



An Overview of Self-Regulated Learning Models

Öz-düzenleyici Öğrenme Modellerine Genel Bir Bakış

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Abstract

In recent years, the concept of self-regulation of learning and performance has been accruing attention among educational researchers. The importance of learners who direct their own acquisition of knowledge and skill has also been stressed by educational instructors. Thus, as an emerging topic of integrated research, many theories and models have been formed to identify the self-regulated learning (SRL) process. The purpose of this article is to present the most up-to-date approaches which are Zimmerman, Pintrich, Winne & Hadwin and Boekaerts's SRL models in the light of studies conducted in the last three decades. With this purpose, it is aimed to represent an overall view of how each model defines SRL and which components each model consists of. The final section of the article discusses the common and different aspects of the four main SRL models.

Keywords: Self-regulated learning, self-regulated learning models.

Öz

Öğrenme ve performansın öz-düzenlenmesi kavramı son yıllarda eğitim araştırmacıları arasında artan bir ilgi kazanmaktadır. Kendi bilgi ve beceri kazanımlarını yönlendiren öğrenenlerin önemi de eğitimciler tarafından vurgulanmıştır. Böylece, gelişmekte olan bütünlük bir araştırma konusu olan, öz-düzenleyici öğrenme (ÖDÖ) sürecini tanımlamak için birçok teori ve model oluşturulmuştur. Bu makalenin amacı, son otuz yıldır yapılan çalışmaların ışığında ortaya çıkan en güncel yaklaşımlardan, Zimmerman, Pintrich, Winne ve Hadwin ve Boekaerts'in ÖDÖ modellerini sunmaktır. Bu amaçla, her bir modelin ÖDÖ'yü nasıl tanımladıkları ve bunların hangi bileşenlerden oluştuğunu genel bir bakış açısıyla sunulması hedeflenmiştir. Makalenin son bölümünde dört temel ÖDÖ modelinin ortak ve farklı yönleri tartışılmıştır.

Anahtar Kelimeler: Öz-düzenleyici öğrenme, öz-düzenleyici öğrenme modelleri.

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1. What is Self-Regulation?

Consider a person having a great control over his or her thoughts, emotions, and desires while struggling in terms of all areas in daily life. It is believed that such person is more capable in solving problems initiating from the early ages. Being able to direct one's own cognition, carrying out a plan, setting goals with an intrinsic motivation, and reflecting on any performances provide a self-regulated learner with autonomy. Since its inception, the term *self-regulated learning* (SRL) has been given importance as a prerequisite to formal schooling and even beyond; also, it has special significance to life-long learning (Zimmerman, 2002). Because of this, many stakeholders in the education system, such as educators and policy makers, emphasize the importance of raising awareness about self-regulatory skills, which are seen as necessary for anyone who wishing to educate themselves after formal schooling (Boekaerts, 1997).

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Many researchers have crafted various definitions for the concept of self-regulation (SR); individual perspectives tend to influence each of these definitions. As defined by Pintrich (2005), self-regulation provides learners an ability to set goals, monitor, regulate and control their learning and motivation. SR has been defined in process terms, presenting a view that SR is not merely a cognitive skill or performance ability. Instead, SR is a development process that is directed by learners that allows them to transform their mental abilities into academic skills (Zimmerman, 2002). Underneath both of these definitions is the implication that learners build learning environments for themselves in line with their own standards for an effective self-regulation process. The term of SRL, which, in the literature, is used interchangeably with SR, is defined by Boekaerts (1997). She reports that self-regulated learning is an automatic and easy way of learning, rather than being complicated. Boekaerts and Niemivirta (2005) further emphasize that SRL is not just a single unit; on the contrary, the term encapsulates many occurrences, which are compiled by different apparatuses, for example, motivation, metacognition, and /or emotion.

2. Overview of the Key Models of Self-Regulated Learning

Self-regulated learning should be paid more attention because its theoretical and educational relevance integrates the different components of learning with its framework. It has practical value as well, which stresses the role of personal efforts, self-direction, and autonomous learning (Camahalan, 2006). The past three decades have produced several different models of SRL. Each one gives an alternate viewpoint of SRL and contributes to understand the components of SRL and its process. In the following part four major SRL models, including Zimmerman, Pintrich, Winne and Hadwin, and Boekaerts are reviewed respectively. Based on the following SRL models, it is aimed to take a closer look about what self-regulation is and why it is important for lifelong learning.

2.1. Zimmerman's Model of Self-Regulated Learning

Bandura's Social Cognitive Theory formed the basis for Zimmerman's (1998) model of SRL. Figure 1 represents Bandura's (1986) views about self-regulation; his theory shows mutual interactions between behavior factors, environmental behavior factors, and personal factors. In this model, Zimmerman (2005) stated that environmental and behavioral events have a reciprocal relationship with self-regulation as well as personal processes. Self-regulation can take place on a behavioral level, where an individual self-observes and then adjusts performance strategically, as well as on an environmental level, which includes taking environmental conditions into consideration and adjusting accordingly. Zimmerman (2005) approached the topic from a social cognitive perspective, and he pointed out the cyclical nature of self-regulation, referring to a cycle where feedback is attained from previous experiences and then used to adapt present performances. Considering the constantly changing nature of personal, behavioral, and environmental factors, these adaptations are an important part of learning and performance.

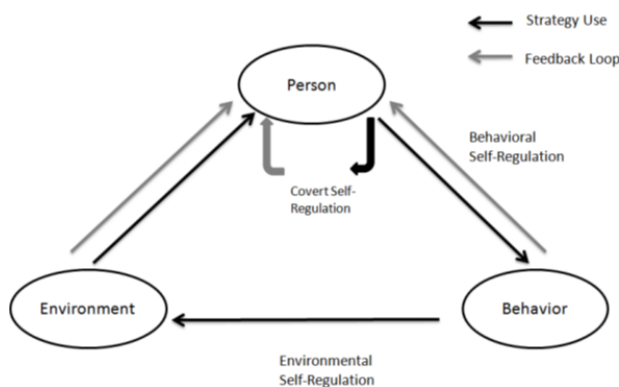


Figure 1. *Triadic forms of self-regulation* (Zimmerman, 2005, p. 15)

Zimmerman (2005) explained several types of regulation. One, covert personal regulation, covers the states of cognition and effectiveness (i.e. imagery for remembering), and monitors and adapts as needed. Another, behavioral self-regulation, includes observing one's self and making strategic adjustments during the performance (i.e. one's method of learning). A third type of regulation is environmental self-regulation, which deal with observing and adapting to conditions in the environment. As an individual goes through the three stages in this cyclical process,

his/her functioning is influenced by covert personal, behavioral, and environmental events which can be seen as both separable and inseparable factors. Bandura (1986) explained that this triadic process cannot be thought of as a set pattern. Depending on the context, one factor might be stronger than the other two (Zimmerman, 1989). This means that context plays a large part in self-regulation (Schunk, 2001).

According to Zimmerman (2005), self-regulation is “self-generated thoughts, feelings, and actions that are planned cyclically adapted to the attainment of personal goals” (p.14). This definition clearly favors treating this subject as a single trait or ability, which stands in contrast to other definitions of this subject. This definition explains why individuals may find difficulty self-regulating every kind of performance. Differing from meta-cognitive definitions which only emphasize knowledge states, the definition of Zimmerman (2005) provides more importance to self-beliefs and one’s affective reaction in each context of performance. This is a vital part of the SR definition; for example, self-efficacy is a process which helps to explain differences in performances due to personal motivations.

Table 1 shows the three cyclical phases of self-regulatory processes as viewed from a social cognitive perspective: (1) forethought, (2) performance or volitional control and (3) self-reflection. Each phase has an effect on the following processes in the cycle.

Table 1
Phase Structure and Sub-processes of Self-Regulation

Cyclical self-regulatory phases		
Forethought	Performance/volitional Control	Self-Reflection
Task Analysis	Self-control	Self-judgment
- Goal Setting	-Self-instruction	-Self-evaluation
- Strategic Planning	-Imagery	-Causal attribution
	-Attention focusing	
	-Task strategies	
Self-Motivational Beliefs	Self-observation	Self-reaction
-Self-efficacy	-Self-recording	-Self-satisfaction
-Outcome expectations	- Self-experimentation	-Adaptive-defensive
-Intrinsic Interest		
-Goal Orientation		

(Source: Zimmerman, B.J. (2005). Attaining self-regulation: A social cognitive perspective. In M.Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation*, (pp.13-39). London: Elsevier Academic Press.)

The forethought phase, as the name implies, takes into account beliefs and processes that are in existence before an individual acts in a certain situation. In this phase there are two unique groupings: *task analysis* and *self-motivational beliefs*. The first, task analysis, includes *goal setting*, which is considered a fundamental part of this phase. When goal setting, an individual must resolve on what outcomes in particular would be attained from the learning or performance. *Strategic planning* is another part of task analysis. This refers to deciding on the methods that would be appropriate for the task and setting. These strategies, if they are appropriately selected, are believed to improve performance (Zimmerman. 2005).

Self-motivational beliefs should be considered in the discussion of self-regulatory skills. The reason for this is the fact that if people are unable to encourage themselves, then self-regulatory skills lose their value. Activities such as strategic planning and goal setting have some foundational self-motivational beliefs underpinning them, beliefs such as self-efficacy, outcome expectations, intrinsic interest, and goal orientation. Self-efficacy refers to an individual’s assumptions about whether or not he/she has the means to learn or perform effectively. According to Zimmerman, a person’s inclination to reach and maintain his/her self-regulatory behaviors relies heavily on his/her self-efficacy (2005). Nevertheless, more is needed than just self-efficacy; the expected performance will not change as long as there is a deficit of necessary knowledge and skills. Outcome expectations influence decisions because people are more likely to pursue activities that they believe will have positive results (Schunk, 1994). Intrinsic motivation is the quality of doing a something simply for its own sake; in other words, accomplishing the activity is a reward in and of itself, no external source provides the motivation (Pintrich & Schunk, 1996). The final belief about motivation discussed here is goal orientation. Goal orientation addresses achievement behavior, and includes both a reason for acquiring achievement and a determination to reach that goal.

There are two important types of processes involved in the performance, also known as volitional control, phase. These are: *self-control* and *self-observation*. Self-control involves self-instruction, imagery, attention focusing, task strategies, all of which help learner concentration on the task, enabling them to maximize their efforts. An individual may also use *self-instruction*, as term which denotes an overt or covert verbal description of the completion of an activity. Another technique is *imagery*, which helps an individual to encode and perform. *Attention focusing*, as the name suggests, refers to an individual's concentration on a task, filtering out other outside or covert processes. *Task strategies* denote the importance of identifying the major sections of an activity by reorganizing to assist learning and performance (Zimmerman, 2005).

The second process involved in the performance phase, self-observation, traces particular aspects of one's own performance and involves self-recording and self-experimentation. The first technique, *self-recording*, keeps personal data spontaneously and protects its accuracy; this prevents needless rehearsal. Self-experimentation, on the other hand, is used when an individual believes that self-observation has not provided accurate information. In order to gather correct information, self-experimentation systematically tests cases that are questionable (Zimmerman, 2005).

Self-reflection, the final phase, consists of the processes of *self-judgment* and *self-reactions*, both of which are closely related to self-observation. Self-judgment involves making evaluations about one's own performance and the possible results of that performance. *Self-evaluation* also occurs during this process; it involves compared the information about the monitored performance and the expected goal or standard. Zimmerman (2005) observed four criteria that are generally used when people evaluate themselves: mastery, previous performance, normative, and collaborative evaluations. The criteria for mastery involve comparing outcomes with tests or test scores. Previous performance measures past performances with the current performance. Normative criteria, contrary to mastery or previous performance, makes comparisons within a social group, i.e., about other's performances. Finally, the criteria for collaborative evaluations involve making a team evaluation, which changes depending on different team endeavors. Attributions, which Weiner (1979) describes as beliefs concerning the causes of the outcomes, about the causes of the results come from self-evaluative judgments. Causal attributions are viewed as key factors of self-regulation and mostly come into play during the self-reflection phase. Although attributions are generally thought to occur when reflecting on a performance, they also happen before a task is begun, in the forethought phase (Schunk, 2008).

Secondly, this phase involves self-satisfaction and adaptive or defensive inferences. The term *self-satisfaction* denotes the presence of perceptions of satisfaction or dissatisfaction. These perceptions can lead individuals to increase or decrease their performance in the learning process. Adaptive and defensive inferences allow an individual to modify his/her self-regulatory approach in future attempts to learn.

2.2. Pintrich's Model of Self-Regulated Learning

Pintrich created a conceptual framework of self-regulation which made a major contribution to educational psychology (Schunk, 2005). In contrast to other representations, he presented his work in the format of a table. His model reflects an understanding of social-cognitive theory, although it also includes elements of other theories, such as cognitive information processing (Zimmerman & Schunk, 2001).

Pintrich (2005) proposed an interaction/mediation between self-regulatory activities and the relations of learners, their environments, and their overall achievement. There are four phases in his model: forethought, monitoring, control, and reflection. Four potential self-regulatory areas are given for each phase: cognition, motivation, behavior, and context (See Table 2). The first three areas are in the realm of the learner. The learner's own cognition, motivation, and behavior are used to attempt to control and self-regulate. In addition to these personal efforts, people such as teachers, peers, or parents can also regulate an individual's cognition, motivation, or behavior by directing or scaffolding the individual regarding a task. These contextual factors (task characteristics, feedback systems, and/ or evaluation structures) may affect the self-regulation of an individual's learning.

In Phase 1, the mental activities of planning, goal setting, prior content knowledge and meta-cognitive knowledge activations are used. Processes that stimulate motivation also play a part in this initial phase, affecting goal orientation adoption, efficacy judgments, ease of learning and perceptions of difficulty, task value activation, and interest activation. During this phase, time and effort planning as well as planning for self-observations can be self-regulated. The context factors that influence learning are students' perceptions of a task and the context. In Phase 2, the mental processes involve meta-cognitive awareness. Motivational monitoring during this phase consists of awareness and monitoring of motivation and affect. Behavioral monitoring involves awareness and monitoring of effort, using time, and need for help. The context is supervised via monitoring task and context conditions. Phase 3 involves mental control for the cognitive strategies of learning and thinking. Control of motivations involves selecting and adapting

approaches that will manage motivation and affect. Behavioral control consists of expending effort, persisting and seeking help when needed. Control of the context refers to efforts to change or renegotiate a task. For instance, students might demand their teachers make changes in the assignment (Schunk, 2005). In the final phase, Phase 4, mental reaction and reflection contain judgments and attributions. Motivational reactions include affective reactions and attributions. Behavioral reaction and reflection take in one's choice of behavior. Contextual reaction and reflection, on the other hand, comprise evaluations of task and context.

Pintrich (2005) cautioned that these four phases may not always occur in the order they are listed. Although there is a general time-ordered sequence that learners normally follow, it is not necessary for the phases to be passed through consecutively as they are not hierarchically or linearly structured.

Pintrich's (2005) emphasis on the motivational processes was a major contribution to SRL. For him, motivation was a factor that played a key part in each of the four phases. Pintrich's (2005) motivational variables have been viewed as critical in the understanding of SR, and later studies have showed that an individual's motivational process can determine whether or not he is a good self-regulator or a bad self-regulator. These findings have shown that self-regulated learners demonstrate the characteristics of setting hierarchical goals and simultaneously holding process and product goals. These results in them seeming more self-efficacious than learners who are less self-regulated, since they have the ability to use self-regulatory skills to assist them. Another contribution that Pintrich (2005) made was the other aspect of students' goal orientations. Adding this to the definition of SRL allowed more focus to be given to mastery and performance goals. Mastery goals lead students to give attention to learning, understanding, and mastering tasks. On the other hand, performance goals lead students to focus on mastery or being the best at the task when compared to others. Research in this area has demonstrates that mastery goal orientated learners demonstrate stronger cognitive monitoring and use of learning strategies.

Table 2.
Phases and Areas for Self-Regulated Learning

Phases	Areas for regulation			
	Cognition	Motivation/affect	Behavior	Context
Forethought, planning, and activation	Target goal setting Prior content knowledge activation Metacognitive knowledge activation	Goal orientation adoption Efficacy judgments Ease of learning judgments (EOLs), perception of task difficulty Task value activation Interest activation	[Time and effort planning] [Planning for self-observation of behavior]	[Perception of task] [Perception of context]
Monitoring	Metacognitive awareness and monitoring of cognition (FOKs, JOLs)	Awareness and monitoring of motivation and affect	Awareness and monitoring of effort, time use, need for help Self-observation of behavior	Monitoring changing task and context conditions
Control	Selection and adaptation of cognitive strategies for learning thinking	Selection and adaptation of strategies for managing motivation and affect	Increase, decrease effort Persist, give up Help-seeking behavior	Change or renegotiate task
Reaction and reflection	Cognitive judgments Attribution	Affective reactions Attributions	Choice behavior	Evaluation of task Evaluation of context

(Source. Pintrich, P. R. (2005). The role of goal orientation in self-regulated learning. In M. Boekaerts, P. R. Pintrich, M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 451-502). San Diego: Academic Press)

2.3. Winne and Hadwin's Model of Self-Regulated Learning

The model was codeveloped by Winne and Hadwin (1998) and presents a perspective of SRL with three, sometimes four, phases. Each phase encompasses cognitive operations that build particular kinds of products. According to this model, there are four roles that information can perform: condition, product, evaluation or standard. Two events are vital to SRL: metacognitive monitoring and metacognitive control. Furthermore, this model designates four basic phases of learning: (1) task definition, (2) goal setting and planning, (3) studying tactics, and (4) adaptations to metacognition (although this final phase is optional) (Winne, 2001). The fourth phase is a process that students use to inspect critically what they developed in the previous phases, in the light of their meta-level knowledge (Winne & Perry, 2005).

Two components, event and aptitude, were discussed as measures of SRL (Winne & Perry, 2005). Winne and Perry defined an event as "snapshot that freezes activity in motion, a transient state embedded in a larger, longer series of state unfolding over time" (2005, p. 534). An aptitude refers to a relatively stable personal attribute. In their opinion, this model offered the ability to view alternative ways of measuring SRL as an aptitude and as an event. To measure SRL as an aptitude, protocols such as questionnaires, structured interviews, and teacher judgments can be used. To measure SRL when it is considered as an event, however, think aloud measures, error detection tasks, trace methodologies, observations of performance methods are used (Winne & Perry, 2005).

2.4. Boekaerts' Model of Self-Regulated Learning

Yet another model, developed by Boekaerts, treats the many inter-connected aspects of SRL holistically. The Model of Adaptable Learning (MAL) is a framework that addresses the intertwined aspects of SRL, and operates on the assumption that individuals self-regulate their behavior regarding two basic priorities. In this model, individuals acquire knowledge and skills in order to improve their personal resources and maintain their available resources by preventing loss, damage, and distortions of well being. It is also assumed that these two priorities are already underlined by information processing approaches. However, according to each individual's goal hierarchy, the two priorities can change in terms of their prominence. In this model, the construct of appraisal takes a central position. In addition, this model shows links between the appraisal process and the contents of a dynamic internal working model; these links demonstrate that each learning situation activates a network that affects an individual's efforts and vulnerabilities (Boekaerts & Niemivirta, 2005).

Several models, similar to MAL, also give importance to the fact that learners' expectancies and goal setting are influenced by both situation and personal variables. The uniqueness of MAL is that it clearly delineates between two types of person variables. These are: those revealing the individual's metacognition and interacting with the content of the task, and those reflecting the individual's self and motivational beliefs. This distinction allows the distinguishing of higher order control processes that involve metacognitive and motivational control (Boekaerts & Niemivirta, 2005).

3. Discussion of Reviewed Self-Regulated Learning Models

In summary, a number of models describing SRL are in existence, each offering a different perspective and involving different aspects (Boekaerts & Niemivirta, 2005; Zimmerman, 2005; Winne, 2001). All of the models so have characteristics in common, however, and have similar general assumptions and features. Each of the four models was compared to the definitions of SRL, the background theories of the authors, and the components included in the models.

First the models were discussed according to the definitions of SRL. In this process, two types of definitions seem to be present. Boekaerts (1997), Pintrich (2005), and Zimmerman (2005) view SRL as a goal-oriented process. From their definitions it is clear that motivational and social factors played a part in activities such as monitoring, regulating, and controlling one's own learning, in addition to cognitive factors. In contrast, Winne and Hadwin (1998) viewed SRL from an information processing perspective, focusing on the metacognitively managed process involved. This process adapted the use of cognitive tactics and strategies to tasks. Although Winne's model does not stress the role of goal orientations in definitions, this model does seem to make the assumption that intrinsic motivation and goals are part of the self-regulated learners' process (Puustinen & Pulkkinen, 2001).

Some of the models show marked similarities, most notable Pintrich's (2005) and Zimmerman's (2005); both are founded on social cognitive theory and view SRL as a goal-oriented process started with a forethought phase and ending with a phase for self-reflection. Unlike Winne and Hadwin's model, Boekaerts (1997) model also shows some

influence from the social cognitive theory, since it offers equal status to cognitive and motivational components of SRL. Another prominent variance between Winne and Hadwin's (1998) model and Pintrich's (2005) involves the separation of the process of task definition from those of goal setting and planning.

All of the models stressed the active role of learners in the SRL process. Instead of passively receiving from external sources, such as teachers or parents, learners must actively and constructively make meaning while learning. Students are viewed as active members who must construct their own meanings, goals, and strategies from external and internal environments.

As explained in the prior sections of this article, there are similarities between the models, especially between Pintrich's and Zimmerman's models, but they differ in the method of using the components. For example the Winne and Hadwin (1998) model focuses on the meta-cognitive monitoring process, assisted by internal feedback, which functions in any phase of the SRL process; the others chose to place it in the performance phase and assign feedback to the appraisal phase (Puustinen & Pulkkinen, 2001).

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