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Assessment for learning as support for student self-regulation

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Abstract Assessment for learning (AfL) is integral to teaching and learning, and has as its central foci (i) pedagogical intervention in the immediacy of student learning, and (ii) the students' agency in the learning and assessment process. The role that students adopt in AfL is consistent with the idea of self-regulated learning, which involves students as metacognitively, motivationally, and behaviorally active agents in their own learning. Through an analysis of an extended sequence of classroom interaction for the purpose of obtaining evidence of learning, this paper demonstrates that self-regulation is supported through a temporary process of co-regulation between teacher and student in the context of AfL. Co-regulation is a construct derived from Vygotsky's concept of socially mediated learning, and the neo-Vygotskian perspective on human learning as a culturally based communicative process, through which knowledge is shared and constructed. Specific features of co-regulation illustrated through the analyses presented in the paper are (i) goal orientation, a focus on the learning to be achieved; (ii) scaffolding, the assistance the teacher provides to achieve a goal that is currently beyond students' unassisted efforts; (iii) intersubjectivity, a shared understanding based on a common focus of attention; (iv) the active construction of knowledge by students, rather than transference of knowledge from the teacher to the student; and (v) temporary support, provided through scaffolding and other external supports that students can ultimately appropriate as their own.

Keywords Assessment for learning · Self-regulation · Co-regulation

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This paper has two aims. First, to identify key mechanisms that make possible the process of co-regulation in the context of assessment for learning (AfL). These key mechanisms, identified through analyses of a teacher's one-on-one interaction with a student, are (1) goal orientation; (2) scaffolding; (3) intersubjectivity; (4) active construction of knowledge; and (5) temporary support. The second aim is to argue that these mechanisms are appropriated as major components in students' academic self-regulated learning.

The paper first focuses on key attributes of AfL, and then considers the processes of self- and co-regulation. Next, is a description of the conceptual framework used in the analysis of the teacher–student interaction as an instance of AfL, which is followed by a presentation of the analysis. Finally, there is a discussion of some of the contextual factors through which co-regulation and the development of self-regulation skills are made possible.

Assessment for learning

The central focus of AfL is teachers' pedagogical intervention in the immediacy of student learning, and the development of students' agency in learning (Black and Wiliam 1998; Sadler 1989). The practice of AfL involves establishing clear learning goals and performance criteria (success criteria), eliciting and interpreting evidence of learning, taking immediate or near-immediate pedagogical action based on evidence, and promoting students' active involvement in the assessment process (e.g. Black et al. 2003; Heritage 2016).

Interaction between teacher and students has been characterised as a principal source of evidence in AfL (Black and Wiliam 2009; Torrance and Pryor 1998). Based on their interpretation of evidence elicited during their interactions with students, teachers make decisions about the pedagogical action they will take that is contingent on the students' current learning status, and is matched to the "edge" of students' learning (Heritage and Heritage 2013, p. 178).

Students take an agentive role in AfL, assessing their own learning with the intention of comparing their current learning status with the goal and assessment criteria as a means of making judgments about their goal attainment (Hattie and Timperley 2007; Nicol and Macfarlane-Dick 2006; Sadler 1989). Ultimately, a core objective of AfL is to guide students to the development of these 'learning to learn' skills so that they are able to continue learning for themselves beyond school (Organisation of Economic Development and Cooperation 2008).

Self-regulation and co-regulation

Self-regulation

The various conceptualisations of self-regulation in the literature share the common perspective that self-regulated learners proactively orient their behaviours to achieving goals by setting goals, developing plans to achieve goals, monitoring

progress toward goals, and, when necessary, adapting learning approaches to move closer to desired goals (e.g. Boekaerts and Cascallar 2006; Zimmerman 1989; Zimmerman and Schunk 2001). The active role that students play in AfL with respect to monitoring their progress toward goals and adapting their learning strategies when they deem it necessary is consistent with these characteristics of self-regulated learners.

Co-regulation

Co-regulation involves learners in receiving external support from others. It is consistent with the concept of socially mediated learning (Vygotsky 1962), and the perspective on human learning as a culturally based communicative process through which knowledge is shared and constructed (e.g. Mercer 2011; Wertsch 1991). In co-regulation, thinking is distributed between the individual who is providing regulatory support and the individual who is appropriating regulatory knowledge and skills. Through this process of appropriation, the co-regulation taking place progressively transfers to self-regulation (cf. Vauras et al. 2003) so that the self-regulatory processes that learners initially cannot undertake on their own gradually become part of their independent practice.

Co-regulation can be further characterised in terms of whether the co-regulation offered by a teacher leads to the successful transfer of regulation of the learning process to the student who is the target of their assistance (Rogat and Adams-Wiggins 2014). Co-regulation may be either facilitative in focus and in outcome (i.e. assists a student en route to independent learning) or more directive in nature (i.e. may lead to the completion of an immediate task but may be counter-productive for promoting student self-regulation) (Bailey and Heritage 2018). It is the facilitative aspect of co-regulation which lends support for the development of students' own self-regulation skills.

Conceptual framework

Figure 1 shows the conceptual framework used in the analysis of teacher–student interaction presented in this paper. AfL is the context in which the interaction takes place. During the interaction, as the teacher is eliciting evidence and responding to the status of student learning that is revealed, co-regulation in support of self-regulation occurs through the key mechanisms of (1) goal orientation; (2) scaffolding; (3) intersubjectivity; (4) active construction of knowledge; and (5) temporary support.

Goal orientation

In line with the goal perspective of self-regulation, a critical practice in AfL is for teachers to assist students in understanding what meeting their learning goal entails, as well as the performance criteria that will be used to assess their learning. It is only when students have a conception of the expected learning that they are able to

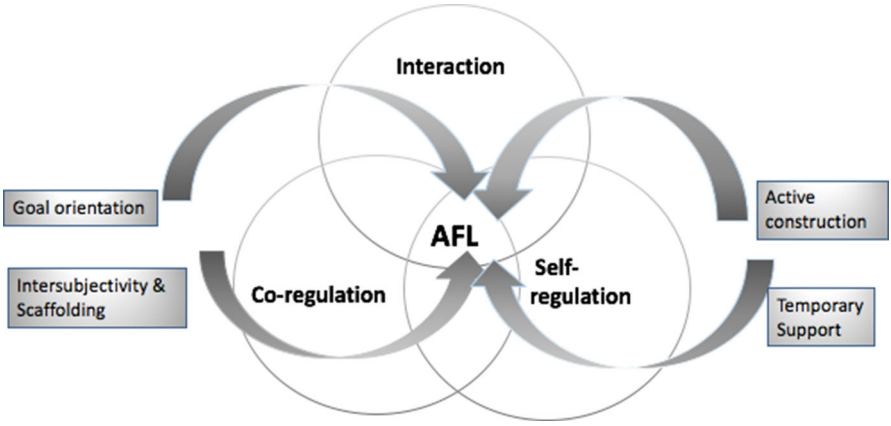

Fig. 1 Conceptual framework for analysis of teacher–student interaction

engage in self-monitoring and self-assessment. Indeed, Sadler (1989) argued that students' understanding of the goal being aimed for is an "indispensable" condition for both learning and for monitoring their own learning (p. 121).

Scaffolding

Scaffolding is a metaphoric concept rooted in Vygotsky's (1978) idea of the zone of proximal development. Various conceptualisations of scaffolding exist in the literature. Wood, Bruner, and Ross (1976) view scaffolding as a range of functions, including (1) enlisting the student's interest in, and adherence to, the requirements of the task; (2) accentuating certain features of the task that are relevant; and (3) keeping the student "in the field" to pursue the particular objective by making it worthwhile for him or her to risk the next step (p. 98). Greenfield (2000) argues that scaffolding keeps the task constant and simplifies the learner's role through the graduated support of the teacher. Tharp and Gallimore (1991) regard scaffolding as assisted performance, proposing three linguistic methods of assistance: instructing, questioning, and cognitive restructuring, which can ultimately be taken up by students as metacognitive strategies. Van de Pol et al. (2010) posit that scaffolding is contingent, based on immediate student responses, and involves the transference of responsibility from the teacher to student. Heritage and Heritage (2013) consider scaffolding as creating the conditions that enable a moment of recognition, realisation, or generalisation through which the learner makes a first move toward a new level of understanding.

Intersubjectivity

In the context of AfL, intersubjectivity is a key enabling mechanism for the implementation of scaffolding. It is created through two primary processes. First, the generation of a common focus of attention forms the ground for communication between teacher and student (Rogoff 1990). The creation and maintenance of

common ground is a core theme of work that analyses the organisation of gaze, participation frameworks, and gesture in a wide range of fields (Clark 1992, 1996; Goodwin 2017). The collective focus that arises from establishing and maintaining common ground is central in supporting co-regulation through goal orientation, scaffolding, active construction of knowledge, and temporary support.

Second, during the interaction, intersubjectivity is made possible through the ways each successive turn by the interactants builds upon the previous one, displaying an understanding of what was intended, and moving the sequence and its associated tasks forward. A crucial part of this process is the convergence by participants in a joint understanding of what has been said and why, and the joint recognition of that joint understanding (Schegloff 1992). It is through these processes that the interactions of the 'scaffolder' and the 'scaffoldee' can become conceptually and practically coordinated around specific tasks (Heritage 2016). Every contribution to interaction unavoidably contributes to the management of intersubjectivity, and, in this sense, constitutes a continuous substrate of all forms of classroom interaction (Maynard and Marlaire 1992). For this reason, the analysis of the AfL interaction in the next section concentrates less on the continuous substrate, but rather focuses on actions that have the management of intersubjectivity as their primary task.

Active construction of knowledge by students

Contemporary perspectives on learning (cognitive and sociocultural) emphasise learners' active construction of knowledge (e.g. Brown and Campione 1996; Dumont et al. 2010; Greeno 2006; National Research Council [NRC] 2000, 2012). In the cognitive perspective, individuals actively construct their understanding by connecting new knowledge to their existing knowledge. They modify their prior knowledge in order to accommodate the new knowledge, reconstructing existing cognitive structures in the process (NRC 2012).

The sociocultural perspective, while also emphasising active knowledge construction, highlights the collaborative nature of learning (NRC 2012). The work of Vygotsky (1962) is foundational to the sociocultural perspective, since he considered that knowledge appears first on the social level between people (interpsychological) and then internally at the individual level (intrapsychological).

Temporary support

Co-regulatory support provides temporary support for learning through scaffolding and other external supports, such as when teachers request information from students, restate or paraphrase students' statements, request judgments of learning, model thinking, and provide prompts for thinking and reflection. When students receive this kind of support during learning, there is the potential for them to appropriate these learning processes, regulating their own learning independently by choosing relevant information for themselves, and generating their own judgments of performance (Hadwin et al. 2011). Thus, co-regulation operates on the social

level as a temporary support, eventually transferring to an individual's self-regulation as an internal, independent process.

Instance of AfL as co-regulation

This classroom example is taken from a larger data collection conducted by the author for the purpose of analysing AfL in classroom practice (Heritage 2016). From this data corpus, a 1-h long video-taped lesson was selected from a first- and second-grade combination class (students aged six to eight). The school's student population comprises students from a wide range of socioeconomic, racial, and ethnic backgrounds, and includes a significant proportion of students who are learning English. The videotape was transcribed and examined for sequences of teacher–student interaction in one-on-one AfL conferences with the purpose of illuminating the mechanisms described in the conceptual framework. The particular interaction analysed below was selected because it clearly illustrates instances of co-regulation. While one-on-one interactions, termed 'conferences' by the teacher, are not the only formative opportunities in a lesson, they are a routine practice intended to elicit evidence about the status of student learning.

This lesson was a continuation of a sequence of lessons where the students had been learning about poetic devices. To this point, they had learned about "rhyme" and "repeated line", and in this lesson the teacher, Ms Ramirez, introduced "alliteration". The class read and discussed a poem that exemplified alliteration and how it contributes to the rhythm and meaning of the poem. Following the whole class session, the teacher reviewed the learning goal with the students, linking it to the introductory activities related to the goal. She had written on the whiteboard:

> Today, your learning goal as readers is to understand that poetic devices can be used to supply rhythm and meaning in a poem.

Next, she discussed the success criteria, indicators that she and the students would use to judge how well they were meeting or had met the goal:

> I can identify the poetic device used in the poem;
> I can explain how the poetic device supplies rhythm and meaning in the poem.

Finally, Ms Ramirez invited the students to choose a poem from their reader (a collection of poems selected by the teacher at an appropriate level for each student) and read independently with the goal and criteria in mind. Ms Ramirez routinely used the students' independent reading time as opportunities for her AfL conferences.

During the independent reading time, she joined Jason, a second-grader, who had selected a poem to read about a school bus. The author had used text presentation to signal the sound of the words related to the bus and its movement, for example, buMPY, **STOP, s l o w**.

After greeting Jason and letting him know she was going to sit with him, the following interaction ensued.

Ms. R Can you first tell me what is the poetic device you think the author is using? Is it something we've covered or maybe we haven't covered it yet? What do you think? [*Goal orientation*]

Jason We haven't covered it yet.

Ms. R We haven't covered it yet. So what did you notice? [*Intersubjectivity; temporary support; scaffolding*]

Jason Well I noticed that they had different-sized letters, like capitalised and lower case. Oh, and one more like in bumpy, and uhm, uhm, you also have spaces, big spaces [*Active construction*]

Ms. R Spaces here (pointing at the text) and what did we call this (pointing at the word **STOP**) … when all the words… all the letters…all the words…they look different [*Intersubjectivity; scaffolding*]

Jason Bold

Ms. R They're bold. Right. They are thicker. And what does that bold do for the word? [*Intersubjectivity; scaffolding*]

Jason (Inaudible)

Ms. R So the author wants you to focus on certain words. [*Temporary support]* So you think the bold face type is highlighting certain words. [*Temporary support; intersubjectivity]*

Jason Mmm…

Ms. R So what do you think this is doing? [*Scaffolding*]

Jason Well, maybe to describe uh… to describe…uh how the bus… how the uh…fast the bus. [*Active construction*].

Ms. R How about you read to me. Read me the poem. And read it with the effect you think the author is trying to…[*Scaffolding*] [Jason reads the poem with expression]

Ms. R So I noticed that you changed your voice with big and loud. And I noticed that you extended the 'o' sound in slow. Why did you do that? … [*Temporary support; scaffolding*]

Jason Well, because there's a lot of space between. [*Active construction*]

Ms. R So do you think the space…what is it that the poet wants the reader to do by putting the space? [*Temporary support; scaffolding*]

Jason Well, to make it like sound like it's slow…maybe… [*Active construction*]

Ms. R To make it sound like it's slow. So he wants you to use your voice to show the meaning of the word. Maybe? [*Intersubjectivity; temporary support; scaffolding*]

Jason Maybe

Ms. R So let's try that again. What does slow mean? [*Intersubjectivity; scaffolding*]

Jason Slow means…

Ms. R How would you read it? How would you read it if you know what slow means? [*Temporary support*; *scaffolding*]

Jason Not fast at all. [*Active construction*]
Ms. R Not fast at all. So let's read it again. Let's read the poem. [*Intersubjectivity; scaffolding*]
Jason Our bus is a big, bright, loud, bumpy, stop and start, fast and slow.
Ms. R Did you read that (pointing to slow) the way you think the author… you want to try it again? [*Temporary support*]
Jason Mmm…
[Jason reads the poem with increased expression and reads the word "slow" very slowly and deliberately]
Ms. R Oh and I noticed you changed your voice again at the end! Why did you change your voice then? [*Temporary support*]
Jason Cuz it has an exclamation mark. [*Active construction*]
Ms. R Because it has an exclamation mark. And what are exclamation marks for? [*Intersubjectivity; scaffolding*]
Jason To be dramatic. [*Active construction*]
Ms. R To make… to say the sentence with expression. I notice you like the word drama (Jason laughs). I notice you use it a lot. And definitely you chose the right poem to add some drama to your voice (Jason laughs). Because there is so much going on here with just the way the author chose to display the words. [*Scaffolding; temporary support*]
Jason Mmm. (Jason nods)
Ms. R So this is really important. But why do you think it's important for the author that you read it a certain way? [*Scaffolding*]
Jason Well… because it makes it sound better… and makes it … like… makes it sound better and makes it …um…makes it sound…makes it sound like what the poem is describing [*Active construction*]
Ms. R (Nodding). Makes it sound like what the poem is describing. And do you think maybe it makes you understand the poem a little better? What the message is? [*Intersubjectivity; temporary support*]
Jason Yeah. (Jason nods)
Ms. R So how do you think you are doing on your goal? On your road to meeting that goal (pointing to the displayed goal) today? How do you think you are doing? [*Goal orientation; scaffolding*]
Jason Yeah, good… yeah. (Jason nods). [*Goal orientation*]
Ms. R You think you are going to meet that goal of understanding that poetic devices supply rhythm and meaning? [*Goal orientation*]
Jason Yeah
Ms. R Alright, you're definitely on your road. So just make sure that in your explanation that you write down what you just told me right now. [*Goal orientation*]

Jason It's right here (showing his post-it). Maybe I'll stick another post-it. [*Goal orientation*] [What was written on the post-it note is not evident in the video].

Ms. R Yes, I think you might need to explain that a little bit further. [*Goal orientation*]
Thank you. It was nice reading with you today.

In the next section, I present an analysis of this interaction using the framework shown in Fig. 1.

Goal orientation

Ms. Ramirez first operationalises the lesson goal in relation to the text that Jason has selected, and then in terms of the affordances of the text with respect to rhythm and meaning. The precise pathways through which textual practices are linked to voicing rhythm and meaning are contingently constructed through (1) discussions of specific elements of typography; and (2) through Jason's reading aloud and discussions of his choices in voicing those readings. At the end of the sequence, Ms Ramirez refers to the lesson goal, and asks Jason for his assessment of his achievement of the goal. In this way, she scaffolds the connection of the specific parts of the conversation to the overall goal of the lesson, before ending with a validation of Jason's judgment and a direction to write down what he has told her (*So just make sure that in your explanation that you write down what you just told me right now*).

Intersubjectivity and scaffolding

Intersubjectivity is managed in this interaction through a wide variety of social practices. For example, the video shows that (1) the parties establish a joint attentional focus on the printed poem (Goodwin 2000), which thus becomes the default domain for reference to individual words and their typographic representation. This process of joint ostensive reference is the putative common ground (Enfield 2006) for the remainder of the interaction; (2) Ms Ramirez recurrently repeats Jason's remarks, indexing by this practice that she has registered, understood, and accepted Jason's preceding observation; (3) in some cases, these acknowledgements are associated with turns in which Ms Ramirez expands on Jason's observation with remarks of her own, and, more frequently, follow-up questions (e.g. *And what does that bold do for the word? And what are exclamation marks for*?); and (4) in the moments where Jason struggles with meta-linguistic terms to characterise the poetic effects of the poem's typography, Ms Ramirez invites him to express his understanding through reading the poem aloud, in each case commenting on his reading in ways designed to pin down the relationship between the typography and the poetic effects. This list of characteristics, which could readily be expanded upon, points to the multiplicity of practices through which intersubjectivity is the object of nearly ceaseless processes of active management.

The scaffolding that occurs in the interaction begins when focusing their joint attention on the text, Ms Ramirez asks about bolded text in the word "**STOP**", and again in the section on the word "s l o w" where she scaffolds Jason's move from silently reading the text to vocal production, asking him to read the poem "*with the effect you think the author is trying to [convey]?*" After his first try at reading the poem, Ms Ramirez engages him in further scaffolding around the word "slow", then asks Jason to read the text again, which he does with increased expression. After completing the reading, Ms Ramirez notes that Jason changed his voice again at the end and asks him why, to which he replies "*Cuz it has an exclamation mark*". After discussing the dramatic element in Jason's voicing associated with the exclamation mark, Ms Ramirez ties his reading with expression to the fact that there is so much going on because of the choices the author made in how to display the text. Finally, she provides scaffolding to encourage Jason to figure out links between the author's practices of word display on the one hand and the poem's meaning on the other.

Active construction of knowledge

In this entire sequence, other than when Ms Ramirez centres the interaction on the discussion of the word "**BOLD**", there is little direct transfer of information from the teacher to the student. Ms Ramirez manages the interaction so as to permit Jason's opinions to drive the sequence, for the most part, repeating or recasting what he says in ways that acknowledge and accept the assertions he is making (e.g. *Makes it sound like what the poem is describing*). In response to her question about the word "slow", Jason struggles to articulate his thinking (*Well, maybe to describe uh… to describe…uh how the bus… how the uh…fast the bus…*). This occurs again when Ms Ramirez asks him why it is important for the author that he reads in it a certain way (*Well… because it makes it sound better… and makes it like… makes it sound better and makes it…um…makes it sound…*). She provides him with space, and lets him stumble, with the result that he ultimately arrives at a sophisticated point about the author's intent (*makes it sound like what the poem is describing*). In the management of this exchange, Ms Ramirez has created a context in which Jason's thinking has undergone expansion through his own efforts and reached a greater degree of precision. With Jason's observation that the typography helps to make the words sound "*like what the poem is describing*", Jason arguably has reached the central understanding that is the goal of the lesson, and he has, moreover, done it under his own steam and in his own words.

Temporary support

Some aspects of Ms Ramirez's scaffolding that offer support to Jason's thinking are clearly local and temporary in character. For example, she builds on a comment from Jason about the extension of the word "slow"—"*to make it sound like it's slow… maybe*"—with the generalisation "*so he wants you to use your voice to show you the meaning of the word. Maybe*?" Although offered tentatively, Ms Ramirez clearly wishes to nudge Jason towards more inclusive generalised thinking about the

relationship between typography, sound, and meaning. In a related practice, Ms Ramirez's request that Jason read the poem aloud, furnishes him with opportunities to recognise in his own responses to the text what the various typographic practices are designed to achieve—a signature feature of self-regulation. At the same time, his reading aloud provides Ms Ramirez with a range of opportunities to consolidate Jason's text-to-voicing linkages as explicit objects of comment further extending the scope of his self-regulatory repertoire in this domain.

Discussion

In the analysed AfL interaction, the teacher and her student are participants in a process of co-regulation. During the AfL conference, the teacher provides a multiplicity of external supports for the student that have the potential for appropriation by the student as metacognitive strategies in the development of his self-regulation skills. While transfer to the student's own internal regulatory repertoire is unlikely to be immediate, the prospect for the eventual uptake of the mental processes that the student has engaged in is made much more likely by the sustained nature of these interactional practices during AfL opportunities.

The social ecology of the classroom can either inhibit or enable co-regulated learning (cf. Erickson 2007). The social relations evidenced in the interaction examined reflect a partnership between teacher and student, where student agency in the learning and assessment process is both acknowledged and supported by the teacher. At no time in the AfL interaction does the teacher tell the student he is right or wrong. Instead, the management of regulation moves back and forth between teacher and student because each participant invites the other to recognise their thinking in the context of a specific task.

During the AfL interaction, the student is consistently invited to make his own judgments about his learning in support of metacognitive capabilities. The teacher's questions and restatements prompt the student to do his own thinking. Through the joint responsibility instantiated in the interaction, the student maintains focus and attention on the task at hand, and the agentive stance of the student is upheld throughout.

Bandura (1997) noted that "a fundamental goal of education is to equip the students with the self-regulatory capabilities that enable them to educate themselves" (p. 147). This observation represents the ultimate aspiration of AfL: students will develop the knowledge, skills, and internal capacities to be successful academically in school, and to continue future learning for themselves. That an eight-year old child is learning to be self-regulated in an AfL context is a source of optimism for what AfL, when oriented to students as agentive partners in learning with their teachers, can accomplish.

Conclusion

This paper has focused on how co-regulation occurs through a process of joint regulatory ownership toward the ultimate goal of students acquiring their own self-regulatory skills in learning. The analysis of teacher–student interaction presented here provides evidence from direct classroom practice of the presence of five mechanisms in sequences of AfL that make co-regulation possible. While the evidence presented of co-regulation in AfL is certainly preliminary, nonetheless, it adds to the exploration of co-regulation in AfL as a major component in the development of students' academic self-regulated learning. Through co-regulation evidenced in the context of AfL, temporary support is provided *en route* to students gradually acquiring independent self-regulatory learning processes. No doubt, additional analyses of co-regulation are needed to illuminate the development and consolidation of these processes further as they occur in teacher–student interactions for the purpose of AfL. Research on the interaction taking place between teachers and students in a variety of contexts will add to conceptualisations of co-regulation in support of self-regulated learning.

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