Center on Innovations in Learning

Wise Ways®

Core Function: **Personalized Learning**

Effective Practice

Metacognitive Competency: Teach and model metacognitive processes and strategies to enhance students' self-management of learning

Overview: Self-management strategies have been demonstrated to improve student learning outcomes and are critical components of personalized learning. These strategies, however, are not learned automatically or just by teachers telling students about them; they must be taught explicitly and modeled by teachers for students. Effective metacognitive processes and strategies include goal setting and planning for strategy use, self-monitoring through self- and peer-checks of learning, as well as documentation of learning strategies used and their effectiveness, and evaluation of learning through formative assessment, self-recording of progress, rubrics, and performance exemplars. The school community can further foster metacognitive competency through professional development for teachers and co-curricular staff and addressing metacognitive competency within school documents and rituals and routines.

Evaluate Your Practice: How can goal setting and planning for strategy use promote students' management of their learning? How can self-monitoring of progress promote students' management of their learning? How can self-evaluation promote students' management of their learning? How can schools provide further support for fostering students' metacognitive competency?

Introduction

Learner-centered or personalized learning refers to "a teacher's relationships with students and their families and the use of multiple instructional modes to scaffold each student's learning and enhance the student's personal competencies" (Twyman & Redding, 2015, p. 3). The student is actively involved with the teacher in co-constructing their individualized learning pathway, and often through technology the location, time, and pace of learning may vary from student to student (Redding, 2016). Metacognitive competency, one of four personal competencies within recent personalized learning frameworks, becomes critical for student success, particularly within personalized learning pedagogies, as students are responsible to some degree for managing their own learning. Metacognition in its simplest sense refers to thinking about one's thinking with the goal of enhancing learning (Wilson & Conyers, 2016). High academic achievers have been shown to have high levels of metacognitive competency (Wang, Haertel, & Walberg, 1993), and metacognitive instruction can help close the gap between high and low achievers (Pellegrino & Hilton, 2012). Metacognitive strategy instruction is particularly imperative given many states' and districts' adoption of Common Core Standards, which require students to be able to use metacognitive learning strategies extensively in order to engage in higher-order processes such as researching and synthesizing information, as well as critically reading and evaluating texts (Conley, 2014).

Research has provided extensive support for explicitly teaching self-regulated learning strategies to students, and meta-analyses have shown consistently positive effects on student performance generally, and in specific domains such as reading, writing, and mathematics (e.g., Dignath & Büttner, 2008; Hattie, Biggs, & Purdie, 1996). Students need to have both metacognitive knowledge (e.g., knowledge about one's self as a learner and knowledge about learning strategies, including when and why to use them) and metacognitive regulation (e.g., monitoring one's cognition, including using planning activities, awareness of task performance, and evaluation of efficacy of strategy use; Lai, 2011; Redding, 2014). Strategy instructional interventions that have a sustained and long-term positive effect on student performance include "teaching students skills such as determining when, why, and how to use learning strategies, how to plan a learning task and establish goals for learning, and explaining the relevance and importance of a task so that they can see the importance of what they are doing (deBoer, Donker-Bergstra, & Kostons, 2013, p. 59-60).

Research also shows that students should be explicitly taught about "driving their brains" (Wilson & Conyers, 2016) via a metacognitive process that includes three stages that may overlap:

1) goal-setting and planning, including how/when/where to use a repertoire of learning strategies;
2) self-monitoring of progress, including self- and peer checks of work and documentation of learning strategies; and
3) self-evaluation of learning and subsequent modification of strategy use as necessary (Redding, 2014).

The remainder of this research practice brief summarizes the research that supports teaching the metacognitive process to improve student outcomes, as well as ways that school communities can further support students' metacognitive competency.

How can goal-setting and planning for strategy use promote students' management of their learning?

Planning strategies are used prior to learning and include activities such as goal setting and pre-planning of resource allocation. Examples include setting a goal, deciding upon the amount of time to spend on an activity, and choosing what to do first (see Allen & Hancock, 2008). Goal setting is critical for enhancing academic performance, and research has demonstrated a clear link between the degree of goal difficulty and performance (Chidester & Grigsby, 1984; Mento, Steel, & Karren, 1987; Tubbs, 1986; Wofford, Goodwin, & Premack,1982; Wood, Mento, & Locke 1987). Achievement is enhanced to the degree that students and teachers set challenging rather than "do your best" goals, relative to the students' present competencies (Chidester & Grigsby, 1984; Guzzo, Hunter & Schmidt, 1983; Jette, & Katzell, 1985; Locke & Latham, 1990; Mento et al., 1987; Tubbs, 1986; Wood et al., 1987). Explicit classroom instruction on how and why goal setting is important has yielded academic gains ranging from 16% to 41% (Marzano, 2007). This explicit instruction may involve teacher modeling of goal setting followed by having students analyze past performance to set new performance goals (Marzano, 2009).

Students need to develop a repertoire of learning strategies to facilitate their learning across content areas. Learning strategies may include note-taking, organization and representation of content, self-questioning, memorization, and test preparation (see Dunlosky, Rawson, Marsh, Nathan, & Willingham, 2013 for a recent review of strategy effectiveness). Learning strategies must be explicitly taught, and teacher modeling of strategies is key (Pressley & Harris, 1990). For example, teachers can model diagramming (e.g., concept maps, t-charts, flow charts, etc.) as a learning strategy to demonstrate understanding and then scaffold the strategy to students with plenty of guided practice and opportunity for independent application (Ellis, Denton, & Bond, 2014). Pressley and Harris (2006) further recommend that teachers model 1) why the strategy is used by providing specific reasons for the strategy selection, 2) how the strategy is used by providing explicit instruction absent of ambiguity, and 3) what strategies to select in specific situations by selecting the appropriate strategy to match the situation. Research also shows that metacognitive learning strategies should be integrated into subject matter rather than taught in isolation in order to increase the chances that students will transfer their new learning across other settings (Pellegrino & Hilton, 2012; White & Fredericksen, 1998).

How can self-monitoring of progress promote students' management of their learning?

Self-monitoring involves the capacity for students to track their thoughts and behaviors during the learning process (Wilson & Conyers, 2016). Self-monitoring interventions have been shown to improve academic performance (e.g., Wood, Murdock, & Cronin, 2002) and have a positive feedback effect, with students seeking to raise their goals based on observed outcomes (Zimmerman, 1990). There are typically two primary components used in a self-monitoring intervention: self-observation, where a student learns to identify and monitor a specific strategy, and self-recording, in which the student records some aspect of that strategy, such as whether or not it is occurring or the outcome associated with that strategy (Amato-Zech, Hoff, & Doepke, 2006). Children need to be shown explicitly how to self-monitor and taught how to attribute learning outcomes to strategy use (Ghatala, Levin, Pressley, & Goodwin, 1986). Self-monitoring interventions also tend to be more effective when reinforcement for self-monitoring is provided to the students (Otero & Haut, 2015).

Peer checks provide another avenue for building students' self-regulation skills. Engaging in evaluative and corrective activity on peers' work has been shown to improve students' management of their own work (Lindemann, 1982; Sadler, 1989); explaining their deci-

sions to others helps students to be more aware of their own performance. Sadler (1989) suggests that engaging in evaluative and corrective activity on other students' work has the advantages that: (a) the work is of the same type and addressed to the same task as their own; (b) students encounter a wide range of solutions to creative, design, and procedural problems, and exposure expands their own repertoire of solutions; (c) other students' attempts cover a wide spectrum of mistakes for students to observe; and (d) the use of other students' work in a cooperative environment assists in achieving some objectivity, in that students are less defensive of, and less committed emotionally to other students' work than to their own. Students need to be shown explicitly how to complete evaluations of peers' work, and reinforcement for the evaluation should be provided.

Dunlosky et al, (2013) concluded in their study of learning strategies that students tend to cling to familiar practices rather than learn new techniques that might be more effective. A teacher's role, then, is to teach effective practices as well as guide students to which practices are most effective for their own self-regulation. As part of evaluating the performance of themselves and others, students should document which learning strategies were more effective than others in improving learning outcomes. Only when training provides practice in attributing changes in performance to strategies, in order to select the more effective strategy, are children able to use that information to guide their strategy choices in a subsequent learning task (Ghatala et al., 1986).

Students should be taught that self-monitoring of performance is valuable in school and in life in general. Wilson and Conyers (2016) suggest that teachers should 1) emphasize that self-monitoring should cover a lesson's content, and students should continually question their knowledge and consider the strategies and skills they are using for learning; 2) build in regular opportunities for students to "check in" on their learning during a lesson through individual or whole-group questioning; and, 3) frequently assign students to work in pairs or small groups, reminding them they can and should learn from each other and that explaining and discussing lesson content enhances memory and learning.

How can self-evaluation promote students' management of their learning?

Teachers can further build their students' metacognitive competency by teaching strategies for students to determine their own mastery of learning tasks. Self-recording of performance can provide students with systematic, often visual, data regarding their performance, which they collect themselves. For example, self-graphing of performance can provide learners with visual clarification of learning objectives and how well they have understood what they need to learn and what they need to do to achieve their goals (Kasper-Ferguson & Moxley, 2002). Teaching students how to use instructional rubrics, which are standards-referenced tools that provide students with detailed information about what is expected of their work, have also proven successful with a wide range of students (Andrade, 2000; Andrade & Boulay, 2003). Providing exemplars of performance can further assist students with managing their learning, as they make explicit what is required and define a valid standard against which students can compare their work (Orsmond, Merry, & Reiling, 2002). Finally, formative assessment (low-stakes testing that provides information to teachers about how to tailor instruction to meet students' needs) also helps students recognize the gaps between their current progress and their targeted goals. These comparisons help students determine whether current modes of engagement should continue as is, or if some type of change is necessary (Nicol & Macfarlane-Dick, 2006).

How can schools provide further support for fostering students' metacognitive competency?

Metacognitive instruction is not commonly observed, and teachers often have limited knowledge about metacognition and how it can be enhanced (Wilson & Conyers, 2014). Wilson and Conyers argue that "without support for teaching about metacognition at the policy level, teachers may feel too pressed for time to fit this instruction into the already packed school day" (p. 2). School and district improvement plans may need to include targeted professional development that provides teachers with this knowledge and how they can teach and reinforce metacognition and students' ability to manage their own learning. This type of professional development has been used successfully within several areas, including science inquiry programs (Seraphin, Philippoff, Kaupp, & Vallin, 2012), formative assessment

within middle school math classrooms (Dempsey, Beesley, Fazendeiro Clark, & Tweed, 2016) and elementary students' formative self-assessments of their learning using rubrics (Zubrzycki, 2015). Deeper learning within domains may require metacognitive instruction embedded within content to help students "think like a historian or an engineer" for example (Graesser, 2015; Muijset al., 2014), suggesting that this instruction should be strategically incorporated into teacher planning within professional learning communities.

Lesson plans for teachers and relevant planning documents for co-curricular programming can serve to provide documentation of a school-wide commitment to building and enhancing students' metacognitive competency (Twyman & Redding, 2015). Similarly other key school documents such as school improvement plans and parent literature about school programming can incorporate goals and objectives centered on enhancing students' metacognitive competency. These documents should reflect the value the school places on metacognitive competency and how teachers and other staff contribute to efforts to ensure that students develop these critical skills. Co-curricular staff, including, for example, afterschool educators and others working within youth-serving organizations, can also benefit from training to incorporate metacognitive strategies into their programming for students.

In addition, metacognitive competency should be recognized within a school's routines and rituals and its importance made visible within hallways and classrooms so that students, staff, and parents realize its value to learning and future success. Morning announcements and student awards can highlight metacognitive achievements by students (e.g., mastery of learning strategies); in addition, school rituals such as having students write letters to future students with reflections on their learning and advice at the end of courses can address metacognitive competency (Costa & Kallick, 2008). Metacognitive competency can also be reinforced through technology-aided resources, such as digital (online) portfolios or badges that allow students to document and display their progression through learning tasks and accomplishments (Redding, 2014).

Indicators to Support the Effective Practice
The School Community Council ensures that all parents understand metacognitive competency, learning strategies, and ways they can support their children's self-management of learning at home.
The School Community Council ensures that all volunteers understand metacognitive competency and their roles relative to its enhancement in students.
All teachers and teacher teams plan instruction based on the aligned and expanded curriculum that includes objectives for student management of their learning.
All staff conducting co-curricular programs fulfill the purposes of the programs including appropriate elements of student management of learning
The school's key documents explain the value of metacognitive competency and how it is enhanced through specific roles and relationships.
The school promotes metacognitive competency in school rituals and routines, such as morning announcements, awards assemblies, hallway and classroom wall displays, and student competencies.
All teachers teach and model the metacognitive process (goals, strategies, monitoring, and modification) and specific learning strategies and techniques.
All teachers include self-checks, peer-checks, and documentation of learning strategies as part of assignment completion.
All teachers teach methods of logic, synthesis, evaluation, and divergent thinking.
All teachers build students' metacognitive skills by teaching learning strategies and their appropriate application.
All teachers build students' metacognitive skills by providing students with processes for determining their own mastery of learning tasks.
All teachers build students' ability to use a variety of learning tools.

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