Self-Regulated Learning and the 21st Century Competencies

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The purpose of this chapter is to evaluate the relation between the 21st Century Competencies (21CC) and self-regulated learning (SRL). The 21CC framework emerged out of efforts to improve and reform educational systems in order to better prepare students to be effective workers and citizens in the future (Ananiadou & Claro, 2009; Jerald, 2009; Partnership for 21st Century Skills, 2009a, 2009b). Within this framework, competencies move beyond simple content area knowledge or skills to encompass the abilities needed to meet the complex demands within any particular context. Hence, in this framework a competence includes a broader understanding that comprises the skills, attitudes, knowledge and students will need to successful in school, in the workplace, and in life more generally.

Models of SRL are rooted in broader conceptions of self-regulation that have been developed with regard to a variety of domains in order to understand how individuals’ take an active, purposeful and reflective role in their own functioning or behavior. For example, there is work examining self-regulation in areas such as emotion, chronic illness, smoking, exercise, eating, shopping and other non-educational domains (Baumeister & Vohs, 2004; Boekaerts, Pintrich, & Zeidner, 2000). SRL concerns the application of general models of self-regulation to issues of learning with a particular focus on academic contexts. Models of SRL, that is, attempt to understand how students can and do take an active role in managing their own academic functioning. Even within this specific focus, models of SRL have emerged from a number of theoretical traditions including those that stress volition, information processing, behavioral, cognitive development, and sociocultural views of learning (Zimmerman & Schunk, 2001). Hence, there is no single universal model used to understand SRL but rather a number of views that, while stressing somewhat different constructs and conceptualizations, overlap in substantial
ways. The present discussion draws most directly on prominent models of SRL that arise from a general social cognitive perspective on learning (Boekaerts, 1996; Greene & Azevedo, 2007; Pintrich, 2000; 2004; Winne & Hadwin, 2008; Zimmerman, 2000).

Social-cognitive models share several basic assumptions about the nature of SRL (Pintrich, 2004). One assumption is that SRL is dependent on students having a necessary set of skills or abilities as well as adaptive attitudes and beliefs that can be taught and learned by most students. In the past, this assumption has been phrased as students needing to have both the “skill” and the “will” to learn. An important caveat of this assumption is that, although subject to biological, developmental, and contextual constraints, the underlying competencies, attitudes and beliefs necessary for SRL can be learned by most all students. A second assumption in these models is the importance of setting goals or having performance standards or criterion. That is, students set some type of criterion, standard or goal against which comparisons are made in order to assess whether the learning process is proceeding effectively or if some change is needed.

Third, Pintrich noted that most models view learners as active constructive participants in the learning process rather than just passive recipients of information from teachers, parents, or other adults. In other words, students have the potential to manage their own academic functioning at least some of the time and in some contexts. A final underlying assumption of most models is that self-regulatory activities serve as mediators between personal and contextual characteristics and actual achievement, performance, or learning outcomes (Pintrich, 2004). In large part, therefore, the importance of individuals' cultural, demographic, or personality characteristics as well as contextual characteristics of the classroom environment can be understood through their impact on students’ SRL.
On their surface, models of SRL and the 21CC framework appear to have much in common. For instance, both SRL and 21st CC can be described as incorporating important skills, abilities, or competencies that are necessary for students to be effective learners within academic contexts. As well, many critical aspects of both SRL and the 21CC can be taught and learned by most all students. That is, neither depends primarily on dispositions or other more stable heritable traits of the learner. Further, SRL and factors within the 21CC framework are stressed as essential for effective learning in school, but are also viewed as a necessary basis for productive functioning in contexts beyond academics. These basic commonalities suggest a greater consideration of the conceptual overlap and distinctions of between these two areas could be beneficial.

Consistent with this suggestion and with the overall purpose to evaluate the relation between these two conceptual frameworks, the remainder of this paper is divided into four major sections. In the first section a more detailed explanation of the major dimensions of SRL is provided. Second, the conceptual relations between several core competencies and key characteristics of what it means to be a self-regulated learner are discussed. In the third section, empirical evidence documenting the outcomes associated with SRL is reviewed briefly. Following this review, the ability of SRL to understand and improve the academic performance of students at risk for school failure is considered. The final section of the paper highlights some overall conclusions and maps out directions for future research on SRL and the 21st CC.

Dimensions of self-regulated learning

In this section, the main components or facets of SRL are described drawing primarily from the model advanced by Pintrich and his colleagues (2000; 2004; Pintrich & DeGroot, 1990; Pintrich & Zusho, 2002; Wolters, Pintrich, & Karabenick, 2005; Wolters, 2003a). According to
this framework, self-regulated learning is characterized as involving at least four inter-dependent phases. In other models similar dimensions have been labeled as stages, operations, subprocesses or components of SRL (Zimmerman, 2000; Winne & Hadwin, 2008). These phases are used by students to manage their own academic functioning with regard to four areas.

**Phases of SRL.** One phase, often labeled forethought (Pintrich, 2004; Zimmerman, 2000), reflects students planning, goal setting, and prior knowledge activation and other processes that often occur before task engagement. As an example, a student who sits down to study her textbook may identify how much reading she wants to accomplish, think about what she has learned previously regarding the topic, and make plans about where and when to read. This phase also incorporates the students’ activation of attitudes about the perceived importance, usefulness, self-efficacy, or other motivational beliefs about the material, task, and topic more generally. A second phase, called monitoring by Pintrich (2004; Pintrich, Wolters, & Baxter, 2000), describes students’ efforts to keep track or be aware of their on-going progress and performance at a task or learning activity. As she actually reads and take notes, for instance, the student would be aware of whether she is understanding the material and whether she is making adequate progress toward her identified goals. In addition to monitoring, a third phase that often occurs while students are engaged in a task is labeled control, management, or just regulation. This process involves students’ use and management of various learning strategies needed to complete academic tasks (Pintrich et al., 2000; Zimmerman, 2000). It reflects learners’ efforts to actively manage, modify, or change what they are doing in order to maintain their effectiveness. For example, if the student realizes that she is not really understanding the material she is reading, she may decide to modify what she is doing to learn the material (e.g., use multiple colors of highlighters, reread) or change to a different strategy entirely (e.g., take notes, make
flashcards). Finally, a fourth phase in which students review and respond to their experiences is termed reaction or reflection. One key aspect of this phase is the generation of new meta-level knowledge about the tasks, strategies or self. Thinking back on the study session, the student may come to understand that the textbook is difficult to read, that studying in a noisy place is unwise, or that she really does not like geology that much. These new insights might then be stored as metacognitive knowledge that is used when making plans or decisions about how to maximize learning in later situations.

Importantly, Pintrich (2004) and others (Winne & Hadwin, 2008; Zimmerman, 2000) do not view these different sub-processes as a strict time-ordered sequence or as causally connected in a linear fashion. Self-regulated learners engage in these different types of sub-processes in a flexible and adaptive fashion so that they can manage different aspects of their learning. Hence, the phases simply provide a structure and emphasize that SRL is dependent on students’ active engagement before, during, and after the completion of academic work.

Areas of SRL. According to Pintrich (2004) there are four areas or dimensions of learning that can be the target of regulation by the learner. One area, cognition, concerns the various mental processes individuals use to encode, process or learn when engaged in academic tasks. Most typically these processes have included students’ use of cognitive and metacognitive learning strategies. For example, students can monitor and control their use of rehearsal, organizational and elaboration strategies. Motivation and affect represent a second dimension of learning that individuals can self-regulate. In other words, their own level of motivation or motivational processing represents an important target for students who are working to manage their own learning. Prior work has identified many strategies that students use to sustain or improve their own motivation including self-provided rewards, self-talk about the importance or
usefulness of material, and making learning activities into a game so they are more enjoyable (Wolters, 2003a). A third area that students can self-regulate is their behavior or their actual participation, conduct, or other physical actions enacted as part of the learning process. For instance, time-management strategies that students use organize and control where and when they study fits into this area. Finally, the fourth dimension of learning that Pintrich (2004) identified as a potential target of students’ regulation is the context or environment. This area includes facets of the immediate task, classroom or even cultural environment. Students, for instance, might monitor and control the lighting, temperature, and noise in their environment. As well, help-seeking strategies in which students’ manage their learning by effectively utilizing teachers, parents, peers or others within the social environment fits within this dimension.

Although it is possible to distinguish among them conceptually, these four areas overlap and intertwine with one another in practice (Pintrich, 2004). Regulating the processing associated with one area (e.g., motivation) may also involve changes in functioning within the others (e.g., cognition, behavior). Students overall efforts to plan and control where, when, and with whom they study likely involves consideration of all four of these different areas. As an example, planning to study with friends, at the library, in the morning, by playing a flashcard game might be based on goals that reflect cognitive, motivational, behavioral and contextual considerations.

Connecting SRL and the 21st century competencies

Consistent with this brief overview, it remains clear that there may be a high degree of conceptual similarity between SRL and at least some of the competencies stressed within the 21CC framework. In this section, this overlap is explored by highlighting several of the 21CC
that fit most closely with the process of SRL. As well, a few points on which the 21CC and SRL appear to diverge are evaluated.

*Commonalities.* Initiation and self-direction represent an aspect of the 21CC framework that may have the closest fit to concepts within the SRL framework. With this competency, the 21CC model emphasizes the important need for individuals to set and balance their own goals, to initiate and self-direct their own activities, and to work independently (Ananiadou & Claro, 2009; Partnership for 21st Century Skills, 2009a, 2009b). Obviously, when these skills or capabilities are considered within academic contexts they overlap substantially with processes and abilities stressed by models of SRL. Setting learning goals and self-managing the effective pursuit of those goals is a hallmark of what it means to be a self-regulated learner (Wolters et al., 2005; Winne & Hadwin, 2008; Zimmerman, 2000). Characterizations of self-regulated learners also routinely describe them as self-starters who can work independently to achieve their goals (Wolters et al, 2005; Zimmerman, 2000).

Another competency within the 21CC framework is individuals’ adaptability or ability to adjust efficiently to varied roles, responsibilities and contexts (Ananiadou & Claro, 2009; Partnership for 21st Century Skills, 2009a, 2009b). This competency also emphasizes an individual’s ability to work effectively within contexts that are ambiguous or with shifting demands. At the same time, individuals are viewed as needing to be flexible with regard to their ability to incorporate feedback effectively, and to understand and respond to diverse views and beliefs. Again, these aspects of the 21CC framework align very closely with concepts within most prominent views of SRL. As noted above, monitoring is a key process within most social-cognitive models of SRL. During the process of SRL students maintain an active and on-going awareness of task demands, the effectiveness of their learning strategies, and their progress.
toward the goals they have adopted (Pintrich, 2004). As well, self-regulated learners are viewed
as particularly adept at creating and using different forms of feedback within learning tasks
(Butler & Winne, 1995). Hence, these students are effective at keeping track of their progress
and adapting to the feedback they receive in a way that will allow them to continue and complete
academic tasks successfully.

To a somewhat lesser extent, SRL can also be linked to the 21CC of collaboration and
communication. Together, these two competencies stress the need for individuals’ to be able to
communicate effectively with others and to work well as part of a group or team including
respecting the abilities of others and cooperating to achieve common goals (Jerald, 2009).
Communication also means that individuals must be able to attend and understand the messages
that others are providing through these various channels. In addition, individuals must be able to
articulate their thoughts and ideas effectively using various forms of communication (e.g., orally,
written).

Although much of the research on SRL has focused on the skills of individual learners,
there is a growing interest in the social and inter-personal aspects of SRL (Patrick, 1997; Schunk
& Zimmerman, 1997; Wolters, in press). This research has stressed that many of the abilities
and beliefs that undergird the process of SRL are developed through social processes. In
addition, self-regulated learners are effective at help-seeking, group management, and other
aspects of collaboration (Newman, 2008). Essentially, because they are motivated and effective
at managing their environment, self-regulated learners are able to work with others in the
academic context in a way that will aid them in the achievement of their personal learning goals.
To the extent that it will serve to further these learning goals, SRL would include effective
collaboration with others. In line with this view, some researchers have stressed that SRL
actually may often be better viewed as co-regulation in which students’ and teachers, parents or peers support each other interactively in a sociocultural, goal directed system (McCaslin & Hickey, 2001; Meyer & Turner, 2002). Regardless of how it is conceptualized, the overall message is that students viewed as self-regulated learners are considered to be effective at interacting and working with others in the instructional context. Hence, this appears to be another area in which models of SRL and the 21CC framework overlap in their emphasis of what skills, abilities, or competencies students need to be successful.

**Distinctions.** In contrast to these similarities, SRL appears more conceptually distinct from other abilities stressed within the 21st CC framework. In particular, SRL can be considered theoretically separate from the processes of critical thinking and problem solving. Within the 21CC framework, critical thinking and problem solving together reflect the need for individuals to be able to use various forms of reasoning, engage in analysis and evaluation, and make effective judgments or decisions (Partnership for 21st Century Skills, 2009a, 2009b). Especially within the context of authentic novel or significant questions, these abilities allow the individual to be cognitively sophisticated. More broadly, these competencies embody the need for individuals to be effective at a variety of higher order thinking processes described in prior research (Mayer & Wittrock, 2006; Sternberg, Roediger, & Halpern, 2007). These two competencies, therefore, can be viewed generally as more focused on how students apply or use their knowledge, skills, and abilities when engaged in reasoning, decision making, or problem solving. In other words, they are about accessing, manipulating, and utilizing existing abilities or knowledge. In contrast, SRL is concerned more with explaining the processes through which students engage in learning, acquiring knowledge, or coming to understand core content. Models
of SRL focus more on explaining how students’ undertake and manage their own learning, not how they apply what they have learned.

This bright distinction between SRL and critical thinking or problem solving begins to cloud, however, when viewed from some perspectives. For instance, some underlying processes necessary to SRL are likely to depend on effective problem solving or critical thinking. Self-regulated learners must make decisions about where and when to study, must judge their own abilities, and must reason about which strategies will be most effective within a given context. Hence, some forms of effective reasoning and problem solving may underlie the process of SRL. Indeed, the popular instrument developed by Pintrich and his colleagues (Pintrich et al., 1993) to assess SRL includes a subscale for critical thinking, although it is less often used than other subscales as an indication of SRL. As well, engaging in higher order thinking is an effective or even necessary step within some learning activities. Students who are effective at SRL should also have the capacity to engage in these processes. Finally, some of the processes students use within SRL may also be useful for managing their problem solving and critical thinking activities. Setting goals, monitoring progress, and reflecting on the process may be as effective when applied to solving problems or thinking critically as they are for studying. In sum, SRL and the 21CC of critical thinking and problems solving may be theoretically distinct, but they are also likely to be closely associated with one another in practice.

SRL as a predictor of academic performance and attainment

The emergence of SRL as a prominent framework over the past 25 years is due, in part, to the empirical evidence supporting its relation to adaptive academic outcomes. Prior research has tied aspects of SRL to a variety of indicators of students’ academic functioning. Space
limitations and the breadth of this research prohibit an exhaustive review. Instead, research findings with regard to the relation of SRL and three key types of outcomes are reviewed briefly.

*Achievement.* Arguably, the most critical question for many would be whether engagement in SRL promotes or increases students’ acquisition of knowledge and skills within core content areas such as mathematics, reading, writing, and science. Summarizing across many studies, the answer to this question appears to be yes, students’ engaging in SRL or who have been trained in self-regulation processes do tend to evidence greater academic achievement or learning (Baker, Chard, Ketterlin-Geller, Apichatabutra, & Doabler, 2009; Dignath, Buettner, & Langfeldt, 2008; Guthrie, McRae, & Klauda, 2007). Most directly, empirical evidence indicates that different indicators of SRL can be used to predict students’ teacher-assigned grades. In one early study, for instance, Pintrich and DeGroot (1990) found evidence that motivational, cognitive, and metacognitive aspects of SRL predicted students’ performance on homework, seatwork, quizzes and overall grades in a group of seventh graders. Consistently, Wolters and Pintrich (1998) found that self-regulatory strategies reported by a separate sample of junior high school students could be used to explain their semester grades in mathematics, English and social studies. In a similar vein, studies consistently show that higher achieving students evidence greater engagement in different aspects of SRL when compared to lower achieving students (VanderStoep, Pintrich, & Fagerlin, 1996; Zimmerman & Martinez-Pons, 1990). Although less numerous and compelling, studies documenting similar relations with standardized achievement have also been completed. Cleary, Platten and Nelson (2008), as an example, found evidence that high school students provided instruction in SRL showed higher gains on a standardized test of biology achievement than those who did not get the instruction. Perhaps most clearly, engagement or training in SRL has also been found to positively predict
young students performance on standardized measures of reading comprehension (Taboada, Tonks, Wigfield, & Guthrie, 2009; Wigfield et al. 2008).

*Engagement.* In addition to academic achievement, SRL has also been studied as a predictor of students’ engagement, effort, or persistence in academic tasks. As might be expected, students characterized as more self-regulated learners tend to evidence greater effort, engagement or persistence in the short term. For instance, students in an instructional condition designed to improve their SRL tended to show greater engagement in reading both in school and out (Wigfield et al., 2008). Consistent with this pattern, Wolters (2003b) also found that facets of SRL could be used to explain college students’ reported level of procrastination. Notably, the research examining engagement supports the broader conclusion that it is the motivational beliefs and attitudes inherent in SRL rather than the cognitive or metacognitive skills that are most useful for understanding these outcomes (Pintrich & Zusho, 2002). In other words, students’ engagement and persistence with regard to academic tasks are primarily a function of their interest, value, self-efficacy and other motivational factors.

*Attainment.* Unfortunately, few studies have investigated directly whether SRL can be used to understand more global or longer term indicators of educational attainment such as graduation from high-school or enrollment and/or completion of a post-secondary degree. In a summary of one on-going project, Weinstein, Husman, and Dierking (2000) did state that, compared to those who did not take it, college students who completed an adjunct course designed to improve their SRL evidenced a higher rate of graduation after five years despite initially lower SAT scores. In line with this work, Kitsantas, Winsler and Hui (2008) found that students who had left college after two years had reported lower levels of some, but not all, aspects of SRL during their first semester in school. Although not explicitly based on a model of
SRL, many studies have highlighted the importance of students’ motivation for understanding their educational attainment. In particular, motivational components of SRL such as self-efficacy, value, and interest have been implicated as predictors of students’ intentions and actual educational attainment.

**Instructional Interventions Designed to Improve Students’ SRL**

A number of interventions or programs designed to improve SRL have been developed and investigated in prior research (Boekaerts et al., 2000; Schunk & Zimmerman, 1998). Given that SRL is a multidimensional construct that incorporates many individual components, however, it is not always a simple process to identify whether an intervention is an attempt to improve SRL. For instance, there is an extensive literature on efforts to teach students’ individual learning or memory strategies. Devoid of any consideration of metacognitive or motivational issues, however, much of this work may not best be considered as efforts to improve SRL. To reduce the effects of this uncertainty, only interventions that explicitly use a SRL framework are included within the present discussion. Even when using this more restricted criteria, however, there is ample evidence to support three key conclusions concerning instructional efforts to improve SRL: it can be accomplished within the context of learning core content, it can be implemented across most academic levels, and it can be successful with regard to many different types of learners.

One conclusion supported by prior research is that SRL can be used as a model for developing extensive interventions to improve learning and performance in many core subject areas including reading, writing, mathematics, and science. Using a SRL framework, for instance, Guthrie, Wigfield and their colleagues (Guthrie et al., 1996; Guthrie et al., 2007; Guthrie et al., 2004; Taboada et al., 2009; Wigfield et al., 2008) developed an instructional
system that was designed to improve young students’ reading by improving both students’ motivation as well as their use of cognitive and metacognitive strategies. Across several empirical studies, this intervention plan has been used successfully as a basis for improving the performance of young readers (Guthrie et al., 2004). Similarly, Harris, Graham, and their colleagues developed and empirically tested an extensive instructional model to support young children’s writing abilities (Graham, Harris, & Mason, 2005; Harris, Graham, & Mason, 2006; Saddler, Moran, Graham, & Harris, 2004). The core features of this intervention model explicitly draw from a SRL framework to target and develop both students’ motivational beliefs and their repertoire of writing strategies. SRL has also been used as a basis for improving students’ performance in mathematics (De Corte, Verschaffel, & Op’ T Eynde, 2000; Romdass & Zimmerman, 2008). In two separate studies of German adolescents, for instance, Perels and colleagues (Perels, Dignath, & Schmitz, 2009; Perels, Gurtler, & Schmitz, 2005) designed a comprehensive intervention for students in their mathematics courses that included efforts to improve students’ goal setting, motivation, strategy use, and self-reflection. Findings show that students who complete this training evidence improved mathematical problem solving compared to students who got the same training in problem solving but without the SRL components. Improvements in students’ understanding and performance in science has also been improved with interventions founded on a model of SRL (Cleary et al., 2008). In sum, prior empirical research provides substantial support for the overall conclusion that improvements in students’ SRL can be accomplished within core content areas, and that improving SRL can increase the students’ ability to learn core content knowledge and skills.

A second conclusion that can be drawn from prior research is that SRL can be used as a framework for effective instructional interventions across a range of academic levels. As
indicated above, prior studies have proven effective at improving reading and writing skills of young elementary school children. Junior and senior high school students also have been to benefit from instructional interventions based on SRL. For instance, Zimmerman, Bonner and Kovach (1996) authored a book designed to assist any instructor at the middle or high school level who wanted to tailor their instruction in a way that would improve students’ SRL. Using similar principles, Cleary and his colleagues (2008) conducted studies with ninth graders showing improvement in science learning. As well, SRL has repeatedly guided efforts to improve the academic performance of college-aged students. As with younger children, some of these efforts show that relatively short term interventions can be effective. For instance, Azevedo and Cromley (2004) found that students trained in SRL showed improved learning of the circulatory system while using a computerized instructional module when compared to those who did not receive the training. Within post-secondary contexts, efforts to improve students’ SRL within the context of one regular course tailored to this purpose are also common. Typically, the instruction in these courses combines learning content knowledge in some area of psychology (e.g., learning theories) with activities focused more on improving students’ personal efforts at SRL (Hofer & Yu, 2003; Hofer, Yu, & Pintrich, 1998; Weinstein et al., 2000). Empirical studies evaluating the effectiveness of these courses indicate that they do serve to improve students’ academic performance more broadly including their overall grade point average. Textbooks designed to support these courses that specifically draw on a model of SRL also have been developed (Dembo, 2000; VanderStoep & Pintrich, 2003). In sum, prior research indicates that SRL is a viable framework for designing interventions to improve learning in student populations ranging from early elementary school to post-secondary.
A third point supported by prior research is that SRL interventions are effective not just for the general student population, but also for various groups of learners who are at risk for academic difficulties. Perhaps most prominently, SRL interventions have been used as way to improve the academic performance of students with diagnosed learning disabilities. In one line of research, Butler (1995; 2003) has documented the efficacy of using SRL as model for improving the learning and achievement of adolescents and college students with learning disabilities. Other work shows the efficacy of similar types of interventions for younger students from various special education populations (Baker, et al., 2009; Harris et al., 2006; Saddler et al., 2004). Across several studies, instructional interventions based on SRL have also been used successfully with economically disadvantaged students. For instance, Graham, et al. (2005) found improvements in writing abilities after an SRL intervention with a high poverty minority sample from urban neighborhoods in the Washington DC area. As well, Guthrie et al. (1996) successfully used their intervention to improve aspects of students’ reading skills and motivation within a lower-income ethnically diverse sample of elementary school students. Similarly, Elawar (1995) found that poor, low achieving Hispanic students in third through eighth grade who received instruction in the metacognitive components of SRL in a mathematics setting produced higher gains on a pre-post test than students who did not receive the instruction. As a whole, prior empirical work indicates that, in addition to students from the general school population, SRL is an effective framework for providing instructional interventions for disadvantaged students and others at risk for school failure.

Conclusion and Future Directions

The present consideration of self-regulated learning and its relation to the 21st Century Competencies framework provides for three general conclusions as well as some implications for
future research. One conclusion is that SRL encompasses many important skills, abilities and attitudes that substantially overlap with those viewed as core competencies for the 21st century. The level of conceptual similarity makes some of the core competencies appear nearly synonymous with dimensions of SRL. This conceptual congruity lends support to the critical importance of competencies such as self-direction, adaptability, flexibility, and collaboration. A more practical implication of this congruity is that the substantial and growing amount of empirical research examining SRL can be applied to understanding the 21CC. That is, findings from the research on SRL can be used as evidence for drawing conclusions regarding important questions about the core competencies within the 21st century framework. Hence, those advocating the 21CC should look toward greater integration with the empirical findings produced by researchers studying SRL. As well, the research on SRL can be used as a guide for conducting future work intended to further establish the theoretical foundations of the 21CC framework.

A second conclusion is that SRL provides a viable theoretical basis for designing effective instructional interventions that, across diverse academic levels, populations of students and core content areas, can produce improvements in important academic outcomes. SRL is an effective framework for designing and implementing instruction that will improve students’ learning, achievement and perhaps their longer term educational attainment. Again, one implication of this conclusion is that these same instructional models can be used to facilitate students’ acquisition of the competencies within the 21st century framework. Moving forward, prior research focused on SRL should be gleaned in a comprehensive way to identify the key features that make these interventions successful, and this information should be used to develop applications that are consistent with the broader 21st century model.
A third general conclusion from this review is that empirical research that continues to foster a greater understanding of SRL and its relation to the 21CC framework would be useful. There are many fertile avenues for this research to take, including efforts that continue to establish the conceptual links between SRL and academic engagement and attainment for diverse groups of students across core content areas. One specific need is for research that maps out the developmental trajectory of when students should develop efficiency with regard to the knowledge and skills that underpin different facets of SRL or the 21CC. Although it is clear that being a self-regulated learner can contribute to students’ learning and educational attainment, it is not at all certain when particular components of SRL should be or can be developed. For instance, at what age level should students begin to develop particular self-regulatory skills, such as time management, motivational control, or simple metacognitive awareness? Similarly, one can ask what instruction in these different skills or abilities should be like across different grade levels in order to foster their optimal development. Lacking more definitive insights into these issues, it is difficult to know when to deploy interventions that will promote or remediate these skills. Longitudinal research or other efforts to better understand the developmental trajectory of SRL would provide some of the insight needed to address these issues.

Another specific need for future empirical research is to establish assessments that reflect more integrated views of SRL in a single instrument or methodology. A number of self-report, observational, and more implicit measures of SRL already exist (Azevedo & Cromley, 2004; Cleary, 2006; Pintrich et al., 1993; Weinstein, Palmer, & Schulte, 1987). These different assessments, however, suffer from several key shortcomings (Winne & Perry, 2000) and are not entirely consistent with current theoretical views of SRL. Hence, newer assessments that account for all the major facets of SRL, are viable across academic levels or developmental
periods, and allow for diagnosis and design of individual instructional interventions would be a great benefit to both researchers and educational practitioners.

To conclude, self-regulated learning has been viewed as both a process that facilitates students’ effective performance in academic settings and as valuable outcome of the schooling process for more than 20 years. Students characterized as self-regulated learners are seen as more effective, efficient, and productive students when compared to their peers who fail to self-regulate. Further, development as a self-regulated learner within academic contexts is thought to provide a foundation of volition, motivation, and self-management that can transfer to important contexts outside of school. Integrating this rich history of theoretical and empirical research with the applied goals and practical concerns emphasized within the 21st century competencies framework should provide a union that will benefit all involved.

References


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