METACOGNITION IN THE COMMON CORE STATE STANDARDS

Underlying (Yet Neglected) Focus?

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This paper investigates the potential role metacognition (Flavell, 1979; Griffith & Ruan, 2005) may play in helping students meet the increased cognitive demands required by the Common Core State Standards (CCSS) (Porter, McMaken, Hwang, & Yang, 2011). The CCSS and all official accompanying documents were analyzed looking for themes of metacognition. Specific strategies/approaches for incorporating metacognition in the classroom based on TESOL and educational research that may help students with the CCSS demands are presented. While all primary and secondary students would likely benefit from increased metacognition, this project focuses primarily on helping multilingual students and English language learners (ELLs) become stronger students via an emphasis on explicit metacognitive strategies.

Keywords: CCSS, English language learners, learning strategies, metacognition

Much has been made of the increased cognitive demands being placed on students by the Common Core State Standards (CCSS). The CCSS have been shown to vary quite widely from many of the previous state standards, and to require of curricula an increased emphasis on analysis and other cognitively demanding tasks when compared with previous iterations of state standards (Porter, McMaken, Hwang, & Yang, 2011).

However, while the CCSS do advocate higher-order thinking, little has been done to measure the role of metacognition in the Standards, an established and important component of learning (see, e.g., Anderson, 2002; Marzano, 2000). Metacognition has been defined as "knowledge and cognition about cognitive phenomena" (Flavell, 1979, p. 906) and an "awareness and judgment of an event" (Griffith & Ruan, 2005, p. 4), especially regarding thinking about oneself or one's actions in an introspective manner. As one of eight frameworks of mind promoted by the National Council of Teachers of English in its *Framework for Success in Postsecondary Writing* (2011), metacognition is important for students to develop, and teachers should help students to

- examine processes they use to think and write in a variety of disciplines and contexts;
- reflect on the texts they have produced in a variety of contexts;
- connect choices they have made in texts to audiences and purposes for which texts are intended; and
- use what they learn from reflections on one writing project to improve writing on subsequent projects. (p. 5).

Via metacognition, students can become more effective learners. While the CCSS suggest students need to master advanced cognitive skills, the Standards themselves do not adequately discuss the role of

metacognition in building those skills. Because of both the increased cognitive demands of the CCSS and the lack of specificity regarding metacognition, the Standards might especially disadvantage English language learners (ELL), who enter today's classrooms with different resources and levels of language socialization (Baquedano-López & Kattan, 2008) in ever increasing numbers in New York State, as in much of the rest of the country (Lucas, Villegas, & Freedson-Gonzalez, 2008). This paper aims to unpack the role of metacognition in the CCSS-focused classroom, particularly regarding ELLs, and provide suggestions for metacognitive strategies or activities that may better support our diverse student populations.

Theoretical Metacognition in the Classroom

Although often neglected in favor of more visible foci, metacognition may play an important role in helping learners meet the demands of the CCSS—specifically, students who are more metacognitive than others may be more effective learners (Anderson, 2002). Metacognition is important for teachers to understand, as it helps learners think more concretely about often abstract learning approaches or strategies, common in the CCSS, and understand which strategies would be the most effective. In this way, metacognition is linked to the "beliefs one has about oneself and the world in general," as it helps illustrate the "contextual frame" (Marzano, 2000, p. 256) one may have about a particular object, be it a tangible item, a person, or even something abstract. This contextual frame contains three components: the object itself, a value judgment of the object, and a judgment about the person's ability to control the object (Marzano, 2000). For example, a student's contextual frame regarding a math class could consist of the class itself, a value judgment that math is difficult, and her belief that she won't ever learn math. Such a concept of a contextual frame is important, as it could tie directly into accessing the motivation that a student may feel toward mastering a particular task or subject. If students believe that a particular subject such as math is impossible for them to master, it becomes that much more difficult for teachers to help them learn, regardless of actual ability. Accordingly, encouraging students to first identify their contextual frames, and then helping them negotiate appropriate changes, may be a very helpful metacognitive exercise in reducing that kind of intellectual baggage.

Classroom assessment may also benefit from an increased emphasis on metacognition, due to the increasing influence of cognitive psychology on such pedagogical practices (Collins Block, 2005; Marzano, 2000). Any time someone engages with a specific task, that person also engages "[t]he self-system, metacognitive system, and cognitive system" in order to properly accomplish that task (Marzano, 2000, p. 242). Within the classroom, instructors may use various methods to assess students' skills at applying metacognition strategies to various types of tasks. Specifically, journals have been widely used, primarily in English and language arts classes (Atwell, 1987; Calkins, 1986). In one study on journals used to emphasize and report on goals within the classroom, teachers noted that their students naturally gravitated toward employing metacognitive strategies to analyze the types of goals and the effectiveness of their approaches to accomplishing those goals (Hansen, 1994). Hansen held that emphasizing metacognition is one of most advanced forms of learning, and that journals may be a very effective method of accomplishing this aim. Rubrics may also be effective at helping students evaluate their goals (for an example of such a rubric, see Marzano, Pickering, & McTighe, 1993).

In regard to specific content areas, metacognition has been shown to increase the learning in mathematics classes (Carr, 2010), science classes (Kuhn & Pease, 2010; Siegler & Lin, 2010), reading (Donndelinger, 2005), and writing (Joseph, 2005). However, while most education researchers and practitioners appear to agree that metacognition is important for teachers to consider as they teach in the classroom, the accuracy of self-reported metacognitive thinking can be suspect, or even detrimental, when a student's value judgment of himself or herself exceeds what is realistic (Dunlosky & Tauber, 2013). As an example of this phenomenon, if a student feels overly confident about his or her abilities to successfully take a timed writing test, that student may not properly prepare for the test, and thus would miss out on an opportunity to learn.

Despite some shortcomings of research in identifying what is happening in our students' minds, metacognition may in fact be the ultimate manner in which teachers can foster a sense of "learner-centeredness" in their classrooms, which then may help students become more aware of themselves as agents. This "self as agent" may help support the students' "experience of being" and thus help "consciously or unconsciously define who [they] are, what [they] think, and what [they] do" (McCombs & Marzano, 1990, p. 66). By developing such a learner-centered focus in the classroom, teachers can help "offset or ameliorate underlying problems of alienation, fear of failure, and perceived lack of personal relevance" that students all too often may feel and that also may contribute to a devaluation of education in general (McCombs, 2000, p. 379). Because of the established role it can play in developing competent students in various contexts and contents, metacognition should be a focus in the CCSS-centered classroom.

Metacognition and Bilingual Students

In addition to the general role of metacognition in the classroom, much research has shown that language learners who are successful at acquiring their languages tend to be more metacognitive in nature. As a result, students should be taught to think metacognitively of language-learning strategies to better use these important tools. Specifically, "[T]eachers can help students evaluate their strategy use by asking them to respond thoughtfully to the following questions: (a) What am I trying to accomplish? (b) What strategies am I using? (c) How well am I using them? (d) What else could I do?" (Anderson, 2002, p. 4). Metacognition has been emphasized in language pedagogy in recent years, in the attempt to help students take more control of their language learning abilities. For example, listening tends to be one of the more passive of skill areas, but including metacognition skills in explicit listening instruction has been shown to improve listening abilities, as students gain strategies that help them prioritize their time and efforts (Vandergrift & Goh, 2012). Reading as well can benefit from metacognition, as readers who are strategic are more effective (Grabe & Stoller, 2002). Via metacognition, multilingual students can determine which learning strategies are best for them.

Multilingual students studying in primary or secondary schools in the United States—the ELLs in CCSS classrooms today—likely have not been exposed to the same background resources that many traditional students have. This lack of mainstream language socialization (Baquedano-López & Kattan, 2008) in these multilingual students' lives may result in issues of mismatch once students arrive in schools where the standard socialization is expected and is the norm. For example, language students may be struggling to understand the culture of respectful participation in American primary and secondary schools assumed to be internalized by students early on. This expected socialization can be difficult for students of different backgrounds—for example, regarding argument and critique (heavily emphasized in the CCSS), which may or may not align with those of the target culture—and such students often struggle not only with the target language, but also with finding their own role in the target culture and reconciling their own backgrounds in the new context (Bunch, Kibler, & Pimentel, 2012). In order to help multilingual students better match these expected norms, metacognition may be effective, as these students would benefit from thinking metacognitively about what the norms are for them both inside and outside of school. They then may be more able to adjust their roles in a socially acceptable manner.

My previous research has shown a clear link between metacognition and language acquisition, as evidenced by instances of metacognition seen in language-learning journals written by Arabic-as-a-second-language learners studying abroad for a semester in the Middle East (Kurzer, Dewey, & Belnap, 2011). This study compared the journals of the four students who had the highest language gains as reflected by ACTFL Oral Proficiency Interview (OPI) increases with those of the three students who had the lowest OPI increases. While other investigated markers (e.g., goal planning, journal length, reported time spent communicating with native speakers) were not correlated with successful language acquisition, the

instances of metacognition reported in the student journals were correlated positively with language acquisition, despite a small sample size.

Specific Metacognitive Approaches

Various metacognitive approaches have been researched and proposed as effective classroom pedagogies for various content areas and/or skill levels. This section identifies and discusses metacognitive approaches that may help promote the "higher order thinking" of the CCSS. Some of these approaches are specific activities, while others could be considered frameworks within which to build a series of activities to promote metacognition among students. These approaches are largely appropriate for native and non-native English speaking students alike, with some elucidation for multilingual students supplied when relevant. In addition to the suggestions offered here, Tables 1, 2, and 3 in the following section connects these approaches with specific and relevant CCSS.

Declarative metacognitive knowledge refers to the ability of students to use metacognitive vocabulary to describe their thought processes and/or evaluations of a process or object. This vocabulary or awareness of the linguistic features required is a necessary foundation for students to construct in order to develop metacognitive awareness and skills. Specifically, instructors "can support the emergence of declarative metacognitive knowledge by explicitly discussing what influences memory and learning. . . . the different types of strategies . . . [and] what it means to reflect on one's knowledge state and to monitor problem solving" (Carr, 2010, p. 189). Such discussion may serve as an introduction to the concept of metacognition, to which many students may not have had previous exposure; in particular, this may benefit multilingual students, who may not have had explicit instruction on the terms required to discuss metacognition. This foundational approach to metacognition is a critical first step to help students develop the metacognitive abilities that would in turn help them master many of the CCSS.

Procedural metacognitive knowledge consists of the ability to monitor oneself during a particular task, such as planning, setting goals, and pausing to rethink and strategize. Students often need explicit instruction on how this may be done (Carr, 2010). Once acquired, this skill is readily transferable between content areas, and should be stressed in each, along with direct instruction on how to work through a particular task for that content area. This is particularly important when teaching writing, whether to English natives or bilingual students.

Self-explanations promote learner-generated connections between two or more objects (Carr, 2010; Siegler & Lin, 2010). They are used to help students determine why and how something happens, encouraging thought beyond just what happens. This metacognitive strategy may effectively be used in mathematics and science classes, where "teachers frequently lament the fact that their students know how to execute procedures but have no idea why the procedures work" (Siegler & Lin, 2010, p. 89). Self-explanations have been shown to increase learning for both high and low scorers on standardized achievement tests (Chi, De Leeuw, Chiu, & LaVancher, 1994), suggesting that they may be used in a wide range of classes with students of various capabilities.

Sorting tasks are most effectively used to encourage deeper thought and learning when accompanied by a metacognitive component that asks students to explain why they sorted objects (which may be anything from examples of literature, to various types of birds, to example essays) in the way they did (Waters & Waters, 2010). This activity helps students identify the constantly changing nature of many forms of classification, which in turn may help them develop a deeper knowledge of the objects being sorted and increased self-awareness than they would otherwise achieve (Waters & Waters, 2010).

Self-monitoring skills can be implemented using a wide variety of classroom activities. This metacognitive addition requires that students spend some time reflecting not only on what they did, but also on why and how they did it (Waters & Waters, 2010). Various types of journals or partner work can encourage self-monitoring.

Strategy development consists of a broad approach to developing a culture of metacognition in a classroom. In learning, strategy development "involves much more than learning to execute a strategy"; instead, it involves helping students inhibit the lower level, habitual mode of response, and encouraging the higher level, initially feebler attempts at developing a "mode of response" (Kuhn & Pease, 2010, p. 136). Students should be explicitly taught how to evaluate various strategies, and not just react to the instruction to do such a strategy with little or no higher thinking. For this, metacognition is critical in order to properly select strategies that are effective for an individual (Kuhn & Pease, 2010), as students need to think reflectively to determine what is effective for them as individuals. A good example of this would be the inclusion of graphic organizers. Graphic organizers are often used in classrooms as a supposedly effective way of encouraging students to develop the strategies emphasized on the document, but are rarely used in such a way that supports a metacognitive evaluation of their effectiveness for the learner. Teachers also often don't explicitly instruct students on how they can apply the principles of the graphic organizer to other assignments or exercises. This limits the organizers' effectiveness, turning them into little more than a worksheet.

Self-directed scientific inquiry exercises ask participants to examine various primary resources of a particular database (the teacher may either compile various journal articles or provide access to an established database) and focus on the conclusions of the articles, to determine if the judgments are valid or invalid. Invalid judgments are then further analyzed to determine the circumstances in which they could be considered to be invalid and valid (Kuhn & Pease, 2010; Zimmerman, 2007). In addition to exposing students to a wide range of research-based articles (which would help with various research-based CCSS), this exercise could then contain a metacognition component, in which students are asked why they evaluated a particular article as they did; in a further metacognitive approach, students could draw on various inference strategies (or self-explanation strategies, as discussed above) to identify the relationship between the article and their response, thus digging much more deeply into the article and identifying the rationale for their evaluation than they would otherwise be likely to do (Kuhn & Pease, 2010). Students then can evaluate their own judgments to determine what they respond to as a reader.

Approaches that focus on patterns of change over time help students recognize alterations or patterns in their behavior across extended periods, which then can help them identify behaviors that should be modified in order for them to be more effective (Kuhn & Pease, 2010). This tracking could be done in a series of activities that last a few school periods, or throughout an entire semester or academic year. An example of a patterns-of-change-over-time activity designed to help second language (L2) writers understand what grammatical or linguistic issues they personally struggle with is the principle of dynamic written corrective feedback, or DWCF (Hartshorn et al., 2010). Following the DWCF process, students write short paragraphs. The teacher then marks the grammatical issues in the paragraphs using explicit codes that have been taught to the students. The paragraphs are returned to the students, who then record their errors on a grammar log. Next, they revise the paragraphs, and turn them back in to the teacher. This pattern is repeated until the paragraphs reach a certain level of accuracy. Students write additional paragraphs, and the process repeats across a term. By encouraging students to record their errors, they can identify patterns of error, which helps ensure that students can focus their efforts on those issues of highest concern. DWCF has been shown to be effective in both pre-matriculation and matriculation settings (Evans, Hartshorn, & Strong-Krause, 2011; Hartshorn et al., 2010). This specific strategy would help bilingual writers with many of the Language Standards, and the general patterns-of-change-over-time metacognitive strategy would be very helpful in helping students, especially language learners, formulate and meet long-term goals.

Co-construction of knowledge approaches help foster a sense of mutual collaboration in mathematics classrooms, which supports students in developing a solid comprehension of the learned mathematics principles (Leinhardt & Steele, 2005); in addition, these approaches help promote "more complex thinking during discussions, and [they] improve mathematics achievement in populations that typically do poorly,"

such as those from low-income families or those with learning disabilities (Carr, 2010, p. 184). This concept of co-construction of knowledge would be highly valuable for helping these students (and other students, such as bilingual students) participate in classroom discussions. Research has shown that bilingual students, regardless of language level, "can participate in discussions where they grapple with important mathematical content," promoting deeper learning (Moschkovich, 2012, p. 2).

Metacognition as Currently Seen in the Common Core State Standards

This section discusses the theme of metacognition in the Common Core State Standards (CCSS) and their accompanying documentation. It first identifies explicit references of metacognition and—due to a dearth of such explicit references—cognition, before investigating individual Standards for aims that would be strengthened by metacognitive thinking.

Despite the increased emphasis on higher cognitive demands central to the CCSS, the term *metacognitive* or its forms appears only once in any of the documentation central to the Standards. This lone instance is found in the Key Design Considerations section of the introduction to the ELA Standards:

By emphasizing required achievements, the Standards leave room for teachers, curriculum developers, and states to determine how those goals should be reached and what additional topics should be addressed. Thus, the Standards do not mandate such things as a particular writing process or the full range of *metacognitive* strategies that students may need to monitor and direct their thinking and learning. Teachers are thus free to provide students with whatever tools and knowledge their professional judgment and experience identify as most helpful for meeting the goals set out in the Standards. (ELA Common Core State Standards, p. 4; emphasis added)

Although the term *metacognitive* is included in this paragraph taken from the ELA Standards' introduction, little information is provided to suggest that the authors of the Standards had a specific metacognitive framework in mind when drafting them. Instead, the Standards dictate "required achievements" but leave the method by which the teachers support their students up to the district or teacher. Elucidating such "full range of metacognitive strategies" could be very helpful in supporting teachers. Though this section later serves to give some needed guidance, the metacognitive strategies are not presented in any comprehensive sense.

For all its role as such a supposed focus of the CCSS, however, the term *cognition* or its forms appears once in the application for ELLs document, thrice in ELA Appendix A, and nowhere in either the mathematics or ELA Standards themselves. The application for the ELLs document contains the following paragraph:

ELLs, like English-speaking students, require regular access to teaching practices that are most effective for improving student achievement. Mathematical tasks should be kept at high cognitive demand; teachers and students should attend explicitly to concepts; and students should wrestle with important mathematics. (Application of Common Core State Standards for English Language. Learners, p. 2)

This paragraph reinforces the theme that cognitive demands should remain high for bilingual students, meaning that teachers should not strip content down to make the language more accessible for these populations (Wong Fillmore & Fillmore, 2012).

Perhaps the most interesting instance of *cognition* from the ELA CCSS Appendix A is the following:

The reader brings to the act of reading his or her cognitive capabilities (attention, memory, critical analytic ability, inferencing, visualization); motivation (a purpose for reading, interest in the content, self-efficacy as a reader); knowledge (vocabulary and topic knowledge, linguistic and discourse knowledge, knowledge of comprehension strategies); and experiences. (p. 7)

What may be significant for the purposes of this paper is not so much that this paragraph lists critical cognitive skills for students to develop, but that the students' abilities to properly master these cognitive skills would likely be more effectively done using clear metacognitive approaches. This paragraph also links cognition with motivation, which, again, has clear ties to metacognition, as students' motivation for learning should be explicitly addressed in class, with the students encouraged to think introspectively about their own motivations. And, as students think explicitly about their motivation for learning, they can be taught to alter these motivations when appropriate, which would be a strong metacognitive application related to the objects seen in the Standards. Students would also benefit from a metacognitive approach to analyzing their self-efficacy as readers, which would likely have a stronger positive impact on their reading abilities than just collecting self-efficacy information for the sake of the teacher, as this paragraph from the ELA CCSS Appendix A would seem to suggest.

In a different instance of *cognition* in the section on text complexity in reading passages from this same appendix, the authors of the Standards posit the following:

> Surprisingly, what chiefly distinguished the performance of those students who had earned the benchmark score or better from those who had not [from a previously cited ACT study] was not their relative ability in making inferences while reading or answering questions related to particular cognitive processes, such as determining main ideas or determining the meaning of words and phrases in context. Instead, the clearest differentiator was students' ability to answer questions associated with complex texts. (p. 2)

In this paragraph, the authors likely didn't intend to minimize the role of cognition in reading, but to support their position emphasizing the importance of increasing text complexity to better prepare K–12 students for the reading demands of higher education (Williamson, Fitzgerald, & Stenner, 2013). Such focus, however, neglects an opportunity to teach reading strategies from a metacognitive perspective that would benefit the students throughout K–12 and into university; instead, it suggests that students should be explicitly taught how to respond to more complex texts, determining which approaches are best for them and in varying circumstances, and not just be exposed to increasingly complex texts, assuming that exposure equates mastery. In addition, as "the language used in complex texts of the type students should be reading in school is different in numerous ways from the language of ordinary talk" (Wong Fillmore & Fillmore, 2012, p. 1), students, particularly multilingual students who may not have had much previous exposure to these types of text, need clear, explicit instruction on how to properly navigate these readings. Mastery of explicitly taught metacognitive strategies can help them better focus their efforts when reading.

The following subsections consider metacognition and specific content Standards in the Common Core, organized by skill area. In text and tables, specific Standards follow the CCSS format ContentArea.GradeLevel.StandardNumber (6th-Grade Writing Standard 7, for example, would appear as W.6.7).

Writing
The ELA Standards on writing include very little on specific metacognitive strategies. Several such Standards, however, would benefit from a teacher's emphasis on metacognition in his or her classroom approach. See Table 1 for specific Writing Standards (W), with cognitive tasks that could be strengthened via a metacognitive approach.

Table 1

Writing Standards (W), Cognitive/Metacognitive Skills, and Possible Metacognitive Classroom Strategies or Activities

Standard	Specific "cognition" language	Implied cognitive/metacognitive skill(s)	Possible classroom strategies or activities
W.6.7, p. 44	Conduct research projects, "refocusing the inquiry when appropriate"	Think through own research processes; determine when and how to make adjustments	Teach procedural metacognitive knowledge (Carr, 2010); self-explanations (Siegler & Lin, 2010); self-directed scientific inquiry (Zimmerman, 2007)
W.7.5, p. 43	"Focus on how well audience and purpose have been addressed"	Think as various audiences would	Self-explanations (Siegler & Lin, 2010); sorting tasks (Waters & Waters, 2010); self-directed scientific inquiry (Zimmerman, 2007)
W.7	Reflect generally	Think about their abilities and strategy use as a student	Self-monitoring (Waters & Waters, 2010); explicit strategy instruction and evaluation (Kuhn & Pease, 2010)
W.9-10.1.B, p. 45	"Anticipate the audience's knowledge level and concerns"	Think about the aims of genres; reflect how one responds to different genres	Write-to-learn activities; reflection/dialogue journals
W.11-12.1.B, p. 45	Anticipate the audience's "values and possible biases"	Reflect on one's own values and biases; think about what effects they may have	Self-monitoring (Waters & Waters, 2010); write-to-learn activities; reflection or dialogue journals
W.11-12.10, p. 47	Show a "range of writing" and adapt purposes in writing to specific audiences	Explain distinctions between how students can/should write for different audiences	Metacognitive approaches to genre-specific writing

The Standards included in Table 1 are not the only Writing Standards that would be more feasibly accomplished via a metacognitive framework, but they are the most salient. Students would be more able to match virtually all Writing Standards should they be metacognitive.

Reading

In reading, metacognition plays a slightly more obvious role in the CCSS. According to the introduction to the Standards, "students must read widely and deeply from among a broad range of high-quality, increasingly challenging literary and informational texts" (ELA Common Core State Standards, p. 10). Reading is obviously a central focus of the Reading Standards; students would be more apt to achieve this aim if they have thought metacognitively about the various methods they use when reading different genres. See Table 2 for specific Literacy Reading Standards (RL) and Informational Reading Standards (RI) with cognitive tasks that could be strengthened via a metacognitive approach.

Table 2

Reading Standards (RL/RI), Cognitive/Metacognitive Skills, and Possible Metacognitive Classroom Strategies or Activities

Standard (Name/#)	Specific "cognition" language	Implied cognitive/metacognitive skill(s)	Possible classroom strategies or activities
R.Intro, p. 10	"Read widely and deeply from among a broad range of high-quality, increasingly challenging literary and informational texts"	Think through own reading processes; determine when and how to make adjustments	Explicit strategy instruction and evaluation (Kuhn & Pease, 2010)
R.Intro, p. 10	Read widely from different disciplines	Think through how to vary reading approach based on discipline	Explicit strategy (i.e., scanning and skimming), instruction, and evaluation (Grabe & Stoller, 2002)
RI.3.6, p. 14, and RL.3.6, p. 12	"Distinguish their own point of view from that of the narrator or those of the class"	Think about own perspectives, and identify ways they are different from or similar to others' opinions	Write/discuss own perspectives; compare with partners' perspectives
RI.4.8, p. 14	"Explain how an author uses reasons and evidence to support particular points in a text"	Think about how evidence convinces students personally and how they respond to various arguments	Practice analyzing reason and evidence as used in various texts (Anderson, 2002); sorting tasks (Waters & Waters, 2010)
RI.K.4, p. 16	"Read emergent-reader texts with purpose and understanding"	Identify and alter purpose when entering a text	Explicitly teach declarative and procedural metacognitive knowledge (Carr, 2010); practice purposeful reading
RL.6-12.4, p. 35	"Determine the meaning of words and phrases as they are used in a text"	Identify/predict meaning from context	Explicit reading/vocabulary instruction (Grabe & Stoller, 2002)
RL.6-12.6, p. 35	"Assess how point of view or purpose shapes the content or style" of a literary work	Think about and analyze own point of view and purpose when writing	Write/discuss own point of view; compare with partners'; co-construction of knowledge (Leinhardt & Steele, 2005)

The Standards included in Table 2 are not the only Reading Standards that would be more feasibly accomplished via a metacognitive framework, although the Reading Standards are much more closely connected to metacognition than are the Writing Standards. For example, RL.3.6 (p. 12) calls for students to look at their own point of view, a task that plainly requires metacognition. It is interesting to note, however, that, while these third-grade students should be looking at their own reading from a metacognitive perspective, this aim is lost by the fourth grade, when students then should be contrasting between first- and third-person usage in narratives (RL.3.6).

In an equally clear call for metacognition, kindergarteners are expected to read with "purpose" (RI.K.4, p. 16), which is a rather abstract concept to begin with. To achieve the higher order thinking that this Standard is aiming for (at the young age of kindergarten, at that), teachers will need to help students understand what their purpose in reading is, and what it might be to be most effective. This reading Standard of reading with purpose continues throughout the grade levels, one of the stronger trends within the CCSS that is quite clearly connected to metacognition.

Mathematics

The Mathematics Standards contain very little in the way of standards that explicitly require the use of metacognitive thinking or strategies. The cognitive demands placed on students by the Mathematics Standards are touched on, however, primarily in the Introduction, as the authors discuss what it means to truly understand mathematics. See Table 3 for specific Mathematics Standards (MATH) with cognitive tasks that could be strengthened via a metacognitive approach.

Table 3

Mathematics Standards (MATH), Cognitive/Metacognitive Skills, and Possible Metacognitive Classroom Strategies or Activities

Standard (Name/#)	Specific "cognition" language	Implied cognitive/metacognitive skill(s)	Possible classroom strategies or activities
MATH.Intro, p. 4	Justify "why a particular mathematical statement is true or [explain] where a mathematical rule comes from"	Consider own mathematics abilities; think about interaction with mathematics rules	Present/practice various methods of approaching questions; patterns of change over time (Kuhn & Pease, 2010)
MATH.Intro, p. 8	Engage with mathematics in increasingly complex formulations as students progress through the grades	Consider own mathematics abilities	Present/practice strategies (Kuhn & Pease, 2010)
MATH. PRACTICE.MP.2	"Reason abstractly and quantitatively"	Think about how to conceptualize abstract terms	Present/practice discussing abstract terms; co-construction of knowledge (Leinhardt & Steele, 2005)
MATH. PRACTICE.MP.6	"Attend to precision"	Think about own precision on increasingly challenging problem sets; identify trouble areas	Self-explanations (Siegler & Lin, 2010); long-term strategies and time-management instruction

The Standards included in Table 3 are not the only Mathematics Standards that would be more feasibly accomplished via a metacognitive framework. Specifically, each of the "Mathematical Practices" in the box that appears in the Standards for each grade level would benefit from metacognition. Regarding Practices 2 and 6 (MATH.PRACTICE.MP.2 and 6 in Table 3), abstract concepts are often difficult to conceptualize properly, and being trained in metacognitive techniques would help students better master this skill. Students can also be taught to think about their own precision as they work through increasingly challenging mathematical problem sets, identifying areas where they aren't as clear or precise in their thinking as they should be. All areas of the Mathematics Standards would be strengthened by a metacognitive approach, especially the specific standards on modeling and on statistics and probability, as these standards require thinking beyond the typical mathematical processes traditionally taught; for example, students would benefit from understanding their strategic approaches to mathematics questions (Kuhn & Pease, 2010), such as those of the Modeling and the Statistics and Probability Standards (p. 72).

Speaking and Listening

In the Speaking and Listening Standards (SL), little specifically stands out as being directly relevant to adopting a metacognitive framework. The sole clear pertinent standard suggests that students should be able to "adapt speech to a variety of contexts and communicative tasks, demonstrating command of

formal English when indicated or appropriate" (SL.1.6, p. 22). In order to help students understand how and when to adapt their speech, they need to be shown how to think critically about the differences between language register and know how they can best match those expectations, which requires a fair amount of both metacognitive and linguistic knowledge.

The other SL Standards do not explicitly address or promote metacognition as they are currently written. Each, however, could easily be taught with a metacognition emphasis that would help the students learn the content of each more efficiently, while encouraging higher order thinking and reflection.

Language

"[L]anguage permeates *all* the standards, in many ways, even in those cases where the word 'language' is not explicitly mentioned" (van Lier & Walqui, 2012, p. 1, emphasis original). Language is central to the identification of a student's mastery of the CCSS, as that student's language is how teachers will be able to understand the student. The CCSS, in fact, have been shown to require cognitively demanding language of the students across all content areas, including mathematics (van Lier & Walqui, 2012). Specifically, language demands in the Standards have been divided into the following sections: (a) skill area (speaking, listening, reading, and writing for the ELA Standards, and inherent throughout the Mathematics Standards, although not explicitly addressed); and (b) explicit knowledge about language (conventions, including spelling, punctuation, and grammar; knowledge of contextual language functions; and vocabulary acquisition and use). And because the language demands of the Standards contain a large amount of overlap across all content areas (Lee, Quinn, & Valdés, 2013), students, particularly multilingual students, should be exposed to a wide range of language strategies to help them in varying contexts. Students should be able to use metacognitive strategies to determine how they can adapt their language based on content and contextual needs to be effective communicators and strategic learners.

The only clear call for metacognition in the Language Standards (L) is the expectation that kindergarten and first-grade students should be able to sort objects (such as types of birds) into categories (L.K-1.5, p. 27). Sorting tasks (Waters & Waters, 2010) would help students go beyond a cursory sorting process to thinking about the reasons behind the action in a metacognitive manner. Although the Language Standards do not often explicitly include themes of metacognition, each of them would be strengthened by the inclusion of metacognition as an overarching theme, particularly when helping multilingual students increase their mastery of the English language. Multilingual students often don't have the linguistic foundations their native English-speaking counterparts do, and thus frequently have to play "catch-up"; by stressing and explicitly teaching metacognitive strategies, teachers can help their students learn the target language more quickly and effectively. Accordingly, although not explicitly addressed in detail here, teachers should look at each of the Language Standards from a metacognitive perspective to see how they can best help their students (both bilingual and native) become more autonomous language learners. For more information on fostering autonomous language learning, see Barfield and Brown, 2007 (for a general overview), Andrade and Evans, 2013 (for writing), Grabe and Stoller, 2002 (for reading), Vandergrift and Goh, 2012 (for listening), and Burns and Joyce, 1997 (for speaking).

Conclusions and Discussion

The Common Core State Standards do not explicitly refer to metacognition or metacognitive strategies more than once in all their documentation. However, the "higher order thinking" (Porter et al., p. 115) espoused by the CCSS would be more feasibly accomplished by teachers who foster a metacognitive culture in their classrooms. Teachers could approach the Standards of each skill, content area, and grade effectively using a metacognitive framework. Metacognition would not only help ensure that native English speaking students who are developing the skills necessary to succeed at this emphasized the

higher order thinking useful in higher education, but also would help traditionally marginalized students, such as multilingual students and students from low economic backgrounds, develop the skills they need to determine what strategies work best. Metacognition can also help with developing student motivation and in promoting a learner-centered environment that strengthens student investment in the educational system.

Districts and teacher trainers could strengthen their teachers by encouraging explicit metacognitive instruction in the classroom. Teachers should feel that they are able to take the time necessary to teach these strategies to their students, and practice their use, with the understanding that metacognition is an investment; it takes time upfront, but likely will benefit all students in their subsequent studies, regardless of current abilities. Mastery of metacognitive strategies would especially be advantageous for multilingual and other traditionally marginalized students, particularly when the Language Standards are involved, and may help these students retain more control over their learning experiences.

The specific metacognitive approaches illustrated earlier and connected to specific CCSS in Tables 1, 2, and 3 are not meant to be an exhaustive list; instead, they would serve as a good foundation for teachers attempting to include metacognition in their classrooms. By linking the specific metacognitive approaches to specific Standards, teachers should feel justified in including metacognition in their teaching; New York teachers could use the listed metacognitive strategies/activities as a foundation for bringing metacognition into their classrooms. Metacognition can help teachers empower their students. How it can be included in the curricula espoused by the CCSS remains to be seen. The Standards do, however, support metacognition, and our students would benefit from an increased focus on this foundational principle.

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