for Planning and Instruction

Instructional planning for active learning classes may require greater time due to the complexity of the plans. This is especially true when teachers differentiate instruction based on student needs, because that integrates an analysis of on-going informal and formal assessments into the instructional planning process. Sometimes preparation can take longer due to the gathering of instructional materials. Allowing for adequate time for instructional planning and preparation is important to any active learning program. Many active learning schools allocate time for teachers to cooperate for the purpose of instructional planning.

Curricular Considerations

From an instructional perspective, teachers and administrators should also take into account that active learning is often more time-consuming than methods that require less student movement and interaction. This means teachers must be very intentional and selective in long-term planning in order to ensure that all the skills and concepts in the curriculum are covered. Constructivists, in general, tend to stress thought processing ability over concept mastery, especially in the information age when information can be quickly accessed. Therefore, from a curricular standpoint, depth of coverage may be valued over breadth. Many constructivists believe that students learn and retain more through participation in complex projects than they do when exposed to numerous discrete micro-lessons. Project-based learning is thus common in active learning classrooms. Curricula used with active learning approaches tend to rely on transference or generalization of mental processes, such as problem-solving skills and concepts, from one context to another. To some extent this can free teachers from cumbersome skills checklists and the instructional fragmentation that can result.

Preparation of Materials for Active Learning Methods

The active learning classroom itself and the materials needed to teach must be adapted to the type of activities planned. The teacher's instructional methods in class shift from traditional actions such as lecturing and assigning follow-up pencil and paper exercises, to moving about and informally observing small groups, and assisting as needed. Room arrangement and furnishings may be adapted to accommodate the greater activity level of students in active learning situations. Additional preparation time may be needed to collect or create the materials for students to use in their learning activities. This could include provision of supplies to facilitate student inquiries or the development of tools, such as rubrics for students to record data used to make decisions, judgements, or evaluations. Additional time may also be needed for routine class procedures such as students accessing or putting away materials.

Teacher In-Class Activities

In active learning programs more of the teacher's in-class time is devoted to facilitating learning. This is necessary when students are engaged in diverse hands-on activities. Students may be at different stages requiring various levels of support; typically less mature learners require greater structuring of learning activities, such as questionnaires, outlines, and guides. A key to successful active learning classes is providing students with consistent individualized feedback to promote their continued learning. Hence, monitoring of classroom activities can be more demanding for teachers than it would be in a traditionally organized class with the students sitting quietly working in unison on the same activity. Many active learning schools take this into consideration and either provide additional supervision or reduced student teacher ratios.

Assessment

Student evaluation in active learning classes is frequently formative and used as a means to guide teacher planning of subsequent learning activities. Students in active learning classes may be actively involved in peer and self-assessment, as part of their growth process, as this promotes self-regulation. It is becoming more common for student learning to be assessed using authentic assessment methods. Authentic assessments are those that judge intellectual accomplishments on the basis of the extent to which they are worthwhile, significant, and meaningful. These include those undertaken by successful adults in the field or subject area (Newmann et al., 1996, p. 23). Thus, student work might be judged against set criteria, or rubrics to rate the quality of project outcomes. Student-led demonstrations, exhibitions, performances, and the like are often seen at the culmination of units of study in active learning classes. Unlike traditional approaches to education, a test score in an active learning program is simply viewed as one of many performance indicators.

Basic Guiding Principles Common to Most Active Learning Approaches

Although considerable variation can be observed in active learning approaches, they also share many features. Active learning environments are typically organized around a number of principles that determines the shape that classroom instruction assumes. These principles can be grouped into major categories that include beliefs about the nature of learning, and the role and work of teachers. Most of the differences between traditional schooling and active learning approaches stem from whether or not the school and the classroom teacher consistently strive to adhere to these guiding principles or to the similar ones derived from pragmatic philosophy and a social cognitive constructivist view of education. The following list exemplifies some of the principles of active learning:

- People learn best when they have a personal connection to the content.
- People understand information best when they can actively manipulate, use, or do something with it.
- Higher levels of learning occur when people use knowledge to discover new information or accomplish something new or novel.
- Learning and motivation are so integrally linked as to be inseparable.
- Learning occurs at the individual level, and many variables impact a student's progress including prior knowledge, motivation, aptitude, and scaffolding.
- Learning processes are inherently social. People learn best when they interact with others during the learning process.
- People learn and retain more when they are involved in hands-on activities during the process of learning information.
- Learning activities that have value beyond school are inherently more motivational than those that do not exist in the world beyond the classroom.
- Mature learners regularly self-monitor progress, reflect on their experiences, and adjust based on outcomes of their learning processes.

The following is a detailed list of the functions inherent in the role of teacher and in the art of teaching from the perspective of active learning:

- The role of the teacher is to facilitate learning; the primary agent in the learning process is the student.
- Evaluation should be thought of as progress along a continuum. The role of the teacher is to routinely provide students with feedback regarding their progress and to recommend strategies to further their learning.
- Development of self-regulation behavior helps students improve their repertoire of meta-cognitive learning skills, so that they can guide their own learning more effectively.
- Effective teachers constantly monitor and guide the student learning process by providing timely structure, scaffolding, and feedback as needed to help students.
- Self-evaluation and teacher-student conferences are frequently implemented to assist learners in self-regulating their learning.
- Learning environments should be stimulating and allow for active manipulation and experimentation.
- The rate of learning will not be the same across learners, despite participation in similar activities. Therefore, the pacing of learning activities should be thought of as flexible rather than fixed across students.
- Authentic learning activities that have meaning in the broader community beyond the classroom are inherently more motivational to students. Planning authentic activities allows students to see and understand the value and significance of the things learned at school.
- Sustained focus on a topic yields the deepest learning. However, the ability to self-discipline and sustain focus is developmental. For this reason teachers should structure learning activities that gradually allow students to increasingly sustain focus on complex problems and projects.

- Reflection plays a crucial role in facilitating sustained focus and refining learning processes to promote continuous learning. Students should be taught to reflect upon the strategies that they employed over the course of their learning and to make note of how they might be improved in the future.
- Since active learning requires a great deal of teacher professional judgement, and trial and error, professional reflection is required for effective teaching, regardless of the formal educational attainment, experience, or age of the teacher.
- Cooperation with like-minded teachers can help stimulate ideas and increase teacher effectiveness.

When most choices about how to implement schooling include beliefs and assumptions similar to these, the school is said to be implementing active learning. While not every approach to active learning involves all of these principles, collectively these principles underlie most of the methods employed in active learning. Some schools or programs emphasize particular principles more than others. The strength of the commitment to active learning among teachers and administrators can be a determining factor in the degree of success which a school or program experiences with the approach. Evidence suggests that when the majority of the faculty does not genuinely buyin to a philosophy, implementation tends to be weak and superficial, with the approach thus possibly not yielding its intended results (Schoen, 2010, p. 264). This highlights the importance of faculties being well trained in core constructivist ideas and active learning philosophy prior to implementation.

The context in which an active learning program is situated can also make a difference because expectations of the parents and community influence decisions educators make on a day-to-day basis. Administrators are well positioned to both support teachers attempting to implement active learning, as well as to educate the parents and school community as to why this approach to education will benefit both students and the community.

Challenges Faced by Active Learning Educators and the Support Needed

The assumptions of active learning are more widely accepted today than ever before. Nevertheless, this approach is still rarely seen in operation with fidelity to its core concepts. Why? The active learning approach places numerous and different demands upon the professional life of the teacher and administrators than more traditional approaches that fall under the general heading of behaviorism. Behaviorist approaches tend to favor standardized curricula and normative instruction. In short, active learning requires a great deal more teacher training, professional judgement, continuous learning, cooperation, reflection, and flexibility. This is not only difficult to achieve collectively at a school site, but remains difficult to maintain over time.

Brooks and Brooks (1999, pp. 18–24) identified numerous challenges teachers face when schools turn from traditional approaches, such as limited professional development opportunities, limited budgets, a culture of traditionalism, and a lack of administrative understanding and/or support for the unique needs of teachers implementing active learning. Murphy and Alexander (2007, pp. 16–18) also pointed out that teachers typically receive little training in the research on psychological dimensions of learners and learning processes. They assert that increased teacher knowledge of learner-centered principles would have important and substantial implications for improved educational practice. Hence, schools implementing active learning face tremendous challenges. Needless to say, these challenges are greatly intensified when an individual teacher decides to independently implement active learning strategies with less than full administrative assistance and support.

Many contemporary voices agree that strong social and administrative support is necessary to establish an effective and lasting culture of active learning at schools (Newmann, Wehlage, & Secada, 1995; Deal & Peterson, 1999; Fullan, 2005; Leithwood, Aitken, & Jantzi, 2006). There are increased demands on school officials to provide teachers with a school culture in which they can reasonably and consistently experience success. Informed and meaningful teacher commitment to the active learning approach is crucial to the change process since without it teachers will face philosophical dualism from within themselves and from their colleagues that will undermine a unified approach. Philosophical dualism can place faculty into competition instead of building a climate of collegial social support. A unified school culture in which the faculty and administration deeply understands and embraces a common core philosophy is much more desirable at any school.

Another pivotal need for sustaining active learning at the school level is the provision of on-going focused teacher and administrator professional development. Current views on this topic emphasize the need for meaningful professional growth, which is facilitated when teachers work in small groups to explore new methods or to reflect and refine processes based on the actual needs of their students. Consequently, prioritizing and facilitating teacher peer-learning and cooperation during school hours by administrative means is recommended as a way to sustain active learning environments at schools and in school systems. A school's expectations concerning discipline should promote focused interaction between students on expectations, as well as disciplinary policies and practices in an active learning program. Such an agenda should emphasize student self-regulation.

Finally, teacher supervision and evaluation methods must be built on core active learning assumptions, rather than on traditional behaviorist approaches. Administrators of active learning programs should be knowledgeable of the approach and encourage teacher activities known to support planning and execution of active learning classrooms. Effective administration and facilitation of active learning might include looking at the relevance of teacher professional learning to instructional processes, considering processes for teacher planning of student learning, and reflecting in real time on the relationship between instructional activities and student

outcomes. With adequate teacher support, active learning holds much promise for reaching more students and helping them to achieve their potential.

This chapter will next examine how students and teachers are involved in active learning at a small rural school. The aim is to provide an overall outline of the models of action and practices observed for students and teachers during an educational change.

BASIC FEATURES OF ACTIVE LEARNING IN THE FINNISH CASE-STUDY SCHOOL

The central features of current curriculum reforms in many countries intend to emphasize a school culture with personal control of the learning process and a general flexibility and capability of acting on each other in the functioning of the school. How can these principles be transformed into models of action and teaching practices? Does school culture really change? In future years the schools will probably acquire increasing diversity. Curriculum development will constantly require new knowledge regarding successful models of action and practices in the schools. The successful development of schools will require qualitative and contextual information, this to be collated using means such as school-based case studies (see, e.g., Ginsburg, 2009; Kimonen & Nevalainen, 2005; Korpinen, 2010b).

The following case study will examine active learning in the context of curriculum change at Suvila School, a small rural school in Central Finland with twenty-five students in grades one through six. Data were collected in the form of tape-recorded interviews, observation, and document analysis during six day-long visits to the school and the village community. Interviews were carried out with the two classroom teachers in the school, the five students, the four parents, and the chairperson of the school board. The research data were analyzed using qualitative methods introduced by Glaser and Strauss (for a grounded theory, see Glaser & Strauss,1967; Strauss, 1987).

The Organization of Goals and Activities

All systematic teaching and study is founded on a conception of the nature of both learning and the learning situation. This conception is constructed from components including an interpretation of human knowledge and mental processes, societal traditions and norms, and the expectations set by society for teaching (von Wright, 1993, p. 1). Paradigmatic changes in the conception of learning can shape national educational policy and in this way may also be reflected in the practices used in individual schools. A transformation of national educational policy can facilitate the autonomous developmental work of schools.

Suvila School began the process of change from a traditional school culture to one more progressive in the late 1980s. This reform of the instructional goals and practices of the school was promoted by new, constructivist conceptions of

knowledge and learning that gained currency in Finland at about the same time. According to these conceptions, knowledge is constantly changing, with personal experience and structuring being required to comprehend it. Halinen (2008) wrote that this new approach to the curriculum also gave more freedom to the school. The basis of this thinking was that the national curricular goals could be realized in school-based goals within the curricula of individual schools. Teachers were given the responsibility to decide how they would attain these goals (pp. 224–225). As a teacher at Suvila explained:

> We've been making this change, bit by bit, the whole time. We've not made any sudden changes. One of the most important changes was that I broke the 45-minute teaching system and built larger systems... First came the construction of project units. At first, the units were shorter, a week or two... Then I extended the periods to make activity-oriented learning possible, and so that we could deal with things in more detail ... students were given time for their own project work. The final product is the matter I've tried to deepen all the time. This activity-oriented learning revealed that the Finnish school practice does not make this system possible. That's when we gave up this school day that is tied to a strict number of hours.

The transformation of the instructional goals and practices at Suvila School was promoted at an individual level by the in-service training acquired by the head teacher of the school. This particular teacher then became interested in educational ideas, especially those presented by John Dewey. On the micro-level, the change was accelerated by educational discussions with a peripatetic special teacher at the school, the wife of the head teacher, and the other teacher of the school. Korpinen (2010d) reported that many professional teachers have experienced that they need the support of parents and the school's other interest groups in their work. This is of particular importance when teachers are setting new educational goals (pp. 187, 197). Of the meso and exo-level factors supporting the thinking of the teachers at Suvila, the most significant was the renovation of the school, which took place instead of its threatened closure. In the planning of the renovation, the teachers were able to reflect on new educational ideas. In addition, the majority of the parents and members of the community had a positive attitude toward the pedagogical changes in the school.

The head teacher's educational goals and action principles, which emphasize students' freedom of choice during the learning process, were clearly reflected in the practices of Suvila School. During our fieldwork the students were being introduced to the topic of communication. The aim was to cooperatively compile a video commercial and a bulletin. The students were allowed to set their own objectives for activities and to observe their achievements in the cooperation phase of the learning process that arose from the project work described here. While working, the students had an active role characterized by goal-oriented, self-assessment activity that was directed by metacognition in the individual (for elements in constructivist classrooms, see Gagnon & Collay, 2001, p. 102). The teacher decided what the students had to study during the week, but the student groups themselves had the main responsibility for the manner in which they achieved the specific goal.

The work of a teacher in a small school is inherently broadly based. For the head teacher at Suvila, the challenges and problems arising from the miscellaneous activities of the school's everyday life, as well as his own interest in education, formed the basis for his continued motivation to learn. Furthermore, acting as an adult educator was central in the development of his own approach to learning and in the transformation of the instructional practices of the school. Correspondingly, the teacher's commitment to the development of the school and his success in practical educational situations motivated him to shift the emphasis of his own work to student activeness. During our fieldwork the teacher's activeness was evident mainly in the orientation and evaluation phases of the learning process that arose from the project work. In the course of the cooperative work phase he guided and encouraged the students (for professional development, see, e.g., Keiny, 1994).

Cooperation between the members of the school community and the representatives of the school's interest groups was evident in the activities of the school. The students practiced cooperative learning in small groups composed of learners of different ages. The strength of these small groups consisted in their naturalness. During the cooperation phase special emphasis was placed on independent initiative, sense of responsibility, and cooperativeness (for cooperative learning effects, see Arends & Kilcher, 2010, p. 310). The most problematic elements resulting from the activity of the heterogeneous small groups were the poverty of cooperative skills and information processing skills. The level of concentration exhibited by the students also varied according to age (for problems in active learning, see, e.g., Simons, 1997). Cooperation between the teachers was flexible as well as open. The teachers had planned the school activities together at the beginning of the term. The school board and the parents also participated in the planning of school work.

The Processes of Work and Learning

The process of change at Suvila School proceeded inductively in phases by means of the experiences that the teachers gained in practice, and through discussions that they had concerning their work. During the first phase of the change, the teachers adopted topic units lasting from one to two weeks. During the second phase the teachers increasingly stressed activity-oriented learning in their teaching. During the third phase the teachers extended the duration of the school day. The teachers at Suvila intended to continue developing their teaching practices. The teachers also wanted to develop themselves, their teaching, and their teaching materials.

During our fieldwork the learning process resulting from the project work consisted of orientation, cooperation, and evaluation phases. The teacher's role in the learning process was developmental, as he was seeking to develop his students as learners. The teacher's essential responsibilities in the orientation phase included providing students with motivation and instruction. During the cooperation phase he actively gave advice and patiently guided the activity of the small groups. During the

evaluation phase the teacher examined the outcomes with the students, and later he also wrote feedback concerning their outcomes and cooperative skills.

The project work carried out in small groups offered the students the opportunity to actively interact with each other and to solve the problems that had emerged from working together. The most problematic aspects of the group work were the lack of negotiation and conciliation skills, and the passivity of the youngest group members, especially in the planning of the work. Problems were also common in the processing of information. The students selected, grouped, classified, and interpreted information inadequately (for problems in active learning, see Simons, 1997). They were also satisfied with fairly routine solutions. It seems that the simultaneous mastery of the social and cognitive goals set for small group work is a demanding challenge for students in the active learning process of project work.

If teachers are to acquire new information for the construction of models of thinking and action, they need new knowledge (see, e.g., Hargreaves & Fullan, 2012, p. 89). The head teacher at Suvila School participated in courses organized by the university Continuing Education Center and by the National Board of Education and has acted as an educator in teacher in-service training. He found inspiration for his school work in educational books, journals, and other literature. He also accessed information through discussions with other teachers, students' parents, and members of the school board. In his own words:

> I've recently found many relevant points in literature, for example, in Steinbeck's *Cannery Row*. It had a fitting description of a person who has gone through our present school system... The National Board of Education functions so far away, after all. It's very hard to make generalizations and give directions from there that would have an effect on everyday school life. I can't get much from those materials. I read the *Finnish Journal of Education*. The *Teacher Journal* I read whenever there happens to be something worth reading.

The teacher has naturally gained a considerable amount of experience-based knowledge through his long professional experience. In his own teaching the teacher usually utilizes the opportunities provided by the immediate environment of the school (for learning environments, see Kilpeläinen, 2010, pp. 57–58). He also continuously seeks to direct his students in accessing information from various sources both indoors and outdoors.

Utilizing and Assessing the Processes and Outcomes of Work and Learning

In Finland schools have developed as an institution that, in many respects, is separated from other spheres of social life. Consequently the utilization of the school outcomes for purposes other than learning has generally been uncommon. However, the small rural school has traditionally been involved in the life of the village community (see, e.g., Korpinen, 2010c; Nevalainen & Kimonen, 2013). The products of the

students at Suvila are utilized to some extent in the activities of the school and the surrounding community. The teacher has also acted as an agent of change mainly by offering presentations to other teachers from the municipality and from elsewhere in the province. As an implementer of a school-based curriculum, he has provided them with an account of his own experiences and observations. Furthermore, the school has been open to such teachers and university students who have desired to become acquainted with cooperative project work in combined grades.

The evaluation practices of Suvila School mainly follow the evaluation principles outlined in the new Finnish curriculum (for evaluation procedures, see Niemi, 2012, pp. 27–28). The assessment of the learning process and outcomes is continuous within the school. During the evaluation phase of the learning process, special attention was paid to areas in which students were successful. Nevertheless, the achievement of social objectives was not discussed, instead, the teacher gave a written assessment of the cooperation skills displayed by each student in their personal study-books. The students also evaluated their own learning activities and results in their study-books, but they were not instructed to carry out their own assessment of the group work. Nor did they consciously assess one another's products or cooperation processes.

The teachers at Suvila evaluated the functioning of the school annually, together with parents and the members of the school board. According to the teacher, the new work and learning methods that activate students have given rise to many positive characteristics in students' work including increased initiative and a growing sense of responsibility. The students have learned to appreciate project work as an important part of their education. The theoretical basis of the teacher's work, which emphasizes a global and historical mode of thinking while also acknowledges student abilities and interests, reflects an internalized overall view of holistic education and constructivist learning. According to the teacher, the school as a functional system is in a state of constant development. As a result of this transformation, the teacher faces continuous demands for critical reflection and the renewal of his own principles and practices of action. As he expressed it:

> My own philosophy of education was formed a long time ago. I've lacked the means and the resources to put it into practice... This system is never ready, and will never be ready, thus we must think about it all the time... we could utilize the environment even more in learning. Learning should be natural, we should examine the environment and issues, we should ask other people who are knowledgeable, and not always just the teacher. We should learn to benefit from different channels of learning. One channel could be the utilization of computer technology. Information technology will continue to be an important developmental target.

Active Learning and the Process of Change in the School

The teacher's learning process and the development of the school are closely related. Transformation of the traditional school context requires teachers to reflect critically

on their own principles and practices of action and to transform them, in other words, to create a new school context. From a teacher's point of view, innovations in working and the management of change involve a comprehensive learning process, where the prevailing school culture is initially internalized, and then through externalization, transformed.

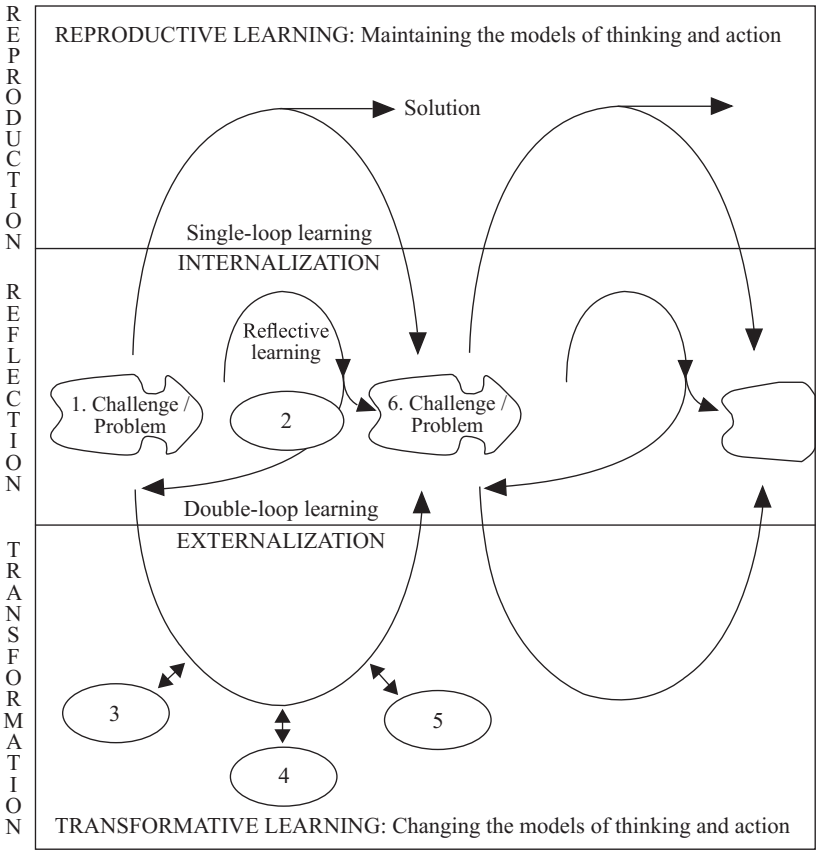
For the teachers at the Suvila School, the learning process was typical of the traditional school culture of the 1980s and was essentially reproductive. Thus, the teachers reacted to changes in the internal and external setting of action mainly by identifying defects and correcting them. In this way the teachers preserved the models of thinking and action sustained by the school, these having been based on a behaviorist conception of learning and emphasizing its external control. Accordingly, such single-loop learning aims at the preservation of prevailing school practices and routines (see Argyris, 1995, p. 8; Argyris & Schön, 1996, p. 20).

By contrast, a modern school culture based on progressive pedagogics following the constructivist conception of learning, requires transformative learning. If the context of the school is to be changed, teachers need new models of thinking and action. Consequently, a change in the basis of action becomes a double-loop learning process for them. One aspect of transformative learning is reflective learning based on deliberation and discussion (see ibid., p. 21; Argyris, 1995, pp. 8–9).

The following section will examine in more detail the transformative learning process of the teacher in the changing school culture. It attempts to outline comprehensively the interrelationship between reproductive, reflective, and transformative learning, and the way they proceed in phases during the active learning process of the teacher. Special attention is directed toward the internalization and externalization of school culture. Figure 1 depicts the active learning process of the teacher during the process of school change.

Facing Challenges Through Problem-Based Work and Learning

Learning and knowledge are always linked to a context in which knowledge is first learned and then used. The context of a school, its practices of action, and the school culture largely determine what is perceived as a problem, what is seen as a method, and what is understood as an acceptable solution (von Wright, 1993, p. 18). The process of change at Suvila School proceeded inductively in phases making use of the teacher's practical experiences and the discussions arising from them. The aspiration to discard the fragmented teaching practices that encouraged passive learning, replacing them with a holistic and activity-oriented school culture, created the basis for both the teacher's problem-oriented work as well as a learning process that has lasted for several years (see Figure 1). The contradictions between the prevailing practices and new challenges motivated the teacher to plan the comprehensive process of change at the school. Gradually, new models of thinking were also reflected in the practices introduced at Suvila. These practices were based primarily on the pragmatist conception of people, according to which the learner



1. Facing challenges: Problem-based work and learning
2. Analyzing practices
3. Defining new practices
4. Constructing new models for thinking and action
5. Producing new practices
6. Facing new challenges: Problem-based work and learning

Figure 1. The Teacher's Active Learning during the Process of School Change

is regarded as an active-minded and inquiring individual engaged in a continuous process of problem solving.

Analyzing Current Practices

People become competent in various lines of work and in different fields by gradually internalizing already existing knowledge and procedures. A developmental

cycle of expert activity begins with an almost exclusive emphasis on internalization (Engeström, 1992, pp. 15–17). The teachers at Suvila School had internalized the behaviorist models of thinking and action that were prevalent in the traditional school culture during the course of their teacher training. This internalization process was further enhanced by experiences gained during their teaching careers. Critical reflection and analysis of problems that arose from the practices of action nevertheless directed the teachers toward the innovative development of school work and a search for new solutions (see Figure 1).

Defining New Practices

Creative externalization occurs first in the form of discrete individual deviations and innovations. As the disruption and contradictions of an activity become more demanding, internalization increasingly assumes the form of critical self-reflection, and then the process of externalization, a search for novel solutions, increases (Engeström, 1992, pp. 15–17). According to expansive learning theory, the direction of the transformation of learning and practices of action is built around the zone of proximal development. This zone is the area between the established, contradictory mode of action and a qualitatively novel mode of action that offers solutions to the contradictions (Engeström, 1987, pp. 174–175).

The zone of proximal development at Suvila School can be examined on two levels. The lower level of change in instructional practices is determined by the teacher's independent resources in developing the school. The higher level of change is brought about by the amount of positive support encouraging the teacher. Such support is offered by persons closely connected with the functioning of the school, including students, other teachers, parents, and administrators. The zone area that lies between these levels represents the development possibilities of the school. The zone of proximal development for Suvila was expanded by many external factors. The change process was accelerated by the renovation of the school building, in the planning of which the new instructional practices of the school culture were also outlined. The teachers wanted to develop their teaching in a more comprehensive and action-oriented direction. These new models of action, in turn, required the implementation of many changes in the curriculum, in the structure of work and learning, in learning and teaching processes, and in assessment. The new national educational policy provided favorable starting points for these activities (see Figure 1).

Constructing New Models for Thinking and Action

Externalization reaches its peak when a new model for the activity is conceived, designed, and implemented (Engeström, 1992, pp. 15–17). The adoption of new models for thinking and action was essential in the shift away from the traditional learning context at Suvila School. The transformation of the prevailing school culture by means of externalization demanded a process of double-loop learning from the

teacher. This double-loop learning emphasizes the identification and solution of those problems connected with school culture that require transformation of action principles (see Argyris & Schön, 1996, pp. 20–21; Kauppi, 1993, p. 87). The teacher at Suvila sought to acquire new models of thinking and action by studying and also by acting as an educator himself in teacher in-service training (see Figure 1).

Producing New Practices

The first result of the transformative learning process was the adoption by teachers of topic units. This presupposed a transformation of the teaching culture by opting for an activity-oriented approach. The teacher's holistic approach and the emphasis placed on activity-orientation arose from the fact that these aspects were in a dialectical relationship in the teacher's work. The teacher had to understand the large variety of connections between activity-orientation and a comprehensive approach to knowledge in practice, and then include this experiential knowledge in his own model of thinking and action. The combination of holistic education with activity-oriented learning produced new challenges in the school culture. The internalization and externalization of these challenges initiated a new learning process in the continuing shift of the school toward active learning (see Figure 1).

Facing New Challenges

As the new model becomes consolidated, internalization of the way it operates becomes the dominant form of learning and development. In this framework, learning involves designing, implementing, and mastering the next developmental stage of the activity system itself (Engeström, 1992, pp. 15–17). The process of change at a school is a continuum, where answers are sought to questions perceived as significant. At its best, the active learning of the teacher consists of independent solving of the problems arising from the everyday life at the school, and of the active accessing of knowledge and skills for the construction of new models for thinking and action (see Figure 1).

In the future, Suvila School aims to increase the interaction between the school and the environment. This trend creates new challenges for the teachers and students in developing their active learning in the direction of authentic learning. Von Wright (1993) cautioned that activeness does not have an inherent pedagogical value. The essential issue is what is done, and what part this plays in the overall learning process (pp. 12–13).

TOWARD AN ACTIVE SCHOOL

Creating Active Schools

It is quite difficult to change the culture of a school. Sahlberg (1997) stated that it can remain unchanged for decades, despite all attempts at reform. The opposition to reform might be a result of a conflict between the teacher's own beliefs and the new ideas. Reforms limited to curricula or equipment do not necessarily change the teachers' ways of teaching, because such changes require teachers to modify their beliefs, values, expectations, habits, roles, and power structures (pp. 180–181, 184).

Changes in school organization can be categorized as first and second-order changes. First-order or incremental changes are deliberated efforts to enhance the existing school system by overcoming deficiencies in policies and practices. The aim is to improve the efficiency and effectiveness of what is currently being done without disturbing the basic organizational features. Such changes are aimed essentially at improving the core features of the organization. Second-order or fundamental changes seek to alter the essential composition of an organization. They involve the identification of new goals, structures, and roles (Cuban, 1992, pp. 218–219). Changes at schools have hitherto been first-order changes. Second-order changes have, in most cases, failed. The challenge of the twenty-first century is to find second-order changes that will have a fundamental effect on school culture and structures.

Small rural schools have, according to previous research, a unique school culture that differs from that encountered in larger urban schools. The ethos of small schools acts as an insulation against government directives, for which reason the teachers in small schools are more easily able to retain their old value systems than are their colleagues in larger schools. In this way the teaching remains unchanged, despite any national curriculum reform that might be in progress (Vulliamy, Kimonen, Nevalainen, & Webb, 1997, pp. 111–112). The work that the teachers performed on the curriculum at Suvila School encouraged them to think in greater depth about the fundamental ideas underlying the school's functioning. However, the teachers did not have the same need as the teachers in larger schools to plan, manage, and formally assess the way their school functioned. This was the result of collegial decision-making. The Suvila school culture was characterized by a family-like atmosphere, informal relationships between the staff and the students, as well as an absence of rituals (for more on Finnish rural schools, see Korpinen, 2010a). The teachers found being flexible in the school organization and bringing about rapid changes to be easy.

The implementation of the new ideas requires a change in a teacher's ways of thinking and working. These changes need to be reflected in the teaching practices employed (see Hargreaves & Fullan, 2012, pp. 154–163). Carlgren (1999) considered that the gap between the reality of teaching and the expectations directed at the teacher can be seen from a wider perspective as a difference between theory and practice. This might be formulated even more precisely as the difference between a teacher's thinking and his or her actions (p. 49). For example at Suvila School the curriculum work influenced the teachers' views of knowledge, learning, and education in a more

progressive direction. It may well be observed that a teacher's internalized educational theory and its practical applications were not inconsistent with each other. The complex process of change was also confronted with obstacles. As far as the parents were concerned, the process of change at Suvila was accompanied by some parents' doubts regarding progressive educational ideas. These parents were even willing to return to the traditional school culture (for obstacles, see, e.g., Niemi, 2002, p. 774).

Major differences characterize the process of change at different schools. A process of change proceeding linearly in rational and systematic fashion represents the fidelity perspective. Sometimes the process of change may be described as eclectic. This is when the teachers choose the parts of the reform that they wish to implement, being guided by their own practical ethics. In such cases the teachers do not actually change the bases of the subjective theory that guides them. During the process of curricular reform at Suvila School, there had been changes of a radical kind in the models of thinking and action followed by the teachers. These changes may be classified as representing change in accordance with the enactment perspective (for these perspectives, see Snyder, Bolin, & Zumwalt, 1992, p. 402). The main features of the history of innovative attempts at Suvila are as follows:

- The process of change from a traditional school culture to a more progressive one started at the end of the 1980s.
- The process of change at the school proceeded inductively, in phases, by means of the experiences that the teachers gained in their working practice and through discussions about them.
- During the first phase of the change, the teachers introduced study units.
- During the second phase, the teachers wanted to develop a more activity-oriented form of teaching.
- During the third phase, the teachers extended the school day.

The process of change in the culture of Suvila is aptly described by the concepts "reculture," "retime," and "restructure" as presented by Fullan (1998, p. 226). He argued that we need to change schools, since at present they are not organizations for learning:

> We need especially to 'reculture', and 'retime' as well as 'restructure' schools. Restructuring is commonplace and all it does is alter the timetable or formal roles. Reculturing as I have argued in several recent writings transforms the habits, skills and practices of educators and others towards a greater professional community which focuses on what students are learning and what actions should be taken to improve the situation. Retiming tackles the question of how time can be used more resourcefully for both teachers and students. Reculturing and retiming should drive restructuring because we already know that they make a huge difference on learning, although they are very difficult to change.

Educational reform, with its complexity, dynamism, and conflicts, is an unending process of change (Fullan, 1993). Nias, Southworth, and Campbell (1992, pp. 236–237) identified the following four sets of conditions that facilitated whole-school educational change:

1. appropriate institutional values, specifically learning, interdependence, and teamwork, the open expression of professional differences, mutual consideration and support, as well as a willingness to compromise;
2. presence of organizational structures, especially for professional interaction, communication, joint decision, and policy making;
3. resources, especially teacher commitment, time, people, and materials; and
4. leadership, both formal and informal.

The curriculum work is a team effort of the teachers. The transformation of the instructional goals and practices at Suvila School was promoted on the individual level by the in-service training acquired by the head teacher. In setting new educational goals, teachers were supported by the school's interest groups. Among the school-level factors facilitating the head teacher's thinking, most significant was the fact that the school had been renovated rather than closed. In addition, the majority of the parents and members of the community had a positive attitude regarding the pedagogical changes at the school. The following four main factors promoting educational change at Suvila are:

1. Teacher (teacher's in-service training and personal interest in professional development; the challenges and problems arising from the everyday activity of the school; acting as an adult educator);
2. School (the school's tendency for rich innovation; management, teachers' cooperation skills, collegiality, trust, interaction, and open communication; the renovation of the school instead of its closure);
3. Community (support from the students' parents); and
4. Society (a reform of national educational policy; a transformation of the concepts of knowledge and learning).

If more fundamental changes are to occur in practice teachers must first undergo professional development to cultivate new attitudes congruent with changes advocated. Such a perspective views educational change as a process of growth for teachers and students – a change in thinking and practice. The nature of teacher professionalism in Finland is predicated on teacher autonomy, a commitment to enabling students to become active independent learners, engagement in lifelong learning, and cooperation with the various educational stakeholders. These attributes have been advocated as the most fitting for professionals in the post-modern era. The intention is to empower teachers and enable them to influence the direction and development of educational reform (Webb et al., 2004, pp. 87, 101).

The implementation of changes in the school system involves the teacher in an active learning process. The teachers at Suvila School have obtained ideas from in-service training, teachers at other schools, parents, the students themselves, and from professional publications. In particular, the significance of in-service training has been crucial because it has motivated the teachers' planning work (for professional development, see Hopkins, 2007, p. 87). The in-service training sessions have offered the teachers the possibility to sketch new ways of thinking for their own teaching. Moreover, sharing experiences with other teachers has been

important. However, in-service training for teachers in small schools has been inadequate because the training topics have been planned primarily to meet the needs of large schools. The features of teacher professional development at Suvila are listed here:

- The teachers have actively participated in in-service training.
- The teachers have participated in courses organized by the Continuing Education Center and the National Board of Education.
- The head teacher has found inspiration for his school work in educational books, journals, and other literature, as well as through discussions with other teachers, students' parents, and members of the school board.
- The head teacher has also been an agent of change by acting as an educator in teacher in-service training.

If the process of educational change is to succeed the teacher must have many pedagogical and professional competences. The teacher's professional development amounts to encountering change, living with it, and influencing it. Changes require the teacher to be sensitive and ready to anticipate the future. An important teacher quality is being able to perceive societal changes together with their colleagues and to determine which changes could be relevant to their professional development (MoE, 2001, p. 2).

Toward Active Learning

The central point of departure of the volume *Education and Society in Comparative Context* (2015) is that education is closely related to the totality of culture and human activity. It suggests changing traditional, reproductive learning into actively problem-oriented, holistic, and life-centered learning (Kimonen, 2015, 261). This section will briefly examine the process of active learning. The interpretative process here utilizes the socialization process of outdoor-oriented education presented by Kimonen (2015, pp. 252, 254–255).

The philosophical basis of active learning is the idea that reality is built on the interaction between humans and the environment. Knowledge evolves through experience generated by active effort. Knowledge is constantly being revised by new theory that better explains the experience and thus serves as a means for reorganizing experience and evaluating activity (Dewey, 1916/1950, pp. 89–90, 188–189). Therefore, thinking is a way of analyzing and articulating the experience arising from activity, which, in turn, contributes to the process of adapting to the surrounding world (see Figure 2).

According to this view, reality is best articulated through doing and first-hand experiences, in which case intentional activity can also generate material results when it is combined with the performance of work. In teaching situations based on active learning, the individual's relationship with reality consists of three categories. The first category involves feelings related to an authentic human experience and its properties while participating in doing and working within different learning

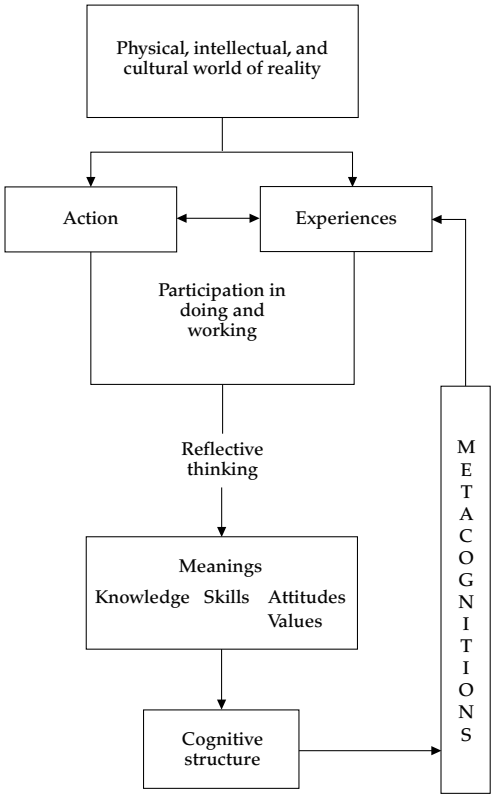


Figure 2. Action, Thinking, and Knowledge as Constituents Contributing to the Process of Active Learning, as Adapted from Kimonen's (2015, p. 254) Interpretation of the Socialization Process of Outdoor-Oriented Education

environments. The second category is connected with the first one, and consists mainly of conscious observation as the individual participates in doing and working within and outside the school. The third category combines doing and working with thinking, with the experiences thus obtained in different learning environments gaining a conceptual meaning.

The central purpose of the ideal active learning process is to articulate the essence of reality, specifically its physical, intellectual, and cultural worlds. Figure 2 summarizes the essential constituents of active learning process – action, thinking, and knowledge – and their interrelationships. The experience of articulating reality is connected with goal-oriented doing and working, which, through problem-solving situations, creates knowledge, skills, attitudes, and values. Such reflective thinking is then used to interpret and evaluate the meanings of the concepts that are linked to human cognitive structure. The process in question concurrently facilitates the

development of metacognition in the individual, thus contributing to the further organization of reality during a new experience.

Functional human beings and their social world are constructed in dialectic interaction, the components of which are internalization, externalization, and the objectivated social world. Society is a human product because of externalization. Objectivation facilitates the process by which society becomes human objective reality. Through internalization, the human being also becomes a social product (Berger, 1967, pp. 3–4; Berger & Luckmann, 1967, p. 61). In this process education and society are intimately linked since the basic functions of active learning are to articulate and internalize the essence of reality as well as to affect and transform it.

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& XIN CHEN

AFTERWORD

EMPOWERING TEACHERS AND STUDENTS FOR ACTIVE SCHOOLS

In Search of a Pedagogy for the Twenty-First Century

INTRODUCTION

The global education reform movement is searching for new models for twenty-first century pedagogy. A worldwide agreement exists that learners need to know how to think critically, communicate effectively, and solve problems through negotiation and cooperation (Scott, 2015, p.1). Learners also need support when using new tools for working and familiarizing themselves with various types of information and communication technologies. Competences that cross the boundaries and link different fields are precondition for living in the complex world of today. These competences are needed for dealing with local and global citizenship, personal and social responsibilities, as well as cultural awareness and tolerance (see Binkley, Erstad, Raizen, Ripley, Miller-Ricci, & Rumble, 2012, pp. 18–19; FNBE, 2016, p. 21).

Adopting twenty-first century skills generally has an overall transformative effect on schools. The nature and extent of change can range from conservative to fundamental. During the conservative type of educational reforms called additive change, teachers tend to add new objectives, contents, and technology to their old practices. During an assimilative change teachers would modify their curricula and teaching methods. More emphasis would be placed on creativity, problem solving, and cooperation. During a fundamental change, teachers would need to change their models of action and thinking completely. Then they would be able to develop the school into a learning community (Scardamalia, Bransford, Kozma, & Quellmalz, 2012, pp. 238–239). All staff members must participate in this development work in order to achieve real changes in the school's internal and external reality as well as to develop the school organization and make its activities increasingly student centered.

UNDERSTANDING TEACHER EDUCATION REFORMS IN CHINA AND JAPAN

The fundamental goal of educational reform in China and Japan is to improve the quality of teacher education. These two countries presently focus on improving teaching professionalism, standardizing and upgrading teacher education, and constructing a lifelong-learning system for school teachers. Behind these common features or tendencies, there are some common or similar background factors, the most prominent of which is the informationization of society. The explanations for nearly all the common features or tendencies in Chinese and Japanese teacher education reforms and developments can be found in the informationization of society.

On the other hand, differences between Chinese and Japanese teacher education reforms and developments are easily identified. One of the biggest differences may be that China attaches greater importance to structural reforms in teacher education, while Japan focuses more on intensive construction. To a certain extent, it can be argued that the goals of structural reforms in China since the 1990s are similar to those of Japanese teacher education reform after the Second World War.

Compared to Japan, China is "making up for its missed lesson" through structural reforms. One of the important reasons for this difference is that the two countries are not at the same developmental stage. China is experiencing a social transformation from an agrarian to an industrial and an information society simultaneously. Japan, in contrast, is in a transitional process from an industrialized to an information society. China is experiencing the transformation from a planned to a market economic system. Japan, for its part, has long had a developed market economic system. Therefore, China has to finish work that Japan has already finished. Attaching more importance to structural reforms does not mean that intensive construction does not play a central role for Chinese teacher education. It may be more accurate to say that the structural reforms are a necessary basis or precondition for intensive construction and improvement of teacher education in China at its present stage.

It is too early to evaluate the effects of Chinese and Japanese teacher education reforms since the 1980s, as the reforms in both countries are still continuing. Nevertheless, certain issues or problems have already been pointed out by many people, even though they are different in the two countries. Here, we would like to point out one common problem in the teacher education reforms under discussion. An aspect of de-professionalization can be found in the reforms aiming at teacher professionalization. In the era of reforms and accountability, school teachers are regarded as key actors in educational reforms, and they and their professionalism are highly valued. At the same time, school teachers are treated as "targets" of the reforms and considered as "objects" to be developed. The subjectivity and autonomy of teachers in their own development does not receive due attention. Fujita and Dawson (2007, pp. 52–53) observed that current neo-liberal and market-oriented education reforms seemed to have had the effect of undermining the bases for teacher cooperation, thus discouraging teachers from taking initiative, and damaging their

sense of efficacy and confidence, thereby deteriorating the quality of teaching and schooling in Japan. Fujita and Dawson's observation is also true of China. If prospective and practicing teachers are to be educated to become professionals, they should be treated as such, with their subjectivity and autonomy highly respected in the process of teacher education. In this respect, China and Japan still have a long way to go.

TOWARD TWENTY-FIRST CENTURY PEDAGOGY IN FINLAND AND ELSEWHERE

The new national educational policy in Finland supports educational practices based on active learning. The main principles of the curriculum reform currently being implemented there support a school culture that lays stress on the autonomous control of learning. It encourages flexibility and develops interactiveness both within the school and between the school and the surrounding community. At the same time as this process is taking place in Finland, many countries are moving in the opposite direction in the educational principles and practices being adopted.

The Finnish curriculum reform favors active learning based pedagogy. Active learning implies that students are mentally and physically active. They guide their own learning, invent solutions to problems, define and interpret concepts as well as reflect on their interrelations. It is also important that students interact with their environment. Through active learning, students enhance their reflective thinking as well as their metacognitive knowledge and skills.

Active learning requires conditions that allow for immediate and meaningful experiences in genuine learning situations. Students create new knowledge by utilizing prior learning when they reflect on their experiences gained through concrete activities. Learning is active when the subject matter to be learned is expressed as problems and questions, for which students seek solutions guided by their inner motivation, either independently or in small groups. Of prime importance in the functioning of these small groups is the interplay between students as they participate in discussions and joint reflection. The opportunity to make choices at the various stages of the learning process is essential for the empowerment of students as a result of the activities. In the learning process, students evaluating how well they have attained their own targets is important. They should also be able to critically evaluate their information and the development of learning skills in their group (Nevalainen & Kimonen, 2016, p. 79).

In the future, schools in Finland and other countries might change and develop in diverse directions. Curriculum development continuously requires new data documenting successful models of action and practices in schools. Schools and their associate interest groups need qualitative and contextual information that can probably best be acquired from school-based case studies. The experiences of teachers and other participants during their careers as implementors of the new curriculum should also be utilized in the pre-service and in-service training of new teachers and

others, such as administrative and social personnel. One important objective of this training is to develop forms of education offering those involved an opportunity for constructing internal models of action (Kimonen & Nevalainen, 2005, pp. 627–630). Educators can connect different theories of learning and teaching to these models of action later to be utilized in their work. During the continuous formation of models of action, an essential role is played by the experiences gained in practical work as well as by critical deliberation on these experiences. The goal is to learn strategies that change school practices by means of transformative learning.

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