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Understanding classroom processes that support children's self-regulation of learning

Nancy E. Perry*

University of British Columbia

Abstract

Background. Research tying self-regulation and self-regulated learning (SRL) to early and continued success in school is accumulating. Specifically, children with low levels of self-regulation before school have difficulties in school, including adjusting to school, relating to teachers and peers, and performing academically. Importantly, teachers judge that a sizable number of children struggle in this area.

Aims. This paper describes how classroom processes – particularly tasks, instructional practices, and interpersonal interactions – can support children's development of and engagement in self-regulation and SRL. Primarily it is a retrospective review of my research in primary school classrooms that examines its strengths and limitations as well as insights gained from other people's research to frame directions for future research.

Results and Conclusions. Children regulate learning in classrooms where they have opportunities to engage in complex meaningful tasks, make choices, control challenge, and self-evaluate learning. However, opportunities to engage in complex tasks and exercise autonomy without instrumental support from teachers and peers can result in unproductive forms of learning and SRL. Attention to how much and what kinds of support children need for effective SRL is, therefore, crucial. Also, children likely experience opportunities for SRL differently, depending on dynamic relationships among task features, personal characteristics, and social and instructional supports in their classrooms. Focusing too much on whether and how opportunities for SRL are presented in classrooms is a limitation of previous research. Research also needs to focus on how learners interpret and take up opportunities for SRL.

Self-regulation refers to individuals' ability to control thoughts and actions to achieve personal goals and respond to environmental demands (Zimmerman, 2008). Children who are productively self-regulating attend to key features of the environment (e.g. instructions for carrying out academic or social tasks) and can inhibit automatic or

*Correspondence should be addressed to Professor Nancy E. Perry. The content of this manuscript was originally presented at the Psychological Aspects of Education Current Trends Conference (presented by the British Journal of Educational Psychology) in June 2011 at the University of Cambridge, UK (e-mail: nancy.perry@ubc.ca).

more favoured responses (e.g. expressions of frustration) that may not serve them well in particular situations (Blair & Razza, 2007; Ponitz, McClelland, Matthews, & Morris, 2009). They can resist distractions and persist through difficult tasks they perceive are necessary or worthwhile. They apply self-regulation to control cognition, emotion, and behaviour, and conduct themselves appropriately and flexibly in a wide range of contexts (Eisenberg & Spinrad, 2004). Finally, they recognize the value of delaying immediate gratification in favour of attaining a more important long-term outcome.

Self-regulated learning (SRL) involves metacognition, motivation, and strategic action (Winne & Perry, 2000; Zimmerman, 1990, 2008). Specifically, self-regulated learners exercise metacognition by reflecting on their strengths and weaknesses relative to the demands of tasks they are assigned and, where gaps exist, considering strategies that can be used to ensure their ultimate success. Their motivation for learning is revealed in the value they place on personal progress and deep understanding, their willingness to try challenging tasks that prompt self-regulation, and their constructive view of failure (i.e. viewing errors as opportunities to learn). Finally, strategic action is exercised by these learners as they approach challenging tasks and problems. They strategically choose from a developing repertoire of strategies those best suited to a situation and then apply them effectively.

Self-regulation supports both independent and social forms of learning (Zimmerman, 2008; Zimmerman & Schunk, 2011), and understanding the social and situated nature of regulating learning is an increasingly central theme in contemporary research on SRL (Hadwin, Oshige, Gress, & Winne, 2010; Hurme & Jarvela, 2005; Volet, Vauras, & Salonen, 2009). It is particularly relevant to classroom studies involving young children. Constructs, such as co-regulation, build on Vygotskian and neo-Vygotskian frameworks for learning, which emphasize the importance of instrumental interaction and activity to support SRL (McCaslin & Good, 1996; McCaslin, 2009). Co-regulation involves giving and receiving support that is instrumental to learning and SRL. It presumes at least one participant in an interaction has knowledge or skills that others need to achieve a goal. It reflects a transitional phase whereby learners gradually appropriate SRL through, for example, instrumental feedback or metacognitive prompts. In classrooms, co-regulators can be adults for children, or children for peers, but children can also co-regulate adults by providing information that helps adults to tailor or adjust instruction or support to better meet their needs.

Shared regulation describes how learners regulate activity in collaborative tasks by co-constructing understandings about tasks and pooling metacognitive, motivational and strategic resources (see Hadwin, Jarvela, & Miller, 2011; Hadwin *et al.*, 2010). Shared regulation of learning implies shared awareness of goals and joint monitoring of progress toward a shared outcome (Winne, Hadwin, & Perry, in press). Finally, productive co- and shared regulation of learning requires *socially responsible self-regulation*, which refers to how children regulate their actions in pro-social, socially competent ways (Hutchinson & Perry, 2012). It reflects self and other awareness plus a desire to see others succeed.

Why is self-regulation important?

All forms of regulation are associated with a wide range of positive outcomes both in and out of school. In school, self-regulation is recognized as a significant source of achievement differences among students and strategies that promote self-regulation

have proven effective for improving achievement in students who struggle academically, including students with exceptional learning needs, such as learning and developmental disabilities (Graham & Harris, 2003; Wong, Harris, Graham, & Butler, 2003; Zimmerman & Schunk, 2011). While the preponderance of the research on SRL has involved students in the intermediate grades and beyond, recent research involving very young children (preschool and into kindergarten) is beginning to link low levels of self-regulation before school to academic difficulties in school (Duncan, Claessens *et al.*, 2007; Mashburn & Pianta, 2006; McClelland & Tominey, 2011). In fact, performing well on tasks that require self-regulatory processes predicts early school achievement (Blair & Razza, 2007; Morrison, Ponitz, & McClelland, 2010), even more powerfully than IQ scores and knowledge of math and reading (Diamond, Barnett, Thomas, & Munro, 2007). Effective forms of self-regulation in kindergarten predict achievement gains through grade 6 (McClelland, Acock, & Morrison, 2006).

Kindergarten teachers rate skills, such as following directions, paying attention, working independently, and constructively coping with emotionally and motivationally challenging situations essential for school success (McClelland, Morrison, & Holmes, 2000; Rimm-Kaufman & Chiu, 2007; Rimm-Kaufman, Curby *et al.*, 2009). They report children who struggle with these regulatory processes have difficulty adjusting to school (e.g. meeting behavioural expectations, completing academic tasks, and relating positively to peers and their teachers). Furthermore, they judge that a sizable number of children struggle in this area.

Responding to these research findings, there is growing interest in young children's self-regulation in school. For example, McClelland and Tominey (2011) recently published a special issue of *Early Education and Development* on this topic and Calkins and Bell (2010) edited a volume, titled *Child Development at the Intersection of Emotion and Cognition*, in which connecting findings from developmental psychology to self-regulation in school is a central theme. Critically, educators and policy makers are attending to self-regulation and SRL as a characteristic of learners who are successful through school and beyond school and looking for ways to structure learning opportunities to enhance self-regulation in *all* learners. In my province, British Columbia (BC, Canada), self-regulation is prominent in the recently revised *Full Day Kindergarten Program Guide* (BC Ministry of Education, no date) and *BC Education Plan* for students in kindergarten through grade 12 (BC Ministry of Education, 2011). This is exciting news for researchers, such as myself, who have been studying how and what classroom tasks, instructional practices, and interpersonal processes influence independent, academically effective forms of learning, specifically SRL.

Since 1995, my research has had two main goals: understanding how (a) characteristics of classroom contexts create opportunities for children to develop and engage in SRL, and (b) helping teachers to design tasks and interact with students in ways that support SRL. The remainder of this paper describes my efforts to study these topics and my findings thus far. It is organized in four main sections. First, I describe principles that guide my research. Second, I review research methods I have found effective for identifying classroom processes that support young children's SRL. Third, I synthesize findings from research regarding these processes and provide elaborated examples from some of my studies. Finally, I conclude with a discussion of challenges for teaching and researching SRL and identify some potentially fruitful directions for future research about young children's self-regulation and SRL in school.

Guiding principles of my research

Three principles frame my research about SRL. First, I choose to focus on children in their first years of formal schooling (the primary/elementary grades). As indicated above, this group has been understudied in this regard until recently. Historically, theories of motivation and SRL presumed young children were not capable of the complex cognitive and metacognition processes SRL requires, and not vulnerable to motivational beliefs and values that undermine it (Pressley, Forrest-Pressley, Elliott-Faust, & Miller, 1985; Veenman, Van Hout-Wolters, & Afflerbach, 2006; Zimmerman, 1990). Consequently, in educational psychology, the preponderance of research on SRL has focused on students in the intermediate grades and beyond. However, research is accumulating that proves young children can and do regulate their learning and are vulnerable to the same academically maladaptive motivations as older students (Cain & Dweck, 1995; Smiley & Dweck, 1994; Fredricks & Eccles, 2002; Perry, 1998; Perry & VandeKamp, 2000; Perry, VandeKamp, Mercer, & Nordby, 2002; Whitebread, Bingham *et al.*, 2007; Whitebread, Coltman *et al.*, 2009). These findings corroborate research in developmental psychology, which indicates self-regulation, generally, is critical to children's success in school (McClelland & Tominey, 2011; Rimm-Kauffman *et al.*, 2009).

Second, my research takes place *in* classrooms, providing opportunities for examining SRL in naturally occurring activities unfolding in real time. This is in contrast to much of the research on SRL, which relies on participants' self-reports of metacognition, motivation, and strategic action. Colleagues and I have described the limitations of self-reports for studying SRL in all groups (Perry & Winne, 2006; Whitebread *et al.*, 2009; Winne, Jamieson-Noel, & Muis, 2002; Winne & Perry, 2000), but especially in young children. They are particularly challenged to generalize across tasks and time to evaluate how they typically self-regulate learning (Turner, 1995), which is what self-report tools ask them to do. Moreover, young learners reliably conflate their intentions with actions (Paris & Newman, 1990) and rate their performances optimistically (Turner, 1995; Winne, 1997), which leads to a positive response bias. In developmental research, studies of children's self-regulation have tended to rely on parents' reports or been conducted in highly controlled laboratory settings. However, researchers in this field also are recognizing the need to move their research into more naturalistic contexts, such as classrooms, to capture children's self-regulation *in situ* (Rimm-Kauffman *et al.*, 2009).

Importantly, classrooms are complex contexts that can reveal SRL as a set of dynamic and developing processes that interact with personal, social and contextual variables. Research in classrooms tests assumptions of previous methods that (a) learners' approaches to SRL are relatively consistent across time and settings; (b) features of contexts (e.g. tasks) are stable and affect all participants in a given context similarly; and (c) features of contexts affect what learners say and do, not the other way around (Martin, 2007; Perry & Rahim, 2011; Turner & Patrick, 2008).

Finally, I rely on social views of learning, including social cognitive and sociocultural theories, to interpret my research results. SRL in classrooms is rarely a solo event. It almost always involves interactions and transactions among individuals in contexts. Consistent with Vygotskian frameworks, my research emphasizes how adults and peers co-regulate children's learning and behaviour (McCaslin, 2004; 2009) and control gradually shifts from other to self-regulation (Gronlick & Farkas, 2002; Schunk & Zimmerman, 1997), or shared regulation (Whitebread *et al.*, 2007, 2009).

Methods

Primarily, I have used case study methods to achieve my research goals, designing studies that offer in-depth descriptions of “what’s going on” in classrooms with regard to SRL. According to Butler (2011), case study designs are particularly useful for addressing four contemporary concerns in research about SRL: (a) articulating relationships among emotion, motivation, cognition, metacognition, and behaviour constructs to develop an encompassing theory of SRL; (b) investigating students’ regulation of learning as a dynamic and recursive event or activity; (c) understanding how regulation of learning shapes and is shaped by context; and (d) advancing theories about how individual and social processes unfold in authentic activities. Butler and others (Creswell, 2007; Yin, 2003) characterize case studies as comprehensive and rigorous frames for inquiry and argue they are ideal for addressing how and why questions. For example, my research asks, “How do features of classroom contexts, including tasks, instruction and evaluation practices, and interpersonal relationships, present opportunities for children to develop and engage in SRL? How do children interpret and take up these opportunities?”

I have used of a variety of measures to address these questions, including observations, semi-structured and retrospective interviews, document collection and analyses, teacher ratings and focus groups. Predominantly, I have focused on classroom observations as a direct measure of opportunities for SRL in classrooms and used evidence from other measures to triangulate interpretations of observation data. My observation protocol (see Perry, 1998) leaves space for researchers to construct a running record of “what’s going on” in classrooms, then code it using six conceptual categories, which attend to ways children have opportunities to engage in SRL by: (a) participating in classroom tasks; (b) making choices; (c) controlling challenge; and (d) self-evaluating learning; as well as accessing support from (e) teachers and (f) peers who co-regulate SRL (e.g. ask metacognitive questions, offer feedback and suggestions, model and scaffold strategy use). Each category is rated 0–2 to indicate no evidence of the category, evidence of a category (e.g. choice) but not to support SRL, and evidence of a category to support SRL, respectively. Ratings can be aggregated across categories to obtain a total SRL score for quantitative analyses. Researchers have achieved high inter-rater reliability using this protocol (agreement $> .90$, $K = .91$; Perry, 1998; Perry & VandeKamp, 2000).

Table 1 summarizes the observations my research team conducted in a 5-year program of research. In each year of this project, we worked with between 11 and 17 teachers across the span of elementary/primary grades (kindergarten through grade 5). Observations typically occurred between January and June and spanned a 1.5 to 2-hour time period (from the beginning to the end of an activity). Observations have several potential strengths for studying SRL in classrooms with young children (Perry *et al.*, 2002). They reveal what teachers and students actually do versus what they say they do, which ameliorates the difficulties associated with self-report measures, especially for young children. Also, they provide detailed descriptions that potentially mark opportunities for children to engage in SRL and evidence of whether, in fact, they do. Finally, they illuminate how much and what kinds of support young students need to be self-regulating, which can inform the design of teaching practices to support SRL.

However, like any research tool, there are important limitations to observations (Perry *et al.*, 2002). For example, some aspects of SRL can be difficult to observe – metacognitive and motivational processes may not be visible. Also, observations typically reflect a researcher’s view about what is important to observe. In my studies,

Table 1. Summary of Classroom Observations Over a 5-Year Period

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Classrooms	16	17	17	11	15	76
Observations	77	84	78	33	52	324
<i>Classrooms By Grade</i>						
K	2	1	3	4	1	11
1	4	5	4	4	6	23
2	8	5	5	3	4	25
3	4	5	5	2	3	19
4	4	3	5	3	5	20
5	3	4	6	3	5	21

Note. Most classrooms enrolled students in more than one grade. Average age at the beginning of grades: K = 5, 1 = 6, 2 = 7, 3 = 8, 4 = 9, 5 = 10.

observations focus on six conceptual categories and, although observers try to remain open to emergent categories, it is possible they miss or misinterpret important indicators and information. This is why triangulation is so important. Moreover, researchers should not presume all participants interpret and experience contexts similarly (Turner & Patrick, 2008). Rather, they should be alert to the ways “individual agency and social processes interact dynamically and reciprocally in context” (Butler, 2011, p. 357). There is room for considering participants’ points of view (reports) along with direct measures of activity (e.g. observations) in classroom research. Finally, because my research designs focus intensively on a small number of classrooms for relatively long periods of time (6 months to a year), sample sizes are small and caution needs to be exercised in generalizing findings to a wider population (Butler, 2011). Replications support generalizations, but small *N* studies need to be brought to scale, which is an aim of my current and future research. Next I synthesize what classroom research has taught me so far.

What have I learned?

In general, children have opportunities to regulate learning in classrooms where they are engaged in *complex meaningful tasks* and where *student autonomy*, including choice, control over challenge, and opportunities to self-evaluate learning, is promoted and supported through highly effective forms of *co-regulation* (i.e. teacher and peer support that is instrumental to developing and engaging in SRL). Importantly, these over-arching categories are not mutually exclusive. In fact, tasks provide a context for embedding opportunities and support for SRL (Hutchinson & Perry, 2012) and opportunities for autonomy without instrumental support can result in academically ineffective forms of self-regulation, even chaos (Reeve & Halusic, 2009). Moreover, opportunities and support typically occur in the context of constructive discussion and questioning, making classroom discourse a critical feature of SRL promoting contexts.

Tasks

Classroom research reveals consistent and robust associations between the work students do in classrooms and their opportunities for developing and engaging in SRL

(e.g. Many, Fyfe, Lewis, & Mitchell, 1996; Neuman & Roskos, 1997; Perry, 1998; Perry, Phillips, & Hutchinson, 2006; Samarapungavan, Manizicopoulos, & Patrick, 2008; Turner, 1995). In particular, complex, meaningful tasks, which address multiple goals, focus on large chunks of meaning, and extend over long periods of time, are associated with opportunities for children to think metacognitively and behave strategically. These multidimensional tasks engage learners in a wide range of processes and allow for the creation of diverse products as evidence of learning (Rosenholtz & Simpson, 1984).

Most children find complex tasks intrinsically, or at least situationally, interesting (Renninger & Hidi, 2002) and both forms of interest are associated with motivation for learning. Moreover, complex tasks address children's learning and motivational differences by creating spaces for multiple zones of proximal development and customizing support for individuals (Brown & Campoine, 1994; Englert & Mariage, 2003). If well designed, they are not overly difficult for some students or too easy for others, and they are not so lacking in structure that students become frustrated or anxious about the clarity of expectations and their ability to meet them (Lodewyk, Winne, & Jamieson-Noel, 2009). Overall, research indicates that when students are invested in complex tasks they perceive are meaningful, they report deeper engagement and increased use of cognitive and metacognitive strategies to regulate learning (McCaslin & Good, 1996; Neuville, Frenay, & Bourgeois, 2007; Pintrich & DeGroot, 1990). Consequently, their performance is enhanced, and the success they experience increases self-efficacy.

Complex tasks are operationalized in classrooms as projects or integrated units of study. For example, in early elementary classrooms in BC, where I conduct my research, teachers often engage learners in researching animals to address curricular goals relating to the life sciences, but also language arts, technology, and social responsibility (BC Ministry of Education, 2005). In addition to researching animals to learn about their habitats, eating habits, babies, and enemies, I have observed teachers using this task to teach learners how to: (a) do research; (b) distinguish factual from fictional texts; (c) write expository text; (d) offer constructive feedback; (e) edit; (f) use the computer as a tool for writing; and (g) collaborate with peers (for detailed descriptions of this task, see Laura/Lynn in Perry, 1998 and Perry & Drummond, 2002; and MH in Perry *et al.*, 2002). In their classrooms, children accomplish these goals by engaging in a variety of processes (e.g. information seeking and sorting; planning for writing, writing, and revising) and with a variety of resources, including the Internet. Also, children produce a variety of artifacts to demonstrate their learning (e.g. written reports, illustrations, diagrams, models). Importantly, in the context of completing this complex task, children have opportunities to regulate learning by making choices, controlling challenge, and self-evaluating learning. These processes are elaborated below when I describe autonomy supportive practices.

Complex tasks support a dynamic view of task environments (Perry, Turner, & Meyer, 2006) where novelty, meaningfulness, and challenge are not presumed to be inherent properties of tasks. These features are reflected in how teachers design and implement tasks and students interpret and manipulate tasks. Moreover, task features interact with other features of the classroom context, such as instructional supports and evaluation practices. Researchers and teachers need to attend to the complex and dynamic relationships between task features and student characteristics. We cannot presume every student in a classroom interprets and experiences tasks similarly, and as the teacher intends or the researcher observes (McCaslin, 2009; Oyserman, 2007; Perry & Rahim, 2011).

Task Understanding

A growing body of research links students' interpretations of tasks, or task understanding, to their SRL and academic achievement (Butler & Cartier, 2004; Oshige, 2009; Winne & Hadwin, 1998). Specifically, learners who have a poor understanding of "what they need to do" are likely to set inappropriate learning goals and engage in ineffective strategies (Butler & Cartier, 2004), resulting in a product that is poorly aligned with a task's purpose or their teachers' expectations (Hadwin, 2006). Hadwin and Winne (in press) identify three aspects of task understanding – explicit, implicit, and contextual – and argue these are the basis for students' successful enactment of subsequent phases in the SRL cycle (i.e. accurate task understanding promotes appropriate goal setting and supports monitoring of progress). Explicit task understanding refers to learners' grasp of the task requirements, criteria for evaluation, and available materials – information that is typically stated directly by the teacher or presented in written instructions. Implicit task understanding refers to information that learners must infer from the more explicit elements of a task, task context, or their experience with similar tasks. Often, it includes learners' awareness of the task's purpose, relevant ideas and concepts, and strategies for completing it. Finally, contextual task understanding refers to learners' knowledge of how the task relates to larger, perhaps disciplinary or pedagogical, ideas and intentions. For example, in researching animals, students might be expected to learn about "doing" research or understand needs and dangers that are common to particular groups of animals (e.g. mammals need air and can be harmed by environmental toxins), or recognize that the teacher likes it when they share ideas.

Most of the research on task understanding has involved students in high school and post-secondary settings and findings indicate that forming accurate representations of tasks is challenging for students (Oshige, 2009). One study (Helm, 2011) investigated grade 2 children's explicit, implicit, and contextual understanding of sub-tasks in a unit on the lifecycles of frogs. The results indicated that developing an accurate understanding of task components, particularly implicit task components, was associated with gains in knowledge over the course of the unit and this was especially true for students who had low content knowledge at the start of the study. Helm's cross-case analysis involved 13 students in a single classroom, so caution is needed in drawing conclusions and making recommendations from it. However, it provides preliminary evidence that corroborates research involving older students (Oshige, 2009) and suggests attending to students' task understanding, as well as features of tasks, is warranted in classroom research about SRL that involves young learners.

Autonomy promoting practices

Research links authoritative, autonomy supporting teaching practices with student motivation and self-regulation (Reeve, Bolt, & Cai, 1999; Reeve & Halusic, 2009; Reeve & Jang, 2006; Stefanou, Perencevich, DiCinto, Turner, 2004). Teachers who support autonomy are responsive to students' needs and interests and want students to be active rather than passive in learning. Toward this end, they rarely offer solutions or use directives when interacting with students (Reeve *et al.*, 1999; Stefanou *et al.*, 2004). Rather, they privilege students' perspectives and encourage student initiative (e.g. when students are faced with challenges in learning, they ask, "What could you do?" instead of telling them how to solve problems). Students in autonomy supporting classrooms evidence thoughts and actions consistent with motivation and SRL (Stefanou *et al.*, 2004; Su & Reeve, 2011). They choose moderately difficult tasks, strive for deep

understanding, persist through challenges, and experience high levels of perceived confidence and enjoyment during learning, in addition to attaining positive academic outcomes. In contrast, students in classrooms they perceive are controlling (e.g. classrooms where students perceive they have low decision-making power and reward structures are extrinsic) are more likely to evidence anxiety, prefer easy tasks that ensure success, and depend on others to evaluate their work (Stefanou *et al.*, 2004). These findings are consistent across studies involving children in preschool through secondary school, and apply to students with exceptional learning needs and children in after-school programs (Reeve & Halusic, 2009).

My research has focused on how teachers use three practices to support autonomy and SRL: giving children opportunities to make choices, control challenge, and self-evaluate learning. For example, in the researching animals task I described above, Laura gave students in her class (ages 7 and 8) opportunities to make choices about what animal they wanted to research, what materials and people they would use as resources (e.g. encyclopedias, the Internet, peers, parents), how to present information (e.g. as text, diagrams, illustrations), who to work with (peers who are researching the same or a similar animal, peers who have knowledge or skills you need), where to work (on the floor, at your desk, in the computer lab), and how to organize their time (fact finding, drafting, revising). Many of these choices created opportunities for children to control challenge by, for example, choosing a familiar subject (i.e. an animal about which they had some prior knowledge), appropriately leveled materials, and easing the burdens of writing by choosing alternative presentation formats (see Figure 1). In addition, students could control challenge by collaborating with peers who had expertise or interests that were instrumental to their projects or moving to a location that was free of distractions or provided more space. Finally, Laura involved students in assessing their work (e.g. generating criteria for "good" research, considering personal characteristics in relation to the task's demands and standards, editing and revising writing, selecting samples from their projects to include in portfolios).

When children have opportunities to make meaningful choices in the context of learning, as they did in Laura's classroom, their interest and perceived competence for

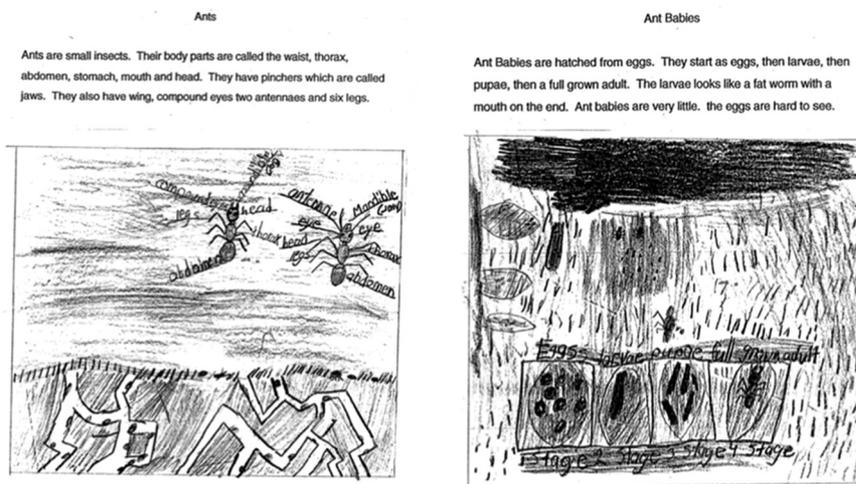


Figure 1. Diagrams from Mark's Research on Ants.

tasks are increased and they are more likely to increase effort and persist when the work is challenging (Stefanou *et al.*, 2004; Turner, 1997; Turner & Paris, 1995). Moreover, teachers can use choices to stimulate students' metacognition. For example, when MH asked her students (ages 6 and 7) to choose an animal to research, she asked them to consider three questions (first cited in Perry *et al.*, 2002, p. 11): "Am I interested [in the topic]? Can I find books [about the topic]? And can I read the books by myself, with a friend, or with an adult?" These questions prompted students to think metacognitively about their interests and abilities, features of the task environment, and then use tactics and strategies that would lead to success. Also these questions prompted students to use choices to control challenge by, for example, fitting learning or task conditions to their interests and abilities (Perry, 2004; Rohrkemper & Corno, 1988). Subsequently, MH elaborated, "I want you to be thinking in your head about what animal you would like to find out more about . . . Then look through the books in the classroom and library . . . If you would like to work with a partner, you can choose to do that." Involving children in reflective exercises (as MH did), or setting evaluation criteria and self-evaluating their work (as Laura did) gives them a sense of control over outcomes and increases their willingness to try challenging tasks (Paris & Ayers, 1994). Also, it prompts metacognition and strategic action because it requires learners to judge qualities of their learning processes and products and make adjustments to enhance them (Winne & Perry, 2000). In these ways, teachers' use of autonomy supporting practices supports SRL.

Researchers and teachers should attend to at least three important provisos for supporting autonomy in classrooms. First, giving students choices is often treated as synonymous with supporting autonomy, and SRL, but all choices are not created equal. For example, teachers in one study (Cordova & Lepper, 1996) reported giving students choices that were "instructionally irrelevant" because they were concerned they might make pedagogically poor choices if they were allowed to decide on instructionally significant aspects of an activity. Similarly, some teachers in my research have conflated giving students any choice – even whether to write with a red or blue pen – with supporting SRL. Stefanou *et al.* (2004) distinguished among three categories of autonomy support in their observations of teachers' practices: organizational, procedural, and cognitive. *Organizational* support gave students opportunities to participate in procedural decision-making (e.g. choosing who to work with on a collaborative assignment or when a project would be due) and *procedural* support allowed students to determine, for example, what form their work products would take or what project to complete to meet the learning objective(s). Stefanou *et al.* argued that organizational and procedural choices may be necessary but not sufficient to foster the kinds of deep engagement and learning that autonomy and SRL promoting practices seek to foster. To reach this goal, organizational and procedural choices need to be paired with *cognitive* support that asks students to justify their choices or evaluate aspects of their own and others decision-making. In other words, giving students the opportunity to choose the topic of their research on animals may not enhance their self-regulation if it is not accompanied by cognitive/metacognitive questions like those MH asked. Asking students to consider relevant person, task, and strategy variables prompted their regulation of learning.

Without cognitive/metacognitive support and activity, students may make poor choices, which leads to a second proviso for supporting autonomy and SRL in classrooms. A clear distinction needs to be made between *laissez faire* approaches to teaching and supporting SRL. My observations indicate teachers who are effective at

supporting SRL are acutely aware of students' needs and use very sophisticated teaching strategies to model thought processes, scaffold students' thinking and performing, and then fade support in response to students' mastery (Perry, 2004). Also, a distinction needs to be made between structure and control (Jang, Reeve, & Deci, 2010; Reeve, 2006; Reeve & Halusic, 2009). According to Reeve and colleagues, structure is present when teachers clearly communicate what they expect students to do, provide instrumental support that guides students' on-going activity, and offer constructive feedback that enables students to make adjustments to their learning processes and products. They emphasize that structure complements autonomy support – each contributes positively to students' motivation and self-regulation – and although structure can be used in controlling ways, control is not an essential element of structure (Jang *et al.*, 2010). Furthermore, the opposite of structure is chaos, which occurs when teachers' expectations are unclear or contradictory and when teachers ask students to produce outcomes without articulating how they can achieve them. Understanding these distinctions is critical because confusion about the role of structure and control may lead well-intentioned educators to undermine, rather than support, learners' motivation and SRL (Reeve & Halusic, 2009).

Finally, as indicated earlier, attention needs to be paid to learners' personalized interpretations of opportunities to regulate learning (Perry & Rahim, 2011). For example, McCaslin (2009) stresses opportunities may not be as equally distributed across learners within classrooms as researchers' descriptions tend to suggest. Highly effective teachers often tailor the choices they give to individual students to meet their particular learning needs (Perry, 2004), but how do learners interpret these disparities? Also, students in a classroom may interpret the same opportunities differently or respond differently to opportunities they perceive are more or less challenging, interesting, or important. Finally, individual students may respond differently to the same opportunities over time and across events depending, for example, on their efficacy or interest. Students' "dispositions toward school learning" come into play and understanding how these can support or inhibit their adaptive participation in activities would be a valuable addition to classroom research (McCaslin, 2009).

Co-regulation

Teachers who effectively support SRL act as co-regulating agents, providing students with just enough and just-in-time support for developing and enacting self-regulation (Perry & Rahim, 2011). They support or co-regulate learning through scaffolding, establishing familiar participation structures, enabling students to support one another, and engaging in non-threatening evaluation practices. Classroom discourse often is the vehicle for providing these kinds of support. Each of these supports is elaborated below.

Scaffolding

Teachers who support SRL offer explicit instruction and extensive scaffolding (e.g. through questioning, modeling, and feedback) to foster students' development of independent and academically effective learning processes, which many students would not achieve without this expert guidance (Brown & Campione, 1994; Englert & Mariage, 2003; Wharton-McDonald, Pressley *et al.*, 1997). In Laura's classroom, researching and writing about animals stretched across an entire school year and resulted in students producing three different reports, each reflecting an increasing

September-October	November-December	January-March	May-June
Focus is on creating a community of learners and developing frameworks for researching and writing about animals.	Research Project # 1 on Chipmunks is conducted. All activities are carried out as a class and regulated by Lynn.	Research Project # 2 on Penguins is conducted. Lynn guides activities but encourages students to do more fact-finding, organizing, and writing on their own.	Research Project # 3 on a topic of students' choosing is conducted. Students work independently on all aspects of their research and writing. They report back to Lynn and the group, who supply support when/where needed.

Figure 2. Progression from Teacher Co-Regulated to Student Regulated Research and Writing in Laura's Class.

amount of SRL. Figure 2 shows how Laura gradually ceded control for doing research to students over the course of the year. The first report, produced in the fall, was about chipmunks. Laura used this project to teach students about “doing research” (e.g. consulting multiple sources, observing the “real thing,” recording and organizing facts). Prior to beginning the project, she spent several weeks teaching students to write expository text. Together they read about animals, discussed them in terms of key words (appearance, habitat, food, etc.) that would become topics for their research reports, and described them in expository texts (first involving one paragraph, then several paragraphs that integrated facts from multiple sources on relevant topics). Laura described her actions as “spoon-feeding” students during this first iteration of the research and writing process. She was “modeling for the future . . . [Students] need to see an order, a structure . . . a way [they] can do it” (Perry & Drummand, 2002, p. 305).

In January through March, students researched and wrote a report about penguins. Although they shared a topic, Laura increased her expectations for independent fact finding and writing and gave students more control over what to do, how to do it, where to work, and who to have as helpers. She continued to support students at the start of each research and writing block by holding a class meeting to discuss progress, next steps, and strategies for solving problems. Also, she embedded mini-lessons where appropriate to address specific topics (e.g. a demonstration of how to copy and paste text on the computer) or support small groups (e.g. students having difficulty finding resources or organizing facts), and she made herself available to support individuals during independent work time. Finally, in May through June, students conducted independent research projects on an animal of their choosing. Reflecting on his research experience throughout the year, one of Laura's students commented, “Normally [the teacher] helped us with the whole research [project] but this is our own . . . the first two times we had to see how it works, how to do it” (Perry & Drummond, 2002, p. 306).

Classroom discourse was a key component of support for SRL in Laura's classroom. Laura used class meetings, mini-lessons, and more informal interactions with students (e.g. during work time) to provide the kind of cognitive support Stefanou *et al.* (2004) refer to as crucial for deep learning and SRL to occur. For example, during one meeting, Laura and her students discussed challenges they were experiencing with their

research. Topics included fact finding, consulting multiple sources and preparing a bibliography. Laura asked, "Has anyone got an arm on their [semantic] web that looks kind of weak . . . What can you do . . .?" Students brainstormed and Laura reinforced some solutions, "Yes. If you see something in a book on someone else's topic, share it with them . . . Do what you can and then I can help." Later Laura asked students if they were remembering to list their sources to make a bibliography and when one student asked, "What do we do if there is no author?" Laura asked another student to get an encyclopedia off the shelf and used an article in it as an example. Finally, Laura asked students how they might represent information in their reports, in addition to writing. Students responded, "Illustrations" and "Diagrams." Then they discussed how diagrams are different from illustrations. This meeting lasted 10 minutes and was but one example of how Laura engaged her grade 2 and 3 students in meta-level discourse about their learning and SRL. Such opportunities for talking about learning and SRL are a prominent feature of the support students receive in SRL promoting contexts (Perry *et al.*, 2002).

Familiar Participation Structures

Class meetings and mini-lessons are examples of familiar classroom routines, or participation structures, that are generic enough to apply to a variety of classroom activities and repeated often enough that students transition to them easily – they recognize the routine and know what is expected of them (Brown & Campione, 1994). Laura spent time at the start of each school year establishing many routines (e.g. norms and procedures for working alone, in pairs, in small groups; routines for sharing information; strategies for help-seeking and help-giving), so that later in the year "students [could] focus on learning" and she could focus on teaching new skills and the curriculum. She said, "Social and problem-solving skills are taught, modeled, and practiced . . . students learn they all must contribute . . . and [they] are given the tools they will need to be successful learners . . . It takes a lot of time, but it's time well spent" (Perry & Drummond, 2002, p. 302).

Similarly, MH (in Perry *et al.*, 2002) developed routines and engaged in discourse about how to regulate learning. For example, her class regularly met at the end of an independent work session to talk about their learning. After giving students time to consider topics for their research projects, MH brought students together and asked them to tell her whether they had chosen an animal and what they discovered about their animal. At the end of writing (or reading) periods, MH generally asked, "What did you learn about yourself as a writer (or reader) today? . . . What did you learn that you can do again and again?" The two questions that framed this closure routine prompted students to evaluate what they learned and consider how useful it was – is it something they can use in the future, when, and in what contexts? According to Brown and Campione (1994), routines such as these provide essential structures that support students' pursuit of individual agendas and enable them and their teacher to navigate between repetitive activities effortlessly. From a sociocultural perspective, they help learners acquire and use language and practices that characterize effective performance in particular disciplines (Englert & Mariage, 2003), including processes that enhance SRL. Reflecting on these efforts to support children's SRL, MH stressed how she and her students were "[talking] so much more about reading" and enacting the "talk" during reading activities in their classroom (Perry *et al.*, 2002).

Peer Support

Teachers who support SRL nurture a community of learners in their classrooms, which promotes instrumental support among students (Brown & Campione, 1994). In communities of learning teachers assign students work that couples individual responsibility with group support and encourage students to share and appropriate ideas and methods. For example, Nora (not written about previously) encouraged students to “browse, borrow, and build” from classmates’ examples (i.e. circulate and see what others are doing, borrow good ideas, but attribute them to their originators, and build something new/personalize what you’ve borrowed). This contrasts sharply with Peter’s advice to students (first written about in Perry, 1998), which was, “If you have an idea, I know you are excited, but keep it to yourself.” In Peter’s classroom, I rarely observed learners, especially low achieving students, approaching their peers for help or, when given the opportunity to work with peers on a project, choosing a partner who could maximize their learning. Typically they chose to work with a friend and spent much of their work time conversing on topics unrelated to their task goals. Alternatively, students in Laura’s classroom provided task focused reasons for choosing partners (e.g. “I asked my friend to help me choose [which way to write my ideas],” in Perry & Drummond, 2002), and effectively co-regulated or shared regulation in collaborative tasks (e.g. shared ideas and strategies; identified everyone’s area of expertise). Productive collaborations, such as these, create additional opportunities (beyond those provided through direct communication with the teacher) for all students to engage in academic discourse and practices, solve problems, and offer or appropriate knowledge, resources, and strategies (Englert & Mariage, 2003). Moreover, productive collaborations provide motivational support for participating in intellectually rigorous activities.

Non-Threatening Evaluation Practices

Finally, teachers who support SRL engage in non-threatening evaluation practices (Paris & Ayres, 1994; Perry & Drummond, 2002). In a now classic review of research on how classroom evaluation affects students, Crooks (1988, p. 467) wrote:

“... it guides their judgment of what is important to learn, affects their motivation and self-perceptions of competence, structures their approaches to and timing of personal study ... consolidates learning, and affects the development of enduring learning strategies and skills.”

He went on to argue that all too often classroom assessments are presented as recall or recognition tasks and focus on isolated information rather than ideas and skills in the context of broader, more meaningful frameworks. This, according to Crooks and others (Paris, Lawton, & Turner, 1992; Pintrich, Marx, & Boyle, 1993), encourages students to engage in surface rather than deep learning and SRL. In contrast, non-threatening assessments that support SRL are embedded in on-going activities that are supportive of SRL and evaluate students’ use of SRL processes as well as learning products. This sends a message to students that SRL is valued and required for success. Moreover, SRL supporting assessments downplay social comparisons and the cost of making mistakes (Dijkstra, Kuyper *et al.*, 2008). Instead, they focus on personal progress, and encourage learners to view errors as opportunities for learning. As a result, students are more willing to attempt challenging tasks, which require SRL. Finally, involving students in setting the criteria for evaluating learning makes expectations explicit and provides students with standards against which to monitor and self-evaluate their progress (Perry, 1999; Winne & Perry, 2000). Also, it reduces the anxiety that often accompanies assessment

of learning by giving students a sense of control over the outcomes (Linnenbrink, 2005; Zimmerman & Dibenedetto, 2008).

Barb (originally described in Perry, 1999) involved her grade 3 (age 8) students in developing and implementing assessments of reading. She wanted them to “take more responsibility for their reading development . . . to realize that I couldn't improve their reading skills, they would have to do it themselves” (p. 8). To accomplish this goal, Barb and her students generated lists of criteria to address four questions related to reading: What do good readers do when they read aloud? What do good readers do when they come to a word they do not know? What do good readers do to understand the story? And what do good readers do when they do not remember part of the story because they were interrupted or lost their focus? She wrote the questions on chart paper and divided students into four groups. Each group discussed one question for 30 min. Then, students came together as a large group, examined the criteria generated by each group, discussed the importance of each skill and strategy, and added new ideas they agreed were important. Barb also added ideas during this large group discussion. This process took 90 min., but Barb believed it was time well spent because it resulted in a shared understanding of criteria (skills and strategies for reading), generated by the children, that would be used for practicing and evaluating reading.

Each morning for eight weeks, students practiced using the strategies during their 40 min. reading block. Barb encouraged them to work on one or two strategies each day and they could work independently, in pairs, or in small groups. Charts were posted around the room to remind students about the strategies and each student was given a 9 × 11 inch checklist (a smaller version of the charts), so they could keep a daily record of the strategies they practiced and needed to practice. In addition, Barb assigned each student to a “reading circle,” a small group of students that met with her once a week (five reading circles were formed so that Barb worked with one group each morning). Each member of a reading circle brought a book they were reading to the group and demonstrated the skills and strategies on which they were working. The group provided feedback (two stars and a wish) and Barb assessed students' progress and, based on her assessments, prompted individuals toward higher levels of reading performance or provided instruction to the group (e.g. about a strategy, or about vocabulary and key concepts). In this way, Barb used assessment to support learning, not just to perform a grading function (Crooks, 1988).

Reflecting on this activity, Barb noted that students developed language from their skills and strategies lists that enabled them to provide constructive and productive feedback to one another. “You read good isn't . . . a star because [we] don't know what that means. So [students] have to be really clear . . . ‘I like the way you stopped at punctuation,’ or ‘You really did sound that word out’ . . . and that's making them more aware” (Perry, 1999, p. 11). Barb invited students to write comments about their reading for their report cards and found they were “right on” in describing their reading development. “They were asked to be honest in their assessments and told that [their comments] would not be shared with the class . . . [but] would be sent home with their second term formal report . . . they truly were candid, especially in identifying the areas that needed practice” (p. 12). Barb's evaluation of students' reading is an excellent example of how teachers can use assessment to support SRL. Through their involvement in articulating standards for judging “good reading,” Barb's students developed deep understandings and language for talking about the reading process, their strengths and challenges as readers, effective strategies for solving problems, and the ability to realistically monitor their progress toward the goal of becoming good readers.

Summary and Conclusions

I have argued the promotion of self-regulation and SRL early in children's academic careers is an important goal for education. Recent research involving very young children links self-regulation before school to success in school (Duncan *et al.*, 2007; McClelland & Tominey, 2011) and primary teachers judge skills associated with regulating learning, behaviour, and affect are essential for children's adjustment to and success in school (Rimm-Kaufmann & Chiu, 2007; Rimm-Kaufmann *et al.*, 2009). Similarly, research involving students in later grades indicates students' ability to regulate learning is a significant source of achievement differences and *all* students benefit from instruction aimed at promoting SRL (Graham & Harris, 2003; Wong, Harris, Graham, & Butler, 2003; Zimmerman & Schunk, 2011).

My research has sought to understand how characteristics of classroom contexts create opportunities for children to develop and engage in SRL with a view to helping teachers design tasks and develop practices that support it. I have focused on teachers and children in primary/elementary classrooms where opportunities for SRL are revealed in naturally occurring activities unfolding in real time. Primarily, I have studied classrooms as cases and used detailed observations, in the form of running records, to document "what's going on." This approach has allowed me to document what teachers and students actually do, as opposed to what they report doing, and provide detailed descriptions of interactions (including verbatim transcriptions of classroom discourse) that mark opportunities for children to engage in SRL and evidence of whether and how they do (opportunities and uptake). Also, these observations offer insights about how much and what kinds of support young children need for regulating learning, which are essential for designing SRL promoting tasks and practices.

Like all research tools, observations have limitations for studying SRL. Importantly, they cannot capture all aspects of self-regulation (i.e. some aspects of self-regulation are not readily observable) and they may not represent the experience of all the stakeholders (e.g. students and teachers). For these reasons, triangulation is essential. I have attempted to triangulate my interpretations of observations with evidence from individual and focus group interviews, documents (e.g. children's work samples), and teachers' ratings of children's achievement and motivation. Finally, I have relied on social views of learning (e.g. social cognitive and sociocultural theories) to interpret my data because SRL in elementary classrooms is rarely a solo event.

In general, my research indicates children have opportunities to regulate learning in classrooms where they are engaged in complex meaningful tasks, making choices, controlling challenge, and self-evaluating learning, and when they receive support from teachers and peers that is instrumental to SRL. Moreover, my research indicates opportunities and support for SRL occur in classrooms where teachers and children engage in meaningful and extended discourse about learning and SRL. However, these findings come with several provisos. First, it is important not to treat tasks, even complex tasks, as static entities with inherent properties, such as level of difficulty or degree of meaningfulness. Students likely experience complex tasks differently, depending on dynamic relationships among task features, personal characteristics, and social and instructional supports in their classrooms. Focusing too much on how tasks are presented is a limitation of classroom research, including my own. In addition to articulating how tasks present opportunities for students to develop and engage in SRL, researchers need to pay close attention to how students interpret/understand tasks and how they engage with them.

Similarly, choice is not synonymous with opportunities for SRL (i.e. all choices are not created equal). To support SRL, choices must require students to make meaningful decisions about learning and be accompanied by cognitive/metacognitive support and activity that prompts SRL (e.g. choosing a partner for a collaborative task on the basis of who will be most instrumental to learning). Without such support and activity, students may make poor choices that undermine productive regulation of learning.

I have distinguished between *laissez faire* approaches to instruction and the sophisticated co-regulatory activities that occur in classrooms where children develop and engage in productive forms of SRL. In particular, teachers in these classrooms offer explicit instruction and extensive scaffolding, establish familiar participation structures, encourage peer support, and engage in non-threatening evaluation practices. They carefully orchestrate opportunities for students to engage in SRL with support (e.g. metacognitive questioning, informative and/or elaborative feedback) that attends to multiple zones of proximal development and increases the likelihood of success. This means opportunities for SRL may not be equally distributed to all students within a classroom (e.g. teachers may tailor choices for particular students) and opportunities may yield different interpretations and responses from different students or the same student at different times. Understanding how students' dispositions influence their uptake of opportunities for SRL is a topic that deserves more attention in classroom research on SRL.

Challenges for teaching SRL

Teaching toward SRL is not easy and teachers participating in my research experience several challenges in this regard. Many teachers struggle to design and implement complex tasks. In particular, they are challenged to meaningfully integrate skills and curricula and to connect students' learning to a larger project or learning agenda. As a consequence, their learning goals, processes, and products reflect surface as opposed to deep learning agendas, which limits opportunities for SRL. Some primary teachers are challenged to believe young children are capable of engaging with complex tasks and regulating learning. Other teachers struggle to place SRL in a developmental context (e.g. What does SRL look like in kindergarten?), which can lead to a mismatch between what they plan for students, the support they provide, and what students can do. Many teachers conflate their use of SRL promoting practices with students "doing" SRL. They assume that if they present opportunities for SRL, students will engage in SRL, and so do not consider whether and how students take up opportunities. More importantly, they rarely consider whether and how the opportunities they present prompt particular facets of self-regulation, such as metacognition, emotional control, or strategy use. Finally, the range of SRL promoting practices I observe in classrooms is often constrained. Choice is a prominent practice, and control over challenge is often embedded in a choice, but teachers often comment that they forget to incorporate student self-evaluation, or run out of time for it at the end of their lesson. Also, within the category of choice, teachers often present children with choices about what and who, but not where and when, even though choosing productive spaces for work and managing time are key components of regulating learning, especially as students progress through school.

Teachers need to be supported in their efforts to promote self-regulation and SRL. My research involving preservice and inservice teachers (Perry, Hutchinson, & Thauberger, 2007; Perry, Walton, & Calder, 1999) indicates this may best be

accomplished by providing teachers with contexts for learning like those we want them to create for their students (i.e. contexts that provide teachers with opportunities to hone their self-, co-, and shared regulation of teaching with guided and sustained support from expert mentors). Toward this end, partnerships among researchers, teacher educators, and inservice professional development facilitators are needed to make the implementation of SRL promoting practices as widespread as research indicates they should be.

Challenges for studying SRL

Similarly, there are challenges researchers need to meet in order for knowledge about self-regulation and SRL to transform teaching and learning generally. Researchers need to continue studying children's regulation of learning in events/activities and as both an intra and interpersonal phenomena. This requires more studies *in* rather than *about* classrooms, collecting and analyzing group data and studying features of teaching and learning in concert (i.e. examining both opportunities and uptake). Also, more developmental (i.e. longitudinal) studies are needed to understand how children's regulation of learning develops over time and across contexts. Classroom research should be brought to scale. Widespread adoption of SRL promoting practices depends on demonstrating their utility and feasibility in large numbers of classrooms. Along these lines, research that links SRL promoting practices to general accounts of teaching effectiveness would sell their potential to transform teaching and learning in classrooms and schools. Finally, researchers need to expand their focus beyond classrooms to understand how school, district, and community influences afford and constrain opportunities for SRL in classrooms.

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