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Jennifer Lock
University of Calgary, jvlock@ucalgary.ca

Sarah Elaine Eaton
University of Calgary, seaton@ucalgary.ca

Elaine Kessy
University of Calgary, ekessy@ucalgary.ca

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Fostering Self-Regulation in Online Learning in K-12 Education

Jennifer Lock

University of Calgary

Sarah Eaton

University of Calgary

Elaine Kessy

University of Calgary

Current educational trends identify self-regulation as an essential skill for today's K-12 students. Online learning environments provide a unique opportunity for teachers to use the various features to cultivate student self-regulation. Through a review of the literature, self-regulation has been defined and key strategies have been identified that support self-regulated learning in online learning environments. Course design, goal setting and orientation, self-efficacy, scaffolding, and reflection are identified as key factors that foster student self-regulated learning skills. The article concludes with implications for teacher education.

Keywords: Online Learning, Self-Regulated Learning, Teacher Education

Introduction

Over the past two decades, there has been rapid growth of online learning in both educational and training sectors. Online K-12 education is now offered in all 50 states, plus the District of Columbia (Watson, Murin, Vashaw, Gemin, & Rapp, 2011; Kennedy & Archambault, 2012). In Canada, there is a similar growth pattern with online and blended learning in K-12 (Barbour, 2013). According to Christensen, Horn, and Johnson (2011) by 2020, 50% of high school classes will have an online component. Given this reality, there is a need for pre-service teachers to develop the skills to teach effectively in online environments. Teacher education programs that focus solely on preparing teachers to teach in traditional classrooms are doing a disservice to these emerging professionals. We argue that teacher education programs must address the reality that 21st century teachers need the knowledge and skills to teach effectively in online environments.

We focus specifically on one element of online education that may significantly benefit learners, which is self-regulation. There is an expectation that online students are self-directed and self-regulated learners who can manage their own learning processes. It cannot be assumed that students will have this skill or have it to the degree required for the nature of the learning needed in an online course. Rather, teachers need to carefully consider and purposefully plan and facilitate student learning in support of the development of self-regulation in an online environment. This article addresses the need for both pre-service and in-service teachers to be able to effectively teach online K-12 students the skills needed to become self-regulated learners.

We begin the article by defining self-regulation and articulating a rationale for why instructors in online K-12 environments need to help develop students' ability to self-regulate their learning. For the purpose of this article, we have focused on secondary students in the development of self-regulation. This is followed by identifying guidelines for teacher education and practice through strategies and technique that instructors can integrate into their courses to support all students in enhancing their self-regulation skills. Fostering the development of self-regulation requires purposeful planning and intentional facilitation.

Online Learning

According to Allen, Seaman, and Garrett (2007) traditional *face-to-face* instruction has between 0 to 20% of the course content delivered online, whereas *blended learning* would have between 30 to 79% of content delivered online. Therefore, *online learning* would involve 80% or more of the course content delivered online. The earliest forms of online learning, according to Harasim (2012), occurred in the mid-1970s where individuals used email and computer conferencing. "Educational experimentation and student interest in the new communication technologies ignited exploration, and, as a result, computer-mediated communication (CMC) became not only course content but pedagogical process" (p. 28). Online learning, as defined by Harasim (2012), is "learning that involves the use of computer networks such as the Internet, World Wide Web or Local Area Networks. It can be synchronous (for example, using video conferencing) or asynchronous (i.e., using computer conferencing), instructor-facilitated or solely computer-based" (p. 179). Adding to this definition, "online learning integrates independence (asynchronous online communication) with interaction (connectivity) that overcomes time and space constraints in a way that emulates the values of higher education" (Garrison, 2011, p. 3).

The proliferation of online learning technologies and universal internet access has caused online education to increase at a rapid rate at both the post-secondary and high school levels. "An increasing number of universities are incorporating online environments into courses of all kinds, which is making the content more dynamic, flexible, and accessible to a larger number of students" (Johnson, Adams Becker, Estrada, & Freeman, 2014, p. 10). In the United States, 6.7 million higher education students are enrolled in at least one online course (Allen et al., 2011). They noted that "[t]he proportion of all students taking at least one online course is at an all time high of 32 percent" (p. 4). Further, Barbour (2013) reported that currently over 140,000 high school students are participating in K-12 online learning in Canada (p. 7). Online learning technologies have become an important part of high school education delivery in Canada. Barbour (2013) also explained that research into the design, delivery, and support of K-12 learning has not kept pace with the growing practice.

Johnson et al. (2014) argued there has been a notable shift in perception about online learning. It is now "seen as a viable alternative to some forms of face-to-face learning" (p. 18). Educators and students are exploring and valuing the affordances that technology offers in support of learning. "Online learning environments can offer different affordances than physical campuses, including opportunities for increased collaboration while equipping students with stronger digital skills" (Johnson et al., 2014, p. 10). In turn, teacher education must adapt to meet this changing landscape.

Changing Roles of the Teacher in Online Learning

Teachers must take on new roles to manage online learning effectively (Guri-Rosenbilt & Gros, 2011). However, it is not clear what these roles should be. "The teacher's role is becoming

that of a mentor, visiting with groups and individual learners during class to help guide them, while allowing them to have more of a say in their own learning” (Johnson, Adams Becker, Estrada, & Freeman, 2015, p. 29). The New Teacher Project (2014) examined the shift to online and blended learning and the challenge created in terms of the role of the teacher. They argue with a traditional teaching model the role of the teacher uniform whereas in a blended environment is “more fluid... The role of the lone traditional teacher is being replaced by teams of educators who individually assume the responsibilities of a Researcher & Developer, Integrator, and Guide” (p. 2). Within this new role, teachers need to be able to guide, facilitate, and scaffold learning.

Self-Regulation in Online Learning

One unique challenge is how pre-service and in-service teachers can design and support student learning to foster the development of self-regulated learning skills. Teaching online is more than presenting content and assessing knowledge acquisition. Rather, for students to engage in learning content, they must employ a variety of skills. One critical skill is self-regulation. A key problem of practice is how we can educate pre-service teachers to develop the skills necessary to design learning that supports students to cultivate self-regulatory skills, particularly in an online environment.

Using a social cognitive view, Zimmerman (1989) described self-regulation in terms of the learner’s ability to be metacognitively, motivationally, and behaviorally active in their own learning process. Paris and Paris (2001) further refined the concept by noting that the learner’s actions are directed by a sense of autonomy and control, which in turn leads to monitoring, directing, and regulating actions towards goals of information acquisition, expanding expertise and self-improvement. Lynch and Dembo (2004) emphasized the external self-regulatory attributes that contributed to distance learner success. They identified “motivation (self-efficacy and goal orientation), Internet self-efficacy, time management, study environment management, and learning assistance management” (para. 10). Zimmerman and Tsikalas (2005) described three cyclical phases in self-regulation: forethought, performance, and self-reflection. Perry and Winne (2006) emphasized the importance of learner beliefs. Students who focus on what they can control create an incremental set of learning strategies that serve them well in a variety of challenging academic situations.

Theoretical Framework: Community of Inquiry

The Community of Inquiry (CoI) theoretical framework (Garrison, Anderson, & Archer, 2000) was developed as a conceptual model to understand how computer mediated communication (CMC) can support an educational experience. Its creators also noted that online learning can enhance classroom learning (Garrison & Akyol, 2013a). The element of the CoI of most interest for the purposes of this article is that it provides a lens to support the design and facilitation of self-regulated learning in online environments. As noted by Garrison (2011), the CoI “provides the environment in which students can take responsibility and control of their learning through negotiating meaning, diagnosing misconceptions, and challenging accepted beliefs -essential ingredients for deep and meaningful learning outcomes” (p. 22). The community of inquiry is comprised of three interdependent elements: social presence, cognitive presence, and teaching presence. The nexus of the three is the educational experience, which results in deep and meaningful learning (Garrison & Anderson, 2003).

Social presence is “the ability of participants in a community of inquiry to project themselves socially and emotionally, as ‘real’ people (i.e., their full personality), through the medium of communication being used” (Garrison et al., 2000, p. 94). This element “describes the learning climate through open communication, cohesion and inter-personal relationships” (Akoyl & Garrison, 2011, p. 185). Social presence is a needed precondition in support of purposeful learning experiences (Garrison & Cleveland-Innes, 2005). *Cognitive presence* is “the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse in a critical community of inquiry” (Garrison, Anderson, & Archer, 2001, p. 11). Cognitive presence is operationalized through the four-phase process of the Practical Inquiry model: “triggering event, exploration, integration and resolution. This conceptualization is consistent with a collaborative constructivist educational experience” (Akoyl & Garrison, 2011, p. 185). Garrison (2011) argued that students and instructors both contribute to teaching presence and that “students must be encouraged to become critical thinkers and be self-directed in monitoring and regulating their learning appropriate to the task and their ability” (p. 62). *Teaching presence* is “the design, facilitation and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes” (Anderson, Rourke, Garrison, & Archer, 2001, p. 5). “Teaching presence brings all the elements of community of inquiry together in a balanced and functional relationship congruent with the intended outcomes and the needs and capabilities of the learners” (Garrison, 2011, p. 25).

With the CoI framework, students are not learning in isolation. Rather, there is a “dynamic relationship of self and co-regulation of learning concurrently” (Garrison & Akyol, 2013b, p. 85). As such, students are both learners and teachers. They have the “responsibility to construct personal meaning and to assume the role and responsibilities to facilitate and direct that process individually and collaboratively” (Garrison & Akyol, 2013b, p. 85). Cognitive presence embraces the inquiry process, whereas the teaching presence establishes the roles and responsibilities of the student in the online CoI (Akyol & Garrison, 2011). According to Garrison and Akyol (2013b), when cognitive and teaching presences are integrated the full importance of both self and co-regulation are realized.

Self-regulated Learning

Broadly speaking, academic self-regulation refers to learning behaviors that are active in nature and contribute to the achievement of goals. In The New Media Consortium Horizon Report 2015 K-12 Edition (Johnson et al., 2015) it was noted that one of the key long-term impact trends in education is the shift to deeper learning approaches. This deeper learning includes the integration of soft skills such as “mastering communication, collaboration, and self-directed learning” (p. 10). Online learning provides a unique opportunity to teach such soft skills as self-directed learning. This teaching and scaffolding of self-directed learning can occur in the K-12 and teacher education contexts.

From the literature, five key elements emerged that are required to support self-regulation in online learning environments. Each of the following speaks to the elements of CoI, which are social presence, teaching presence and/or cognitive presence and the interrelationship of them: purposeful design of the online environment, goal setting, fostering self-efficacy, scaffolding, and reflection.

Purposeful design of the online environment. A purposeful design of the online environment needs to carefully consider how to create conditions to support student self-regulation. Instructional design of online courses should provide opportunities for learners to

choose to engage in scaffolding activities that improve their self-regulation skills and become actively engaged in their learning (Delen, Liew, & Willson, 2014). Strategies need to be put in place in the cognitive presence to create opportunities for students to engage in meaningful ways with the work. Further, the affordance of the technology can support the student learning through the use of checklists and intelligent agents that send reminders or reports when the last time the student logged in. The course design must create opportunities for students to customize and optimize their own learning experience. Instructors organize the course content and learner spaces clearly and give instructions as to how to navigate the course. They might also provide multiple tools for organization and planning such as course checklists and calendars. Additionally, the instructor includes clear, easy-to-find instructions for assignments, as well as exemplars and rubrics for student reference. Effective design offers students choice about the particulars of their assignments whenever possible. Students must invoke self-knowledge and creativity, which creates an opportunity for self-regulation and deeper learning to develop. Another helpful online tool for students is the inclusion of online surveys at multiple points in the course. These surveys enable learners to monitor their progress, measure their levels of understanding, and refine their approach to learning as necessary.

The course design should also support rich interactive experiences in the online learning space. Moore (1989) identified three types of interaction in distance education environments: (a) learner-to-instructor, (b) learner-to-learner, and (c) learner-to-content. A well-designed online course will have multiple ways for students to participate in these three types of interactions. Specifically, learner-to-instructor interactions can take place through private email, private or public discussion areas, through a telephone conversation, or during virtual office hours. Students can interact with one another by engaging in academic discourse in the asynchronous discussion area of the course, by working on a group project together, or by participating in a peer editing or coaching activity. Students might also interact with one another synchronously using virtual workrooms set up by the instructor (e.g., in Adobe Connect) or by setting up their own independent Google Hangouts. Synchronous student-to-student interaction can be supported by the instructor. Or, students might take the initiative to set up their own ways of interacting in real time. Students might also interact with content in a number of different ways. When there is a carefully curated selection of course content, students are required to make active choices and decisions about what and how they will interact with these materials. Interaction between the student and content can also exist outside the online classroom. Under the direction of the instructor, external websites and content experts can be utilized, which enriches the learning experience by creating a real world connection.

Goal setting. There must be opportunities for goal setting and goal orientation both in the design and in the facilitation of learning. Within the online environment, it is helpful for an instructor to create conditions where students are establishing goals and developing work plans to support their academic success (Dabbagh & Kitsantas, 2012). According to Hayes, Uzuner-Smith, and Shea (2015), goals and standards must be explicit in course syllabi and also referred to in instructor feedback. This helps students learn how to achieve goals. Through the teaching and facilitation, instructors should not give direct instruction. Rather, they should provide guidance through hints and asking questions to promote student independence. Cho and Shen (2013) noted that intrinsic goals are more powerful than extrinsic goals for the development of self-regulation habits and academic success for students. They suggested that instructors can promote this by using problem-based learning.

Instructors cannot assume that all students understand the process of setting goals. Rather, they must be actively guided through the process. Through the purposeful design and actions of the teacher, students can learn how to establish clear, challenging, and yet attainable goals. Hayes et al. (2015) reported, “it is important to make goals and standards explicit in course documents, such as syllabi, assessment instructions, rubrics, etc., and make specific references to these in the feedback provided” (p. 12). Further, “[instructors] should provide hints for improvement and ask questions that provide learners with an opportunity to clarify their thoughts and rethink their actions” (Hayes et al., 2015, p. 12). When teachers establish clear goals in the course syllabi and refer to them when giving feedback, students get a sense of what attainable goals look like and how to take action to achieve them. Students also become better at setting and achieving goals when ongoing assessment of goal setting and attainment is facilitated. Goal setting can be done at the beginning of a course, but also at subsequent intervals, such as the midpoint of a course. Students can also support each other in setting and attaining goals by sharing experiences and learning from each other, in terms of goals and strategies for success. For example, students might share their work plan for the semester and get feedback from others.

Fostering self-efficacy. Structures and supports need to be integrated in the online environment to foster the growth of self-efficacy. Student self-efficacy must be highly encouraged (Liaw & Huang, 2013) in online environments given learners may quickly feel isolated or not supported in contrast to what they may experience in a face-to-face learning environment. Within teaching presence, Cho and Shen (2013) suggested such items as proper design, instruction, facilitation, and feedback help foster student self-efficacy. Through a strong teaching and social presence, interaction among students and their instructor help promote a sense of belonging and connection. The development of good communication strategies that foster the development of community and connection helps relieve potential anxiety that may emerge when working online.

Self-efficacy is an essential component of building self-regulation skills that can be encouraged by the instructor. Design and support systems must work together to create a sense of belonging and community, which is particularly important in an online learning environment, where the potential to feel isolated is high. Self-efficacy can be fostered through the teacher introduction and subsequent student introductions, as well as other welcoming or icebreaking activities. Through these activities, students learn of others and find common interests, which may be helpful when selecting members for group work. Also, such activities develop a sense of presence transforming names on the screen to being people who come with rich experiences and insights to the work. Learning about others communicates that the student is not alone, and that others are experiencing similar thoughts and feelings.

Excellent communication can also lead to the promotion of self-efficacy. The teacher models this by actively participating in class discussions, and providing specific, meaningful formative and summative feedback throughout the course. Teachers develop and project the sense that each student is an important contributor to the knowledge of the whole group. Teachers acknowledge and appreciate the unique skills and experiences of each learner, and encourage growth. One simple, yet effective way to acknowledge the importance of each student is to refer to them by name and remember key details about each student such as the topics of their projects or other personal interests that the student may have such as sports or hobbies. The teacher often takes on more of a mentoring role, coaching students on how to be the stewards of their own learning.

Scaffolding. Scaffolding of learning “occurs at the intersection of teaching presence and cognitive presence. The intentional design of activities helps move learners from social relationships to the development of cognitive relationships designed to foster deep and meaningful learning opportunities” (Lock & Redmond, 2009, p. 183). Scaffolding of student learning by an instructor requires knowing where the student is and implementing appropriate strategies and techniques (e.g., questioning, probing) to advance student learning. Using Vygotsky’s (1978) zone of proximal development (ZPD) requires the instructor to provide the appropriate and needed support to assist the student in achieving the particular learning task. Cho and Shen (2013) found that students are supported when instructors consistently monitor their individual and group activities and provide guidance when necessary. Hayes et al. (2015) acknowledged that scaffolding is important and can be facilitated by peers. When students share their process for working and achieving learning goals, learners envision multiple ways to resolve challenges and formulate their own process. It is important to note that the instructor must be present in these forums to ensure that misinformation is not spread and progress is being made.

Scaffolding plays a key role in helping students with their self-regulation. According to Silver (2011), it is incumbent upon the instructor to determine the student’s current knowledge and experience for the task, to link content to the current level of student understanding, to break the task into smaller components with opportunity for ongoing feedback, and to incorporate cues and prompts to help the student. For example, with a project or a paper, formative assessment can be used to provide qualitative feedback on drafts of the work, along with synchronous meetings to talk about the work. Through the planning stages, the instructor can play a key role in helping students to think through the work. Within this space the instructor might establish the initial scaffolding. However, the added interaction of others (e.g., students) will help scaffold the learning by adding, supporting, and extending the discussion. In such a situation, scaffolding occurs in community where the instructor creates the environment and provides the building blocks.

In preparing for online discussions, Lock and Redmond (2015) shared how they used examples of postings for analysis purpose that have been de-identified from previous semesters. Students along with their instructor review the examples and give “feedback in terms of readability, likelihood of reading it, and structure and made recommendation for ways to improve the posts” (p. 27). By working through such an activity, students are able to “identify qualities of good online discussion posts and then for them to mirror those qualities in their own work; it also made them familiar with the criteria for their assessment” (Lock & Redmond, 2015, p. 27).

Scaffolding might include such techniques as modeling or demonstrations. For example, instructors need to be active participants in the discussion forums. Their responses and participation in the online environment influence how students engage in the depth of the discussion. Instructors should provide exemplars of quality online posts and clear expectations for the asynchronous discussion in order to direct student work. In addition, within the first few weeks of the course, the instructor needs to model effective online discussion practice (e.g., asking probing questions, extending and deepening the discussion, sharing resources and/or examples so to make linkages). In the modeling, the instructor needs to establish an online presence.

Reflection. Students need to be shown how to reflect on their learning and to learn through reflection. Hayes et al. (2015) noted that reflection is part of the learning process. The

instructor within a project or course needs to encourage the setting of goals, the development of an action plan, the execution of the work, the evaluation of results, and then reflection on the entire process. In this reflection, questions can be used to help students gain insight into what worked, what were the challenges, and what students can do differently to better support their learning. An instructor may want to implement the practice of reflection-*in*-action, reflection-*on*-action (Schön, 1983) and reflection-*for*-action (Killion & Todnem, 1991) as a means to assess the current practice and to gauge the nature of the self-regulation that needs to be implemented as the student moves forward with the work.

Purposefully designed in the online course, along with assignments, there must be opportunities for reflection. Hayes et al. (2015) suggested,

whenever possible, after providing feedback on learners' performance or the products they produce, online instructors should have learners write a short reflection where they identify the criteria their work/performance was judged against, assess where their work/performance does not match the targeted goals, and decide what action(s) to take to close the gap(s) between current performance and good performance. (p. 12)

Students need to be taught how to reflect on their day-to-day work, along with reflecting at the end of an assignment or course.

Reflection needs to be woven throughout the course in meaningful ways. For example, as students work through a major assignment, they need to learn to pause to reflect on what they have done and what they need to do next. By taking time to think about the work, students can determine what has worked well, what has not and why, and what needs to occur as a next step in the work.

One approach to teaching students reflection includes the 'What? So What? Now What?' approach (Ash & Clayton, 2004). First, students identify what worked well and what did not (What?). Second, students reflect on why elements of the work succeed or failed and what they can learn from it (So What?). Finally, students plan their own action steps for what to do next to improve the work (Now What?). This type of reflection may also be incorporated into a mid-course reflection so to re-visit and possibly re-establish goals and expectations for the last half of the course.

A second example of reflection may be having students self-select assignments and/or components of their work they want assessed by the instructor. As they select the work, they would be encouraged to identify why this work and why it best represents the student learning. Lock and Redmond (2015) shared an example in their project where students

self-selected their best online discussion posts to be submitted for assessment. The evaluation of their work was not based on a quantitative perspective (e.g., how many times they posted) but on the quality of their online contribution to the dialogue. (p. 27)

Through this approach, students reflected on their learning using the criteria for assessment. The articulation as guided by the criteria requires students to reflect on their learning and their understandings. In addition, there are affective elements of online learning that instructors can implement to encourage student engagement, such as treating students as individuals who are important to the class. Finally, teachers can coach and empower students to develop their own

self-efficacy and self-regulation by building skills such as reflection, revision and self-assessment.

Summary

Self-regulation may look different in the online environment. Working in synchronous and asynchronous environments requires purposefulness in the design and facilitation of the social, cognitive, and teaching presence that results in rich educational experiences. Instructors must help students use the technological features of the synchronous and asynchronous tools in support of regulating their learning. For example, in a synchronous session an instructor may do a quick check using the emoticons to determine if the pacing is okay or if students understand or if students are questioning. Within an asynchronous environment, the use of checklist may provide a means for students to monitor their own work. Instructors must have a good understanding of the potential of the technology in relation to supporting self-regulation and then integrate it in the online learning environment.

Implications for Teacher Education

Online and blended learning are part of today's learning environments. "The issue is no longer whether or not online learning is or should occur, but rather how it is implemented" (Hathaway & Norton, 2013, p. 146). As reported by Kay (2006), many in-service teachers report they are not prepared for online teaching. Often teacher education programs offer a course focused on the use and integration of technology in teaching and learning (Kay, 2006), but still lack sufficient focus on designing, developing and/or facilitating online learning. As such, pre-service teachers are not gaining the confidence or competence of being able to design for and teach in online environments.

Teacher education programs need to provide pre-service teachers with online learning and teaching experiences in order to adequately prepare them for the realities of the profession as it exists today. As argued by He (2014), pre-service teachers need to have an "opportunity to experience quality online learning themselves" (p. 283). At that same time, it is important for pre-service teachers to learn about how to design, develop and facilitate learning in these technology-enabled environments. From their study of online student teaching, Graziano and Feher (2016) recommended that teacher education "should offer an online teaching methods course to prospective online student teachers"; "should require preservice teachers to take a minimum of two online courses from different faculty members before student teaching"; and "should lead efforts to develop a set of technology competencies for online teacher educators" (p. 510). As teachers take courses online, they can scaffold self-regulation into their own learning process to become more cognizant of themselves as online learners. In turn, they would be in a better position to help their future online students become self-regulated learners in a digital age.

With the experience of online learning and being taught how to teach in online environments, it provides an opportunity for pre-service teachers to be introduced to the concept and strategies for self-regulation. They can learn to implement these skills in their own experiences, as well as appreciate why such skills should be taught to students. Within such learning experiences, pre-service teachers will develop their competence and confidence in supporting students in developing this critical 21st century learning skill. By taking some of their teacher training through online courses, pre-service educators can benefit from authentic online learning experiences that allows them to develop pedagogical skills and self-regulation, as they

prepare for a teaching career that will almost undoubtedly call upon them to teach in an online environment at some point in their future.

Conclusion

We argue that teacher education programs must address issue of online K-12 education in order to prepare these emerging professionals to meet the needs of 21st century learners. We have shown that self-regulation is an important component of contemporary education and a key element of online learning. It cannot be assumed that students in online environments will effectively develop their self-regulation skills. Rather, through deliberate design and facilitation efforts, teachers need to create and nurture the development of self-regulation skills through rich learning experiences. There is a need for pre-service and in-service teachers to know how to help online learners develop and implement these skills.

Features of the online learning environment (e.g., discussion forums, checklists) can provide a forum in which self-regulation can be taught, modeled and scaffolded in sustainable and personalized ways to meet the learning needs of all students. Through the intentionality of integrating and fostering self-regulation, teachers can provide students with the means to develop this capacity to enable them to have greater success in their learning. With the growth of online learning, pre-service along with in-service teachers need to have the knowledge and skills to support students in developing their self-regulated learning skills.

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