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Chapter 1

Self-regulated learning: where we are today

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Abstract

Self-regulated learning has emerged as an important new construct in education. Our understanding of self-regulated learning has been informed by three schools of thought: (1) research on learning styles, (2) research on metacognition and regulation styles, and (3) theories of the self, including goal-directed behavior. Based on these schools of thought, a three-layer model is presented. The innermost layer pertains to regulation of the processing modes. The middle layer represents regulation of the learning process. The outermost layer concerns regulation of the self. Educators and researchers would benefit from an integration of these three frames of reference into a comprehensive model of self-regulated learning. © 1999 Elsevier Science Ltd. All rights reserved.

Self-Regulated Learning (SRL) has emerged as an important new construct in education. The concept has been embraced by policy makers, teachers, educators, and parents, not in the least because there is consensus that the general picture of our schools to date is not a flattering one. The 1993 report of the United Kingdom National Commission on Education, entitled “Learning to Succeed”, included the following quotation:

A minority of academically able young people receive a good, if narrow, education and, for them, provision is well suited and efficiently run. For the majority of young people, education is of more variable benefit. The talents of many are not valued enough and not developed enough; and, once they start work, the same is true in terms of training. In addition, an uncomfortable large minority of young people

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leaving school have trouble with literacy and numeracy and seem to have benefitted all too little from their education (p. 1).

This quotation is but one attempt to voice the dissatisfaction that has been building up in the last decade in all countries in Europe, North America, and beyond. Partly in response, national governments, local authorities, and educators took note of the tidal wave called self-regulation that swept educational psychology. This new construct stimulated debate about school reform world wide. At present, being able to regulate your own learning is viewed by educational psychologists and policy makers alike as the key to successful learning in school and beyond. Self-regulation means being able to develop knowledge, skills, and attitudes which can be transferred from one learning context to another and from learning situations in which this information has been acquired to a leisure and work context. The imagery power of this construct is so strong that researchers have redefined successful learning and designed powerful new learning environments in which the knowledge, skills, and attitudes associated with self-regulation can be acquired.

Policy makers, for their part, have endorsed the basic principles of self-regulated learning and put school reform high on the political agenda. At present much money is devoted to re-organizing schools in such a way that powerful new learning environments become an integral part of them, thus providing new opportunities for students to learn according to the new learning principles.

1. What is meant by self-regulated learning?

Zimmerman and Schunk (1989) define self-regulated learning in terms of self-generated thoughts, feelings, and actions, which are systematically oriented toward attainment of students' own goals. Over the past decade the construct has been heavily researched. Many influential educational psychologists have proposed theoretical models and set up cross-sectional and longitudinal studies to produce theoretically relevant as well as pragmatic information about self-regulated learning. In his lead article in a special issue of the *Educational Psychologist* on self-regulated learning, Winne (1995) described self-regulated learning as an inherently constructive and self-directed process. Several leading educational psychologists (e.g., Alexander, 1995; Corno, 1995; Pressley, 1995; Schunk, 1995; Zimmerman, 1995) have agreed that we are well underway in describing and explaining the key processes of this complex construct. Now, a vast body of information is available about the processes that self-regulated learners use to acquire new knowledge and skills and about the environments in which self-regulated learning can be most successfully acquired (Boekaerts & Niemivirta, 2000; Randi & Corno, 2000; De Corte, Verschaffel & Op't Eynde, 2000; Pintrich, 2000; Zimmerman, 2000).

Does this mean that researchers are ready to help students learn according to the principles of self-regulated learning? The main obstacles are that teachers and students have naive models of what self-regulated learning means (Bereiter, 1990). I was asked by a group of teachers several months ago whether self-regulated learning

should be viewed as a synonym for successful or optimal learning. I explained that such an equation would neither deepen their understanding nor improve their teaching because the term “successful learning” does not have any explanatory power. “Self-regulated learning” is a powerful construct in that it allows researchers, firstly, to describe the various components that are part of successful learning (Boekaerts, 1997); secondly, to explain the reciprocal and recurrent interactions that occur between and among the different components, and thirdly, to relate learning and achievement directly to the self, that is, to a person’s goal structure, motivation, volition, and emotion. In addition to these advantages, however, the construct also has drawbacks.

The problem with a complex construct such as self-regulated learning (SRL) is that it is positioned at the junction of many different research fields, each with its own history. This implies that researchers from widely different research traditions have conceptualized SRL in their own way, using different terms and labels for similar facets of the construct. It would serve no purpose to try to describe the different models here. Instead, the focus of the discussion is on how three different schools of thought, namely (1) research on learning styles, (2) research on metacognition and regulation styles, and (3) theories of the self, including goal-directed behavior, have contributed to our understanding of SRL. Together, these three bodies of research have shaped our knowledge of the construct. It has become clear that SRL is not an event but, rather, refers to a series of reciprocally related cognitive and affective processes that operate together on different components of the information processing system (see Fig. 1).

2. SRL: the search for learning or processing styles

In the last decade it has become clear that one of the key issues in self-regulated learning is the students’ ability to select, combine, and coordinate cognitive strategies in an effective way. Biggs (1987), Entwistle (1988), Marton and Säljö (1984), Pask (1988), and Vermunt (1992) have described students’ learning styles as the characteristic modes of organizing and controlling cognitive processes. Learning style research has been mainly taxonomic in nature, seeking to identify the typical way students process academic information. Several characteristic ways of learning were identified. For example, Marton and Säljö (1984) introduced two basic learning styles. The first is a surface level or shallow processing style, which is characteristic of students who mainly rehearse and memorize the study material. The second is a deep-processing approach typical of students who want to understand the material. These students spontaneously relate ideas and arguments expressed by others to their own experiences and to the evidence provided.

Pask (1988) classified students according to two contrasting strategies: holistic and serialistic. Students situated near the holistic extreme display a global approach, focusing on main ideas and constructing an overall conception of the information before paying attention to the details. These comprehension learners differ from operational learners, who are situated near the other extreme, and who prefer a linear task, paying attention to procedural information and operational details. Students

who are situated in the middle are versatile, they can employ both strategies in a context-sensitive way.

Entwistle (1988) made a distinction among three learning styles or orientations: a reproducing orientation (memorization), an achieving orientation (trying to acquire high grades), and a meaning orientation (a search for personal understanding). Biggs (1987) distinguished similar learning styles, labelling them utilizing, achieving, and internalizing. Finally, Vermunt (1992) referred to deep-level processing, surface level processing, and concrete processing and connected each to a different regulation style, namely “out of control”, preference for external regulation, or internal regulation.

The response of the academic community to the learning style construct was quite positive, mainly because learning styles provide an easy way to conceptualize and operationalize students’ standard information processing styles, but also because teachers recognize these processing styles in their everyday practice. Recent research, conducted in the Netherlands (Boekaerts, Otten, & Simons, 1997) using Vermunt’s learning styles indicated that almost 70% of the young adolescents that were followed longitudinally in high school used primarily a surface-level learning style, meaning they were predominantly engaged in reproductive activities (reading a text, re-reading it, followed by memorization). These students are not concerned with conceptual integration. Seventeen percent used a concrete learning style. These youngsters are convinced that they have to put the learning content to use, reflected in their tendency to employ cognitive strategies that connect relevant factual information from a text to episodic information in long-term memory or to everyday problems. Another 16% reported they mostly used a deep-level processing style, implying that their target was finding the underlying message of a text. These latter students seemed to derive pleasure from exploring new information and structuring it in such a way that meaningful integration was achieved.

It is important to note that the learning style literature provides insights into *what* students typically say they do when presented with learning material (that is, the types of information processing they characteristically engage in). However, the correlations reported between reported learning styles and grade-point average have been disappointingly low. One obvious reason may be that the measurement instruments do not assess the students’ learning styles in a valid way. Most learning style tests are based on self-descriptions of styles, yet, some research suggests that most students are not aware of their learning style. Students, particularly those under the age of thirteen, seem to have difficulty grasping the meaning of the rather general, abstractly formulated items on the learning style questionnaire (Boekaerts, Otten, & Simons, 1997). Another possible explanation for the low correlations is that students are not consistent in their use of specific processing modes. It is easy to imagine that motivational variables and perceived situational constraints affect the way students learn.

The point here is that the information gained about the typical way students learn (that is, the innermost layer of the three-layer model depicted in Fig. 1) is crucial for describing the quality of their self-regulation process. However, it is not sufficient. We also need to know whether students perceive a *choice* among alternative processing modes. The perception of choice is a critical aspect of self-regulated learning (Winne, 1995; Winne & Perry, 2000). One can only adapt one’s learning style to fit a specific

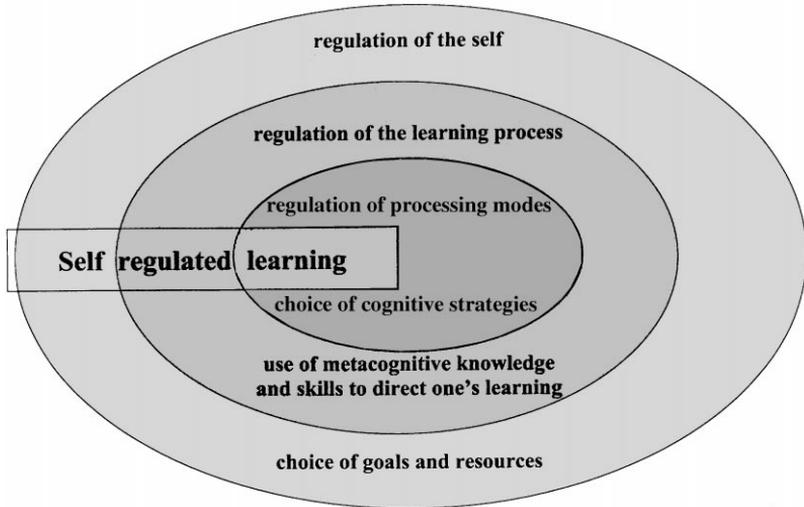


Fig. 1. The three-layered model of self-regulated learning.

task or problem when one is aware that alternative action paths exist. In order to differentiate between students who do perceive a choice and those who do not, fine-grained instruments that assess how students interact with learning tasks in various domains are needed. Only then can information on how their characteristic processing style interacts with the specific content of a school subject and with environmental affordances and constraints be gained.

3. SRL: how students steer and direct their learning process

A second key aspect of self-regulation is the students' ability to direct their own learning (the middle layer of the SRL process in Fig. 1). Researchers working within the tradition of "metacognition" have devoted much attention to these regulatory processes. They redefined successful learning as the attainment of metacognitive knowledge in the service of organizing one's learning in such a way that domain-specific knowledge and skills can be acquired. It was held that successful learners are able to swiftly transfer the knowledge and strategies acquired in one situation to new situations, modifying and extending these strategies on the way. Various parameters of successful cognitive processing have been identified, including the use of metacognitive skills such as orienting, planning, executing, monitoring, evaluating, and correcting (Brown, 1987; Weinstein & Mayer, 1986).

Various researchers have developed new measures to assess different aspects of cognitive processing and helped teachers to understand better why students who lack metacognitive knowledge and skills are not able to direct their own learning (cf.

Pintrich & De Groot, 1990; Weinstein & Mayer, 1986). However, the conceptualization of successful learning offered by proponents of metacognitive theory led to many misconceptions (e.g., younger students are inferior to older students in their use of metacognitive skills and therefore need more guidance and external regulation than do older students). Yet, according to Winne (1995) all students engage in self-regulation because they can be seen planning, monitoring, and evaluating their behavior. He explained that being able to plan a learning activity and to monitor and evaluate it does not automatically imply that one can steer and direct one's learning process without the help and support of the teacher or the textbook.

What is apparently difficult to understand is that being able to regulate one's learning in a particular context (e.g., foreign language learning) does not mean that one can regulate one's learning in other contexts as well (e.g., mathematics or statistics). In order to understand this statement fully, a clear distinction should be made between internal, external, or shared regulation. Students are regulating their learning internally when they specify their own learning goals and do not need instructions or guidelines from others to choose a learning or problem-solving strategy. In contrast, students who are dependent on others to get started or to complete a task need external regulation to direct their learning. There are, of course, mixed forms of regulation, where students and teachers share the regulatory functions (Boekaerts & Simons, 1995).

Several researchers have drawn attention to the disadvantages and risks of (too much) external regulation (Weinert, Schrader & Helmke, 1989). They pointed out that external regulation is a form of support that replaces or compensates for low metacognitive awareness and that students who are not skillful in orienting, planning, monitoring, or evaluating their own performance may rely instead on the teacher's metacognitive skills. Clearly, many students consider external regulation as bliss, viewing it as essential to extend their knowledge and skills. They expect the teacher to tell them what to do, how and when to do it, and when to stop doing it. By relying on the teacher's metacognitive guidance, many average — and even below average — students graduate from high school. These students may even leave school with the impression that they are capable of directing their own learning. The point is that dependence on teachers works only as long as a teacher is available to take over, or to activate the students' poor self-regulatory skills (Boekaerts & Simons, 1995). However, a decrease in achievement will be noticed as soon as these students have to study in an environment where they have to steer and direct their own learning process (Kurtz & Weinert, 1989).

Researchers (and also teachers) should be aware that, under conditions of maximal external support, students' metacognitive skills will develop minimally and that students with minimal metacognitive skills will not have the chance to experience the beneficial effect of these skills first hand. Also, there are many misconceptions in relation to regulation styles. One for example is that students who need external regulation in one domain also need it in another domain. A second is that students who need it today will also need it tomorrow. Vermunt (1992) and Vermetten, Vermunt and Lodewijks (1995) have provided support for their hypothesis that a deep-level processing style is associated with a preference for learning environments

where internal forms of regulation are possible, while a surface level processing style coincides with a preference for external regulation.

What does such an association tell us? Not a great deal. Treating learning and regulation styles as traits or dispositions has drawn our attention away from the important hallmarks of SRL, namely perception of choice, accessibility, and adaptability. It will not do to assess students' strengths and preferences and then cater to *existing* learning and regulation styles. This is not to deny that students may display consistent learning and regulation styles and they may prefer a particular processing mode because it has produced good results in the past. Rather, the argument is that a student's current preferential learning and regulation style reflects personal- or culturally-valued learner characteristics, not because these characteristics are more adaptive but because these students have not yet experienced the benefits of other possibilities in a systematic way (see, for example, Boekaerts, 1998a).

Researchers and teachers alike should be alert to students' reactions to various forms of regulation. Close observation of students' reactions will tell them whether students consider a specific learning environment as optimal or suboptimal. In addition, interviews and discussions with students will reveal why some students deem a particular learning environment "suboptimal" whereas others do not.

To summarize, most researchers have studied SRL by focusing on the students' learning style (the core layer of SRL) and on the way students guide and direct their own learning process (the middle layer of SRL). These two lines of research have used tele-lenses to capture the students' use of optimal learning and regulation strategies. Moreover, most learning and instructional programs based on this research have been predicated on changing *cognitive* aspects of the learning process, not motivational and affective ones. In other words, investigations have been restricted to the metacognitive control system; activity in other control systems (e.g., motivation control, action control, and emotion control) has not been well integrated into theories of SRL. In the next section, a third layer of complexity is added to the two layers described previously. Issues related to the self system and goal directed behavior (the outer layer of the SRL process) are discussed.

4. SRL: how students try to self-regulate

An up-to-date hallmark of self-regulated learning that has not been mentioned is the students' involvement in and commitment to self-chosen goals. This includes their ability to define ongoing and upcoming activities in the light of their own wishes, needs, and expectancies, and their ability to protect their own goals from conflicting alternatives. Several researchers (for a review see Boekaerts and Niemivirta (2000)) have argued that information about how students construe themselves as learners, particularly the goals they set for themselves, provides an interesting and essential compliment to the assessment of learning styles and the evaluation of metacognitive awareness and skills. It provides an indication of *why* students are prepared to do what they do and *why* they are or are not inclined to do what is expected of them.

Researchers, working in the field of motivation, have pointed out that students who are metacognitively aware of the choices they make and are knowledgeable about how to invest resources to attain a learning goal may, nevertheless, not be willing to invest the necessary resources to regulate their learning in certain contexts (Higgins, 1987; Kuhl & Gotske, 1994; Rheinberg, Vollmeyer & Rollett, 2000; Ryan, 1991). There likely are multiple reasons for this reluctance. For example, students may feel that planning, monitoring, and evaluating the learning process takes too much time and effort. Perhaps one or more psychological needs are thwarted in a particular context (e.g., their need for autonomy, competence, or social belonging). In this regard, Deci and Ryan (1985) explained that when students are aware that any of their basic psychological needs are not fulfilled in a specific learning context, they will not identify with the goals and values of that context. It is easy to imagine that students who like to learn in an informal way may perceive formal learning contexts as achievement contexts whereas students who prefer formal learning contexts may define informal learning contexts as light-hearted and meaningless (see, for example, Boekaerts & Minnaert, Chapter 7).

In the context of the present discussion it is important to make a clear distinction between learning activities that are self-initiated and those that are teacher-initiated. The former type of learning episodes differ from the latter on a number of grounds. The most important is that self-initiated learning activities either occur spontaneously or are driven by personal goals, whereas the latter episodes are teacher-initiated and driven by the wishes, needs, and expectations of others (so-called “ought” goals). Referring to the goal literature and the literature on the self and self-identity, Boekaerts (1998b) argued that a student’s higher-order goals are powerful energizers of behavior and are hallmarks of how a student regulates the self.

At this point, it should be mentioned that students rarely pursue single goals. They tend to pursue multiple goals which are part of their complex goal structure. Boekaerts (1998c) has illustrated that some students seem capable of pursuing multiple goals at the same time, navigating elegantly between them, whereas other students give the impression that they are not able to pursue multiple goals simultaneously. The latter students put their goals in a serial position, devoting attention to the goals that have temporarily gained priority in their hierarchy of goals. It is evident that dominant goals have a higher chance of being pursued until they are attained than less salient goals, which may easily be postponed and never be taken up again.

One should realize that being faced with multiple goals requires the capacity to decide which goals to pursue and which ones to put on hold. Ideally, students should spend some time deciding which goals they want to accomplish first (goal setting) and which goals they are inclined to postpone or give up altogether. If it is not clear to them that their goals are in conflict, students may have difficulty motivating themselves to get started with a learning activity and with fending off competing goals.

Kuhl (1984) demonstrated that good intentions formulated in relation to a specific goal in the pre-decisional phase do not necessarily lead to goal striving and goal attainment, mainly because these intentions are not well protected from competing action tendencies. Following Kuhl, Boekaerts (1995) set apart motivation control and various forms of volition control which students need on their way to the goal. She

(Boekaerts, 1999) demonstrated that motivation control (that is, the ability to activate positive scenarios that make one value the task and consider oneself competent to perform it) is needed to form a learning intention but that low motivation control can be compensated by volition control (ability to initiate, persist, and disengage from a task).

On the basis of the current research literature it seems reasonable to conclude that allocation of resources will vary as a function of a student's short-term and long-term goals. Therefore, students should be given plenty of opportunity to communicate and reflect on effort allocation, involvement, and commitment in relation not only to personal goals but also in relation to goals set by others. Many authors have shown that students have naive models about effort allocation and are in doubt as to how much effort is needed to achieve different goals (e.g., Ford, 1995; Schunk & Zimmerman, 1994). Schunk and Zimmerman (1994), for example, pointed out that some students interpret effort as a sign of task difficulty: If effort remains constant after initial practice, most students view it as a signal of low ability to master the new skill. This implies that they will tend to define the task as "a difficult one" in future, thus having pessimistic expectations that may hinder skill acquisition as well as self-confidence. Students should develop coherent models about effort allocation; more specifically, they should acquire tacit knowledge about effort regulation. This is a learning process by itself which requires that they are willing to see various aspects of the self (e.g., self-commitment, self-involvement, allocation of resources) as targets for self-regulation. In Fig. 1, then, the outer layer is the regulation of the self.

4.1. Creating powerful learning environments: what does that mean?

There are three layers of the construct "self-regulation," each representing a different vantage point from which to study self-regulated learning. However, each lacks something that the others have. We would benefit from an integration of these three frames of reference into a comprehensive model of SRL. Indeed, researchers, educators, and policy makers need this conceptual map to understand better the potential and limitations of learning environments. A clear conceptualization of what self-regulated learning is will help them to identify those self-regulatory skills, located within any of the three layers, that students need to acquire at a particular moment in their development.

Many researchers and educators do not realize there is a bidirectional relationship between learning environments and SRL. It is generally acknowledged that powerful learning environments are facilitators for the acquisition of new self-regulatory skills. This one-way relationship has been emphasized throughout the literature and there is abundant evidence that powerful learning environments do indeed promote the use of self-regulatory skills (see, for example, Salomon, 1998). Yet, the "arrow" should also point in the other direction. That is, self-regulatory skills should be viewed as propaedeutic to learning in the context of a powerful learning environment. Indeed, these skills are essential for the appraisal of non-traditional learning environments as powerful facilitators of learning and for the use of resources that are available in these environments. To put it differently, having or not having access to an adaptive profile

of regulatory skills shapes the learning environment and determines whether one considers that environment as instrumental to achieve the learning goals that one has set for oneself.

When providing feedback to students, teachers should bear this reciprocal relationship in mind. They should be ready to interpret students' attempts to allocate their resources (the outer layer in Fig. 1) in view of the cognitive and motivational strategies to which they have access (the middle layer). They should also provide feedback on whether or not students' choice of cognitive strategies (the inner layer) is in accordance with their capacity to steer and direct their own learning in that particular context and with their (the students') appraisal of context features.

5. Guidelines and suggestions provided in this special issue

The contributors to this special issue present information that has accrued within specific subfields of self-regulation. They discuss several key issues of self-regulated learning, providing suggestions as to how the modelling, scaffolding, and fading of self-regulatory skills could be done. Most contributors defend the view that it is extremely important that educators and teachers know which strategies are part of self-regulated learning and know how to turn learning environments into "energizers" for specific types of students.

Pintrich (Chapter 2) describes his model of SRL, specifying three categories of strategies that students should have access to in order to regulate their own learning, namely (1) *cognitive learning strategies* which help students to attend to, select, elaborate and organize information in such a way that deep-level understanding is possible, (2) *metacognitive and regulation strategies* which reflect the student's intention to plan, monitor and regulate their cognitive strategies, and (3) *resource management strategies* which refer to activities that manage and control the material, and internal and external resources that the learner has at his disposal to reach his or her goals. Pintrich documents that an adaptive profile of motivational beliefs is essential to profit from learning environments which target self-regulated learning.

Arguing that self-regulation should not be equated with the process of adjustment to changing circumstances, Lemos (Chapter 3) focuses on self-regulatory skills located in the outer layer of Fig. 1. She explains that self-regulation necessitates personal goals which give direction to one's actions and energize behavior. In her view, self-regulation encompasses change to existing circumstances through the process of goal setting. Lemos defends the view that when goals are established or valued by the students themselves, they serve two major functions, namely (1) directing behavior toward the end-states that they specify and (2) monitoring standards for the evaluation of ongoing activities. She amply demonstrates that the behavior of students who demonstrate high intentionality or strategic, flexible behavior is typically sequential in nature (i.e., it consists of a series of connected activities). In contrast, the behavior of students who show low intentionality or those who display passivity and disorganized behavior consists of short-lived activities that are segmental in nature.

Kehr, Bles and von Rosenstiel's study (Chapter 4) also focuses on goal processes. They split a group of managers into two subgroups, namely those who prefer to act in the self-regulation mode (i.e., pursue self-set goals which are need-congruent) and those who basically act in the self-control mode, thus mainly adopting goals imposed by others. Kehr et al. predicted and found that the goal-directed behavior displayed by "self-regulators" is associated with positive emotions and that reaching the goal is primarily based on acting according to one's own intentions. In contrast, the goal-directed behavior of the "self-controllers" seems to be associated with negative emotions, implying that their working memory is occupied with conflict resolution.

Drawing on neuropsychological research, Niemivirta (Chapter 5) explains that individuals' goal setting reflects their adjustment to situational demands as well as their ability to transform higher level goals into the activation or inhibition of specific lower level schemata. He describes typical and atypical goal setting processes. Students who are avoidance oriented produce atypical response shifts (i.e., they raise their goals after failure and lower them after success). Niemivirta shows that generalized beliefs of personal agency and controllability of one's actions strongly affect both the intensity (level of goal) and the quality of one's actions (selection of subgoals).

Vauras, Rauhanunummi, Kinnunen and Lepola (Chapter 6) argue that students with a long-term history of failure are in need of powerful educational interventions to encourage the use of self-regulatory skills. Their intervention consists of a text comprehension program presented in a game setting and enriched with innovative stories. Most students profited from the program in the sense that their knowledge and skill about strategy subroutines increased. Experimental students were also able to specify what their problem was and they seemed to profit from subtle prompts to gain better control over the task. Yet, there was great variability in individual training gains: the so-called "resistant students" failed to develop the necessary self-regulatory skills to coordinate their mental processes and they did not take responsibility for their own learning, despite their increased metacognitive knowledge about the tasks.

Boekaerts and Minnaert (Chapter 7) point out that we know very little about SRL in informal learning settings. They contrast formal and informal learning, arguing that students' appraisal of a specific learning environment affects not only the value attached to the learning goals but also the quality of the learning process. Finally, Zimmerman (Chapter 8) offers a commentary on the chapters in terms of the "cyclically-interactive view" of self-regulated learning.

In combination, the chapters in this special issue represent the current thinking and research on SRL and make an important contribution to our knowledge base on the "outer layer" of the self-regulated learning model. Hopefully, the ideas and information included in these chapters will spur interest in topics related to SRL, more specifically to the regulation of the self. A focus on how goal processes affect students' choice of processing modes and the way students set out to organize and steer their learning processes is critical to understanding issues of motivation and learning in school and beyond.

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