Center on Innovations in Learning

Wise Ways®

Core Function: Personalized Learning: Metacognitive Competency

Effective Practice: Providing instruction and modeling of metagcognitive processes and strategies to enhance student self-management of learning

Indicator: All teachers teach and model the metacognitive process (goals, strategies, monitoring, and modification) and specific learning strategies and techniques. (D7)

Explanation: Self-regulation skills can be taught to students to improve their ability to effectively assess a situation, monitor their performance, and adjust their behaviors accordingly (Axelrod, Zhe, Haugen & Klein, 2009). Goal-setting, strategy use, self-monitoring and modification of approach have been shown to be effective techniques that impact student performance and achievement (see Koegel, Koegel, Harrower & Carter, 1999). Research has demonstrated that these techniques do not emerge automatically, but, rather, must be taught explicitly and modeled to students. The exercise of self-regulatory skills produces beneficial results. Good self-regulators do better academically than poor self-regulators even after controlling for other potentially influential factors (Zimmerman & Bandura, 1994)

Questions: Why should goals, strategies, monitoring and modification be taught to advance students' self-management of learning? How should these skills be taught and modeled?

Why should goals, strategies, monitoring and modification processes be taught to advance students' self management of learning?

Teaching students to think is essential to fostering independent learning and supporting college and career readiness, and metacognition is central to this goal. Metacognition refers to thinking about one's thinking with the goal of enhancing learning (Wilson & Conyers, 2016). Recent reviews of research (e.g., Lai, 2011) suggest that 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). High academic achievers 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). Explicit instruction in goal-setting, strategy use, and self-monitoring/modification of strategy use during learning can promote metacognition and independent learning.

Goals: Goals are critical for enhancing performance. There is a direct linear relationship between the degree of goal difficulty and performance (Chidester & Grigsby, 1984; Mento, Steel & Karren, 1987; Tubbs, 1986; Worfford, Goodwin & Premack,1982; Wood, Mento & Locke 1987). Further, 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, Jette & Katzell, 1985; Hunter & Schmidt, 1983; Locke & Latham, 1990; Mento, Steel & Karren, 1987; Tubbs, 1986; Wood, Mento & Locke, 1987). Wood, Mento & Locke (1997) found that students who select the most challenging goals perform higher than students who select the easiest goals. In addition, goal attainment is closely related to reported self-efficacy of students (see Meyer & Gellatly, 1988; Ajzen & Madden, 1986). Explicit classroom instruction on how and why goal setting is important has yielded academic gains ranging from 16 to 41% (Marzano, 2007).

Strategies: According to Redding (2014), students "develop metacognitive competency by understanding they have control over their learning and responsibility for it and by knowing procedures that lead to mastery, strategies to employ, and methods for testing their own progress" (p. 13). Strategies must be explicitly taught and teacher modeling of strategies is key (Pressley & Harris, 1990). Teaching strategies to students includes not only teaching the strategies themselves, but also teaching students how to select the best strategies to solve problems. Metacognitive knowledge comprises knowledge on how, when, and why to use learning strategies (Schraw & Dennison, 1994). Research shows that metacognitive strategies should be integrated into subject matter in order to increase the chances that students will transfer their new learning across other settings (White & Fredericksen, 1998; Pellegrino & Hilton, 2012).

According to Harris & Pressley (1991), good strategy instruction is interactive. Students should collaborate in determining the goals of instruction as well as in the implementation, evaluation, and modification of the strategy and strategy acquisition procedures. Further, students need to see evidence that the strategies they are learning really do lead to improved performance (see Pressley, Levin & Ghatala, 1984; Pressley, Levin & Ghatala, 1988; Pressley, Ross, Levin & Ghatala, 1984).

Monitoring: Self-monitoring involves the capacity for students to track their thoughts and behaviors during learning (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 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).

Students' preference for an effective strategy (over alternative strategies) increases following information about the effectiveness of that strategy (e.g., Cavanaugh & Borkowski, 1979; O'Sullivan & Pressley,1984; Paris, Newman, & McVey, 1982; Ringel & Springer, 1980). However, children need to be shown how to self-monitor and taught how to attribute outcomes to strategy use (Ghatala et al., 1986). Self-monitoring interventions tend to be more effective when reinforcement for self-monitoring is provided to the students (Otero & Haut, 2015).

Modification: Knowledge of strategies does not improve outcomes unless self-monitoring and related decision-making skills are explicitly taught (Harris, 1990). Children need to be taught how to atttribute outcomes to strategy use and in using this information to make appropriate decisions (Ghatala et al., 1986). Given training, even children as young as 8 years old can use the results of self-monitoring to modify their use of strategies by selecting and maintaining those that are effective and abandoning those that are not. In addition, they can justify their deployment of selected strategies in terms of the relative effectiveness revealed by the self-monitoring (Ghatala, Levin, Pressley, & Lodico,1985; Lodico, Ghatala, Levin, Pressley, & Bell, 1983).

Ghatala et al. (1986) point out that when children simply practice with, and are tested on, material learned with differentially effective strategies, not much usable metacognitive knowledge results. Instead, only when training provides practice in attributing changes in performance to strategies, in order to select the more effective strategy, were children able to use that information to guide their strategy choices in a subsequent learning task (Ghatala, E.S., Levin, J.R., Pressley, M., & Goodwin, D., 1986). This result is supported by other findings with young children (Ghatala et al., 1985; Lodico et al., 1983). Older children (10 to 13 years) can derive strategy-utility information from practice and test experiences alone, but they can use it only as long as they are prompted to do so (Pressley, Ross, Levin, & Ghatala, 1984; Pressley, Levin & Ghatala., 1984). Research indicates that children develop academically effective forms of self-regulated learning in classrooms where they are engaged in evaluating their work (Many. Fyfe, Lewis & Mitchell, 1996; Neuman & Roskos, 1997; Perry, 1998; Wharton-McDonald, Pressley, Rankin, Mistretta, Yokoi & Ettenberger, 1997; Turner, 1995).

How should these skills be taught and modeled?

Research on effective teaching has shown that effective teachers explicitly teach students what they need to know (Rosenshine, 1995; Taylor, Peterson, Pearson, & Rodriguez, 2002). As Blair, Rupley & Nichols (2007) point out, "students do not become independent learners

through maturation alone" (p. 434). The key to explicit instruction is the active communication and interaction between teacher and student. Good strategy instruction includes collaboration in determining the goals of instruction, as well as in the implementation, evaluation, and modification of the strategy and strategy acquisition procedures (see Harris & Pressley, 1991). At the heart of the explicit instructional model are explicit explanations, modeling, and guided practice (see Heilman, Blair, & Rupley, 2002). Explicit explanations can include step-by-step details and definitions.

Opportunity to learn is a variable associated with explicit instruction. Opportunity to learn refers to whether students have been taught the skills relevant to the areas for which they are assessed. Teachers might employ explicit instruction, but if the instruction does not relate to an assessed learning task or a valued benchmark or outcome, then students have not had an opportunity to learn that which has been deemed important. Opportunity to learn, ongoing assessment, structure, and explicit instruction are related.

Teacher modeling has been demonstrated to be a very effective method for impacting student performance. Teacher modeling should include teachers thinking aloud as they demonstrate metacognitive processes; for example, teachers can describe the mental strategies they use (e.g., prediction) as they read (e.g., Kelly & Clausen-Grace, 2013). The more student time spent actively responding (as opposed to passively receiving information), the more academic gain (Taylor, et al., 2002). Teachers with stronger modeling skills produce better-performing students than do their counterparts with weaker modeling skills (Sang, 1987). In a study of reasoning strategies, Duffy et al. (1987) demonstrated that the effectiveness of modeling depended on the explicitness of information provided; the more specific the teachers' explanation of reasoning was, the better reasoning strategies the students demonstrated. Further, Duffy et al. (1988) ascertained that modeling that provided explicit, unambiguous information was more effective than modeling of vague or jumbled information.

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