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A CONCEPTUAL FRAMEWORK FOR RESEARCH ON SELF-REGULATED LEARNING

INTRODUCTION

In the international community of educational researchers, self-regulated learning has become an important topic in educational and psychological research over the last three decades. One reason for this is that it has been found that the extent to which learners are capable of regulating their own learning markedly enhances their learning outcomes. As Zimmerman and Schunk (2008) point out, research has shown that in comparison to poor self-regulators, good self-regulators "set better learning goals, implement more effective learning strategies, monitor and assess their goal progress better, establish a more productive environment for learning, seek assistance more often when it is needed, expend effort and persist better, adjust strategies better, and set more effective new goals when present ones are completed" (Zimmerman & Schunk, 2008, p.1). It is therefore desirable to study self-regulated learning in order to be able to improve these skills in learners.

The other reason for the rising interest in self-regulated learning is that we live in societies in which lifelong learning is becoming increasingly important. It is to be expected that lifelong learning will in the future occur in informal learning environments to a higher degree than in the past. Informal learning environments are likely to be less instructor- or teacher-oriented and more learner-oriented which means they will require self-regulatory skills to a greater extent (cf. Hofer at al., 1998, p.73), but even in formal education, self-regulatory skills are desirable assets.

Articles on self-regulation began to be published in journals on social psychology and personality in the 1980s, in the United States as well as in Europe, while in the 1990s, contributions to the field were also published in educational, organisational, clinical and health psychology journals which dealt with a wider range of aspects of the concept of self-regulation, including self-regulated learning, self-control and self-management (Boekaerts et al., 2000). Models and different uses of the term self-regulation proliferated. Furthermore, it turned out to be difficult to distinguish the term self-regulation from similar terms like self-management, regulation of the self, metacognition and coping (Zeidner et al., 2000).

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Although some relatively complex models of self-regulation were proposed (cf. Carver & Scheier, 1998, 2000), most models exhibit a fairly simple structure (Steffens, 2006). In many models, self-regulation is depicted as a cyclic process involving three stages: (1) goal setting, (2) monitoring processes and strategies, (3) self-evaluation. There exist a number of models which were explicitly developed to describe processes of self-regulated learning.

In discussing the concept of self-regulated learning, it is important to distinguish between broad and narrow conceptions. In a broad sense, learning is self-regulated if the learner is free to decide what, when, where and how to learn (Weinert, 1982). This implies that most of the learning in academic settings – in schools and universities – is only partly self-regulated and partly teacher/instructor regulated or regulated by the affordances and requirements of the learning environment of which the teacher/instructor may be a part. As Boekaerts pointed out, an adequate model of self-regulated learning in the broad sense would have to consider how the achievement of imposed goals (related to the demands of the learning environment) as well as the achievement of personal goals is regulated by the individual (Boekaerts, 2002).

In publications on self-regulated learning, there seems to be a tendency to define the concept in a narrow sense, thereby neglecting the personal goals of the learner. Some authors refer to the components which are considered to play an important role in self-regulated learning: "Students can be described as self-regulated to the degree that they are metacognitively, motivationally, and behaviourally active participants in their own learning process" (Zimmerman, 1989a, p.4). Other authors describe the process of self-regulated learning: self-regulated learning "can help describe the ways that people approach problems, apply strategies, monitor their performance, and interpret the outcomes of their efforts" (Paris & Winograd, 2001, p.3).

In spite of the abundance of different approaches, authors agree that self-regulation involves several components: "self-regulation involves *cognitive*, *affective*, *motivational* and *behavioural* components that provide the individual with the capacity to adjust his or her actions and goals to achieve the desired results in light of changing environmental conditions" (Zeidner et al., 2000, p.751).

Models of self-regulated learning

Over the last two decades, a large number of models for self-regulated learning were developed. Most of these assume that self-regulating one's learning activities is performed in cycles of three or four stages. Winne & Hadwin (1998), for example, proposed a model of self-regulated learning which distinguishes four stages: (1) defining the task, (2) goal setting and planning, (3) enacting study tactics and strategies, and (4) metacognitively adapting studying for the future.

Zimmerman (1998b) developed a model which describes how university students who aim at improving their performance self-regulate their learning. According to this model, a cycle in self-regulated learning consists of four steps: (1) self-evaluation and monitoring, (2) goal setting and strategic planning, (3) strategy implementation and monitoring and (4) strategic outcome monitoring.

Zimmerman (1998c, 2000) also suggested a social cognitive model of self-regulated learning which is richer with respect to the processes which are considered at each stage. According to this model, self-regulation is achieved in cycles consisting of (1) forethought, (2) performance or volitional control, and (3) self-reflection. Zimmerman (1998c, 2000) describes the stages as follows:

- *Forethought*. In the forethought phase, task analysis and self-motivation beliefs are important. Task analysis refers to planning processes like goal setting and strategic planning. Self-motivational beliefs comprise a student's self-efficacy beliefs, his outcome expectations, intrinsic interest and goal orientation.
- *Performance or volitional control*. In this phase, the chosen strategy is implemented and monitored by the student. Zimmerman distinguishes between self-control and self-observation. Self-control refers to regulatory processes like self-instruction, imagery, attention focusing and task strategies. Self-observation includes monitoring strategies like self-recording and self-experimentation.
- *Self-reflection*. In the self-reflection phase, the student tries to evaluate the outcome of his efforts.

As mentioned above, self-regulation involves *cognitive*, *affective*, *motivational* and *behavioural* components (Zeidner et al., 2000, p.751). While the Zimmerman model described above does consider motivational aspects, most early models of self-regulated learning referred to the cognitive component of self-regulation only. Only recently has the role of motivation in self-regulated learning received increased attention (Schunk & Zimmerman, 2008).

Self-regulated learning and related concepts

Learning may take place in very different learning environments: in and out of school, with or without instruction, intentionally or incidentally, formally or informally. Apart from that, learning may take place individually, in a small group or in a community of learners. Basically, two learning situations may be distinguished: learning that is guided by instruction (teaching) and learning that takes place without instruction. However, this is probably too simple a distinction. It would be more appropriate to speak of teacher guided versus learner guided learning where there exists a continuum between the two extremes. Independent of the degree of teacher or learner orientation, learners will have to self-regulate their learning activities. This will be more important in situations where there is little teacher orientation.

The fact that learners have to monitor and control their learning activities has been described using a number of different concepts. Self-regulated learning as explained above is one important one, but there exist a number of related concepts: metacognition, self-directed learning, self-organised learning, personalised learning and self-regulated personalised learning.

Metacognition

One of the concepts most akin to that of self-regulated learning is the concept of metacognition (Flavell, 1971). While Flavell distinguished between metacognitive knowledge and metacognitive experience (see also Efklides, 2006), it has become common to distinguish between (1) knowledge about one's cognitive processes and (2) monitoring and regulating these processes (see Hacker, 1998, for an in depth discussion of the concept). This distinction is very similar to one made by Nelson and Narens (1990) and Nelson (1996) (see figure 1).

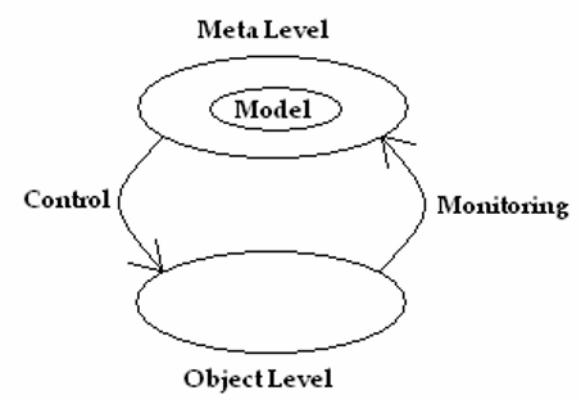

Figure 1: Metacognitive model according to Nelson (1996)

According to these authors, learning always takes place at two levels: at the object level and at the meta-level. The meta-level contains a model of the object level. On the basis of this model, which is continuously updated, the learner monitors the learning process. Moreover, the learner exerts executive control over the learning process. These processes lead to (1) adaptation of the model of the object level, and, consequently, to (2) adaptation of the learning process. Combinations of object level and meta-level can be nested into the object level of a higher control and monitoring loop, leading to recursive cycles of self-regulation activities.

It seems, however, to be difficult to clearly distinguish metacognition from self-regulated learning. Winne and Hadwin (1998), for instance, talk about "metacognitively powered self-regulation" (Winne & Hadwin, 1998, p.278). They present the four-stage model of self-regulated learning mentioned before: (1) task definition, (2) goal setting and planning, (3) enacting study tactics and strategies and (4) metacognitively adapting studying; in their opinion, metacognitive activities can take place in all the four stages. More recently, Azevedo (2009) discussed theoretical, conceptual, methodological and instructional issues in research on metacognition and self-regulated learning. His contribution opens with the statement: "Learning typically involves the use of numerous self-regulatory processes such as planning, knowledge activation, metacognitive monitoring and regulation, and reflection" (Azevedo, 2009, p.87) implying that self-regulated

learning includes metacognitive monitoring and regulation. To us, it would seem to be meaningful to equate the concept of metacognition with the cognitive component of self-regulated learning.

Self-directed learning

As pointed out above, the concept of self-regulated learning is used in a wide and in a narrow sense. Self-regulated learning in a wide sense seems to be equivalent to self-directed learning. As early as 1975, Knowles defined self-directed learning as process "in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating their learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes" (Knowles, 1975, p.18). A rather similar, but more recent definition reads "In self-directed learning (SDL), the individual takes the initiative and the responsibility for what occurs. Individuals select, manage, and assess their own learning activities, which can be pursued at any time, in any place, through any means, at any age." (Gibbons, 2008).

As Gibbons (2002) suggested, enhancing self-directed learning in educational settings would require to customize schooling to the learning needs of individual students and to motivate them to take increasing responsibility for deciding what and how they should learn. This will, of course, be true for any kind of self-regulated learning. Shifting the focus from the learner to the learning environment, the concept of personalisation of learning has come to be of importance.

Personalised learning

Personalisation of learning is part of a much larger campaign that was initiated by the U.K. government in 2001 to personalise public services (Bentley & Wilsdon, 2003; Leadbeater, 2004). While officially it aimed at liberating the individual potential, in effect it put more responsibility (and a greater share of the costs) on the individual citizen. It is therefore not surprising that in talking about personalisation of learning, the more positive aspects of liberating the individual potential are pointed out. According to Halm (2006), personalised learning "meets the needs of the individual learner providing the best method of learning based on their personal interests, learning style(s), motivation and learning objectives". Personalised learning is a form of learning which takes place in a learning environment specifically customised to the individual learner. "Put simply, personalised learning and teaching means taking a highly structured and responsive approach to each child's and young person's learning, in order that all are able to progress, achieve and participate. It means strengthening the link between learning and teaching by engaging pupils - and their parents - as partners in learning." (The Standards site, 2007). Underwood and Banyard (2008) pointed out, however, that in the U.K., managers, teachers and learners understand personalising learning in different ways. They also argue that personalising learning on a large scale will only be possibly using digital technologies (Underwood at al., 2008).

In order to understand how digital technologies may support learners in personalising their learning, they suggest to distinguish between three different spaces: the personal learning space, the teaching space and the school space (Banyard & Underwood, 2009). According to these authors, "the physical characteristics of the personal learning space can still be influenced by teachers and institutions, but the design of that space and the uses of the technology are under the control of the learner" (Banyard & Underwood, 2009, p.11).

The idea of providing learners with technology-enhanced personalised learning environments is also discussed in a series of articles published in the eLearning Papers (Ehlers & Carneiro, 2008; eLearning papers, 2008; Mazzoni & Gaffuri, 2009, a,b).

Self-regulated personalised learning

The concept of self-regulated personalised learning was developed in the iClass project (Aviram et al., 2008,a,b; iClass, 2008). The idea of the project was to develop a web-based learning management system (Intelligent distributed cognitive-based learning system for schools – iClass, see http://www.iclass.info) that promoted self-regulation of learning and intrinsic motivation while allowing learners to personalise their learning environments. Self-regulated personalised learning therefore seems to bear a great deal of similarity with the concept of self-directed learning.

Summing up

It seems that self-regulated learning and similar concepts can be assigned to three different categories: (1) self-regulated learning in the narrow sense and metacognition which focus on the processes in which learners engage when they plan, monitor and evaluate their learning activities, (2) self-regulated learning in the wider sense and self-directed learning which in addition include choice processes (what, when, and where to learn), and (3) the concept of personalised learning which focuses more on the learning environments and its "fit" to the individual student's characteristics.

In the context of this book, the first and narrow concept of self-regulated learning appears to provide the most powerful perspective on the question how to improve self-regulated learning.

TOWARDS A PEDAGOGICAL FRAMEWORK

Although there are a number of studies that show that self-regulated learning can be improved by pedagogical interventions (see, for instance, the collection of studies in Schunk & Zimmermann, 1998, also Boekaerts, 1996; De Corte, Verschaffel, Op't Eynde, 2000; Perels et al., 2005; Rozendaal, Minnaert & Boekaerts, 2005; Schunk, 2005), these do not offer a pedagogical framework that extends beyond the situation analysed in the corresponding contribution. Mooij (2007) suggested that in order to encourage students to develop their skills for self-regulated learning, self-regulation should benefit from the selection of learning

tasks and the coaching and assessment of learning. These three activities may be learner-controlled, but they may also be assisted by teachers or tutors. Two ideas which might be useful in developing a more general pedagogical framework for self-regulated learning are the concept of situated cognition and of cognitive apprenticeship.

Situated cognition and cognitive apprenticeship

In his pioneering article on situated cognition, Collins and his colleagues (Brown, Collins, & Duguid, 1989) argued that in everyday life and in scientific communities, learning is the result of specific activities in specific situations: "The activity in which knowledge is developed and deployed, it is now argued, is not separable from or ancillary to learning and cognition. Rather, it is an integral part of what is learned. Situations might be said to co-produce knowledge through activity." (Brown, Collins, & Duguid, 1989, p.32) In contrast, Collins et al. believed that schools offer knowledge to their students which is abstracted from concrete situations and is therefore not situated. This knowledge can be recalled from memory, but it cannot be put into practice, i.e. it remains inert.

Based on their concept of situated cognition, Collins and his colleagues, in "Cognitive Apprenticeship: Teaching the crafts of reading, writing and mathematics" (Collins, Brown & Newman, 1989) developed a pedagogical model which was based on ideas from traditional apprenticeship. According to Collins et al., teaching and learning in traditional apprenticeship can be described in three phases:

1. the master models the activity in question,
2. he coaches his apprentices as they start to engage in this activity and provides them with scaffolding whenever necessary, and finally
3. he fades from the learning environment, leaving his apprentices to work on their own.

Since this pedagogical model seems to work well in traditional apprenticeship, Collins et al. suggest that schools should adapt it to their needs, making it a cognitive apprenticeship (Collins, Brown & Newman, 1989). To show that this approach might indeed work in schools, they cite publications by Palincsar and Brown (1984) on reciprocal teaching of text comprehension strategies, of Scardamalia and Bereiter (1985) on procedural facilitation of writing skills, and of Schoenfeld (1985) on mathematical problem solving all of which are considered to be good examples of the cognitive apprenticeship approach by Collins et al.

Palincsar and Brown (1984) worked with 5th graders to improve their monitoring of text comprehension. The students were presented with reading strategies that had been observed in expert readers. The training was done in a reciprocal teaching setting, i.e. first the teacher demonstrated the different skills and then teachers and students took turns in actually doing the teaching.

After a three-week training period, students´ reading comprehension scores improved from 15 % correct (pre-test) to 85 % correct (directly after the training). Even after a period of six months, students from the experimental group averaged

60 % correct, and it took only one day of renewed reciprocal teaching to bring them back to their 85 % correct level. Also, effects generalised from the experimental to classroom setting, and there was a clear and reliable transfer to laboratory tasks that differed in surface features from the training task.

In order to help students improve their writing, Scardamalia and Bereiter (1985) developed a number of procedural facilitations in the form of prompts presented on cue cards which aim at facilitating the use of expert-like writing procedures. Similarly, an analysis of goals of the revision process was performed and corresponding prompts were developed. In empirical studies the authors found that their procedural facilitation method did indeed improve students´ writings. It also made them aware that writing is not a linear process, but an iterative one which requires careful planning and revising.

Alan H. Schoenfeld (1985) observed his university students as they solved mathematical problems. He found four factors to be important for successful problem solving: (1) resources, (2) heuristics, (3) control, and (4) belief systems where control refers to the selection and implementation of resources and strategies (planning, monitoring and assessment, decision making, conscious metacognitive acts).

While we agree that the cited publications may be interpreted as examples of cognitive apprenticeship, we also believe that they are good examples of fostering self-regulated learning through instruction. More recent pedagogical intervention programmes which were based on or made reference to the concepts of situated cognition and cognitive apprenticeship have been studied by Jarvela (1995, 1996), Boekaerts (1996), De Corte, Verschaffel, Op't Eynde (2000) and Ghefaili (2003).

Although the work of Collins on situated cognition and cognitive apprenticeship has not gone without criticism (see, for instance, Anderson, et al., 1996, 1997; Greeno, 1997; Klauer, 1999), it did give impetus to the development of Technology Enhanced Learning Environments that seem to have a potential for supporting self-regulated learning (Jarvela 1995, 1996; Ghefaili, 2003). Spiro designed a hypermedia environment based on his cognitive flexibility theory (Spiro et al., 1991). Bransford and his colleagues from the Cognition and Technology Group at Vanderbilt University (CTGV) developed a technology enhanced learning approach (anchored instruction) which is based on the concept of situated cognition. Examples are the Jasper project (CTGV, 1997) and SMART - Scientific and Mathematical Arenas for Refining Thinking (Vye et al., 1998).

More recently, Zimmermann (Zimmerman & Kitsantas, 2005; Zimmerman & Tsikalas, 2005) presented a social cognitive multilevel model of self-regulatory development which shows a high degree of resemblance with the model of cognitive apprenticeship. Like Collins and his colleagues, Zimmerman assumes that at the first level, an expert model is of great importance (observational level). At the succeeding levels (emulation, self-controlled, self-regulated level) the learner becomes increasingly independent of the expert model, improving his self-regulatory skills at each level.

A FRAMEWORK FOR STUDYING SRL IN TELES

In this section, we explore the boundaries of the concept of self-regulated learning, conceived in the narrowest sense as the planning, monitoring and evaluation of learning activities. We view self-regulated learning from the perspective of level of analysis, level of distribution, and level of generalisation.

Level of analysis (low versus high)

Studies in self-regulated learning tend to analyse the performance of learners at the strategic or the behavioural level. Zimmerman (1998c, 2000) suggested a social cognitive model of self-regulated learning which is richer with respect to the processes which are considered at each stage. According to this model, self-regulation is achieved in cycles consisting of (1) forethought, (2) performance or volitional control, and (3) self-reflection. The first and the third cycle encompass strategic activities whereas the second cycle is focused on the behavioural level. However, recently more attention is being paid to the neurological level. Therefore all levels are invoked when students regulate their learning activities. We will subsequently focus on each of the three levels and eventually make a comparison between the various levels of analysis.

Most studies of self-regulated learning focus at the level of strategic processes. For instance, Weinstein's (1996) work on self-regulated learning, particularly the Model of Strategic Learning, relates learning strategies, study skills, motivation, beliefs, and context variables. The same goes for the contributions of Boekaerts (2000), Pintrich (2000), and Zimmermann (1998), discussed above.

At the behavioural level, Koriat, Ma'ayan, Nussinsson (2006) discussed the reciprocal relation between consciousness and behaviour (metalevel and object level in terms of Nelson and Narens, 1990). They provided evidence that task performance is not only regulated by previous planning, but may also influence subsequent planning. For instance, when I have to learn a list of Italian words I may start with estimating the relative difficulty of learning the various word pairs and, subsequently, may allocate rehearsal time according to the expected task difficulty. However, I may experience difficulty in rehearsing particular words and, consequently, adjust my estimate of the level of difficulty of the learning task. This adaptation of the estimated level of difficulty may subsequently determine the way I regulate the learning process. Both causal relationships (planning determines behaviour; behaviour determines planning) appear to occur in self-regulated learning.

Focussing at the neurological level, Shimamura (2000) reported evidence for mid-brain activity during activities like focusing attention, conflict resolution, error correction, inhibitory control, and emotional regulation. Moreover, evidence has been found for frontal lobe activity during selecting, maintaining, updating and rerouting of information in working memory.

Posner and Rothbart (1998) showed that maturation of frontal lobe regions is not completed until the age of 25. Between the ages of 5 and 16 years, the volume of

certain areas in the prefrontal cortex significantly correlates with the performance on cognitive tasks which call upon attentional control. According to Crone (2004), this developmental trend should be taken into consideration when learning arrangements are designed and implemented in which student control is necessary in order to learn. So the presumed advantage of making high school students responsible for their own learning by teaching them how to regulate their own learning has its price: more prefrontal and mid-brain activity is involved in this kind of learning. The required systems should be in place in order to enable the student to bring this kind of learning to a successful end.

As far as the study of self-regulated learning is concerned, all three levels obviously contribute to our understanding of the process of self-regulation. At the neurological level, more important relationships may be revealed. However, the interrelationships between the various levels appear to be very important. We need to know more about the issue of nature and nurture with respect of self-regulated learning. Like intelligence, self-regulation may be determined by both the genetic make-up of the learner and his or her experience.

Level of distribution (individual versus group)

A second perspective on self-regulated learning has to do with the distinction between a focus on individual learning and a focus on the student as part of the community of learners (Brown & Campione, 1994). Most research on self-regulated learning has been focussed on individual student learning. This is not surprising because self-regulated learning is generally considered to be an individual student's characteristic. Zimmerman's (2000) definition of self-regulation as 'self-generated thoughts, feelings, and actions that are planned and cyclically adapted to the attainment of personal goals' (Zimmerman, 2000, p. 14) emphasises this individualised view on self-regulated learning. However, at the classroom level, interesting results have been obtained. Eshel and Kohavi (2003) studied the relationship between teacher control and learner control. Mathematics achievements of 12 to 13-year-old students appeared to be dependent on both high student control and high teacher control. The authors claim that ambitious students may benefit from the "additive effect of high levels of control that are shared by both students and teachers" (Eshel & Kohavi, 2003, p. 259), whereas students aiming for independent learning may flourish under conditions of high student control and reduced teacher control. Apparently, irrespective of the type of students, the development of regulation strategies is related to high levels of student control.

Beishuizen (2008) discussed the potential contribution of the setting of a community of learners to foster the development of self-regulation strategies. He compared two projects in which university students carried out a research task. In one of the two cases, students were involved, as part of their regular bachelor programme in biomedical sciences, in a research programme of the teachers and studied the behaviour of oncogenes in a yeast model. The other case dealt with a software engineering project in which students analysed the introduction of an electronic ticketing system in Dutch public transportation. On the basis of these

two projects, Beishuizen (2008) concluded that the role of the teacher as a model and coach was crucial for the development of self-regulated learning.
It is clear that the focus on individual learning has been predominant in the research on self-regulated learning. We definitely need more evidence as to the contribution of the social environment on both individual development and group development of self-regulated learning.

Level of generalisation (generic versus domain specific)

The third dimension on which we explore the boundaries of the concept of self-regulated learning is the domain within which students develop strategies and skills of self-regulated learning. Most studies focus on a particular domain. For instance, in the Brown, Collins, and Duguid (1989a) paper on cognitive apprenticeship discussed above, three contributions are exposed which focus on the particular domains: text comprehension (Palincsar & Brown, 1984), creative writing (Scardamalia & Bereiter, 1985), and mathematics (Schoenfeld, 1985). Compared to these mono-domain studies, cross domain comparisons are scarce.

Wolters, Yu, Pintrich (1996) asked seventh and eighth grade students to complete the Motivated Strategies for Learning Questionnaire (MSQL, Pintrich & De Groot, 1990) revealing their motivational beliefs and cognitions about the use of cognitive strategies and self-regulation. Students with a mastery or learning goal orientation, valuing the intrinsic value of learning, displayed a positive pattern of motivational beliefs and self-regulation. Students with a performance orientation, motivated by extrinsic goals, showed less positive, more maladaptive motivational beliefs and cognitive strategies. These relationships between goal orientations, motivational beliefs and cognitive strategies were found across the domains of English language, mathematics, and social studies. Interestingly, the authors were able to find distinct effects for two species of performance goal orientation. A so called relative ability goal orientation, aiming at doing better than others, fostered higher levels of self-regulation, whereas an extrinsic goal orientation, associated with test anxiety and fear of failure and looking bad, correlated with a lower degree of self-regulation.

Veenman, Elshout, and Meijer (1997) studied metacognitive skilfulness in three different domains: physics, statistics, and an artificial science domain. High and low intelligent psychology students completed simulation tasks in each of the three domains. Their problem solving behaviour was observed to assess the use of metacognitive strategies. Students showed stable levels of metacognitive performance across domains. Moreover, metacognition and intellectual ability contributed both jointly and independently to the learning process. The authors concluded that metacognitive strategy training makes sense because the training results may be transferable to various domains.

Intra-individual comparisons of self-regulated learning across domains are important for two reasons: to further develop stable insights into the network of concepts elucidating motivation, self-regulated learning and academic performance, and to explore the transferable components of self-regulation

strategies. In this way, these studies may contribute to bridging the gap between laboratory research and school practice.

SITUATING THE CONTRIBUTIONS TO THIS BOOK IN THE FRAMEWORK

While it is the intention of the chapters in the second part of the book to present a European perspective on self-regulated learning (SRL) in technology enhanced learning environments (TELEs), we have to acknowledge that there is no common and unitary European perspective. Instead, there are many different perspectives, not even national ones, but perspective of many European researchers who work in different environments and who have in their research focused on different aspects. We therefore have a diversity of perspectives, but it is this diversity which constitutes something that could be called a European perspective.

Antonio Bartolomé from the University of Barcelona and Karl Steffens from Cologne University first (chapter 2) look at educational technology and its development and then discuss specific technologies and their potential for supporting SRL. Specifically, they present three criteria which they think TELEs should meet in order to be capable of facilitating SRL. These refer to behavioural and strategic aspects of SRL; they focus on the individual learner and they are considered to be domain-general.

Chapter 3 by Karl Steffens discusses whether there is a contradiction between didactics and SRL in TELEs. It is true that classical didactical thinking focussed on teaching and on the perspective of the teacher, and to some extent, this is even true of modern didactics. These approaches leave little room for SRL. Newer approaches in the field of didactics, particularly those of constructivist and media didactics place much more emphasis on the learner and on SRL. They refer to behavioural and strategic aspects of SRL; they focus on the individual learner and they are considered to be domain-general.

Manuela Delfino & Donatella Persico from the Institute for Educational Technology, Italian National Research Council (IDT-CNR) (chapter 4), focus on the development and evaluation of tools to support SRL. They grouped the studies they considered for their review into three categories: (1) studies of metacognitive competencies required or enhanced by the use of Information and Communication Technology, (2) studies aiming to design and implement systems that support the development of SRL and (3) studies aiming to assess and evaluate the potential of different kinds of TELES to support the development of SRL. Their focus is on strategic aspects of SRL and on individual learners, while the level of generalisation varies with the specific study under discussion.

Roberto Carneiro from Universidade Católica Portuguesa and Ana Margarida Veiga Simão from Universidade de Lisboa (chapter 5) look at technology enhanced learning in teacher education. In the first part of their paper, the authors provide an overview of theoretical and empirical studies on SRL in Portugal. In the second section, they describe a study on the impact of a TELE in SRL in the context of a graduate programme of studies offered at the Portuguese Catholic University with a particular focus on motivational profiles of teacher students. The last section provides a brief description of the Digital Portfolio movement in Portugal, a concept that is acquiring momentum among academia and research groups. In this

contribution, the strategic level in individual learners as well as in groups of learners in specific domains is targeted.

Jos Beishuizen from Vrije Universiteit Amsterdam (chapter 6) reports on recent developments in research on fostering SRL in TELEs. The author distinguishes four factors which might influence this process: (1) the student, (2) the teacher, (3) the community of learners and (4) the learning environment. The analysis was based on 26 representative articles from Dutch authors selected from six international and Dutch journals. The author concludes that research has disclosed important relationships between the arrangement of the learning environment, the learning process and the learning outcomes. TELEs seem to be capable of supporting SRL if they provide for adaptability of complexity, interactivity, articulation, and balance. Due to the diversity of studies under scrutiny, almost all levels of analysis, distribution and generalisation are referred to.

Dominique Lenné, Marie-Hélène Abel and Philippe Trigano from Université de Technologie de Compiègne (chapter 7) approach the topic from their own professional perspective which basically is that of a designer of TELEs or, more precisely, a designer of technological artefacts that support SRL. The authors therefore first present some technological tools and environments that can support SRL, then they review recent work on activity tracing and interaction analysis that can provide metacognitive support, and finally they describe a study that evaluated the potential of a TELE in the framework of the TELEPEERS project. Here they look at strategic aspects of SRL, focusing on individual learning in a specific domain (a course on introduction to algorithms and programming).

Paul Lefrere from the Open University in the UK (chapter 8) reports on data gathered in three ways: (1) an impressionistic desk study of education press pieces from 2007, (2) informal and impressionistic interviews of a small number of university teachers in campus-based institutions and (3) a desk study of current UK academic interest and practice in SRL, technology enhanced learning and related areas, as represented by publications by UK researchers, papers accepted by UK editors of journals relevant to technology-enhanced learning and TELEs (primarily the British Journal of Educational Technology) and the type and number of SRL-relevant presentations from UK researchers at major conferences on teaching, learning and TELEs, such as ALT-C. Focus is on the strategic level in individual learners in specific domains.

Jean Underwood from Nottingham Trent University, Antonio Bartolomé from Barcelona University and Paul Lefrere from the Open University (chapter 9), after distinguishing between grand challenges and big issues, discuss the future of learning platforms and their possible impact on SRL as a big issue. Again, emphasis is on the strategic level in individual learners in specific domains.

Jean Underwood and Phil Banyard from Nottingham Trent University (chapter 10) wrote the epilogue to this book. In their contribution, they first reflect on several paradoxes that characterise education in European countries, the first one being that while learners are supposed to be more self-regulating, much more control has been placed on learning and learning outcomes. The second paradox they discuss is that while education is predictable, the future usefulness of this

education is not. The third paradox on which the authors comment is that the present focus on a limited set of basic skills in fact limits a person to that basic set of skills. In the second part of their chapter, they direct their attention to the concept of SRL and to SRL in TELEs. Referring to the preceding chapters, they point out that there seems to be little evidence that the concept of SRL has indeed had an impact on the implementation and use of TELEs. As the authors note, there is, however, also some evidence to the contrary. Jos Beishuizen, in his contribution concludes that Dutch research into SRL in TELEs has disclosed important relationships between the arrangement of the learning environment, the learning process and learning outcomes. So there is hope. But as Underwood and Banyard state "The evidence of the synergy between SRL and TELEs tends still to be confined to the hot-house of research interventions rather than being embedded within the fabric of education."

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