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INSTRUCTIONAL-DESIGN THEORIES AND MODELS, VOLUME IV

The Learner-Centered Paradigm of Education

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9

DESIGNING INSTRUCTION FOR SELF-REGULATED LEARNING

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EDITORS' FOREWORD

Preconditions (when to use the theory)

Content

- *All content.*

Learners

- *All students.*

Learning environments

- *Learner-centered rather than teacher-centered (learning is more important than "covering" content).*

Instructional development constraints

- *Minimal.*

Values (opinions about what is important)

About ends (learning goals)

- *Helping each learner to further develop self-regulation skills is highly valued.*
- *Helping learners to develop each other's self-regulation skills is highly valued.*

About means (instructional methods)

- *Treating each learner with respect and caring is highly valued.*
- *Embracing individual differences, capitalizing on individual strengths, and addressing individual weaknesses are highly valued.*

About priorities (criteria for successful instruction)

- *Efficiency is less important than effectiveness and appeal.*

About power (to make decisions about the previous three)

- *Providing as much learner control over what to learn, how to learn it, and when and where to learn it as the learner can deal with effectively is highly valued.*

Universal Principles

1. Use a problem- or project-oriented task

- *Choice of task: The teacher should help the learner develop SRL skills to identify a task of considerable learner interest that encompasses the learning of multiple standards across several content domains.*
- *Instructional approach: Teacher-centered instruction should be replaced by such learner-centered options as problem-based learning, project-based learning, and inquiry-based learning.*

2. Provide enough time and guidance for preparation

- *Help the learner to develop SRL strategies to set learning and task goals, performance standards, and processes and strategies.*
- *Embrace individual differences in goals, given learners' different goal orientations.*
- *Help learners develop the SRL skills to recall relevant prior knowledge and experience.*

3. Ensure ongoing assessment

- *Formative ongoing assessment: The teacher should help learners develop the SRL skill of ongoing self-assessment—to keep asking themselves questions such as "Is my strategy working?" throughout the SRL process.*
- *Summative authentic integrated assessment: Teachers should assess two things: task performance and attainment of competencies.*
- *Feedback from others: Provide learners with timely feedback from peer learners as well as teachers.*

4. Model SRL for learners

- *Teacher modeling: Teachers should model SRL both within and outside the classroom.*
- *Peer modeling: Peer modeling promotes learners' self-efficacy with SRL skills and processes.*

5. Provide learners with opportunities for application

- *Facilitate learners' application skills by grouping them and having them demonstrate what they do well in terms of SRL to their peers.*
- *Provide opportunities for the learners to explore new ways to use their SRL skills in everyday life.*

6. Provide learners with instruction on SRL skills and knowledge

- *Micro-level instruction: Utilize Merrill's (2006, 2007) three-part skill development model: Generality, Demonstration, and Practice with Feedback.*
- *Macro-level instruction: Based on the Elaboration Theory's Simplifying Conditions Method, include all three phases of the entire SRL process: Planning, Performing, and Reflecting.*

Situational Principles

When class size is large

- *Actively utilize team-based learning activities to meet different learners' needs, since large class size may lead to reduced ability to embrace individual student differences and meet individual needs.*

When time is limited

- *Design and implement interdisciplinary and multidisciplinary instruction to help improve efficiency while maintaining core characteristics of SRL instruction and learner-centered instruction.*

When learners are young

- *Use differentiated guidance to better support early education learners' SRL.*

Implementation issues

- ***Teacher acceptance of SRL:** Teachers who do not understand or accept the veracity of SRL may not be effective implementers.*
- ***Teacher experience with SRL:** Teachers new to SRL may need professional development and mentoring.*
- ***Teachers need time to prepare and implement SRL:** Administration must be willing to provide time and schedule flexibility to support teacher planning and for the implementation of SRL in courses.*

– C.M.R., B.J.B., & R.D.M.

DESIGNING INSTRUCTION FOR SELF-REGULATED LEARNING

I. Introduction

Self-regulated learning (SRL) refers to an ability of learners to actively and intentionally set goals for their learning and to monitor, regulate, control, and evaluate their cognition, behavior, motivation, and environments to achieve those goals (Pintrich, 2004; Zimmerman, 2000). SRL was one of the

hottest topics of study from the 1980s to early 2000s, especially among educational psychologists. Recently SRL has once again gained much attention in the field of education, which can be understood by the growing interest in learner-centered instruction and the development of empowering educational technologies.

Why Is SRL More Important in Learner-Centered Instruction?

We are now living in the Information Age, having passed through the Agrarian and Industrial Ages (Toffler, 1980). After the Industrial Age, the role of education changed from producing factory workers for mass production to producing knowledge workers for continuous innovation and knowledge creation. Thus, the focus of education has also moved from sorting students to promoting learning for all students (Reigeluth et al., 2008). The Information-Age paradigm of education is learner-centered rather than teacher-centered, and learning activities for students are more customized than standardized, as described in Chapter 1.

The American Psychological Association (APA) and McCombs and Whisler (1997) have explored learner-centered instruction. The APA issued a report on learner-centered psychological principles with research evidence, and also examined special features of learner-centered classrooms and schools (APA Work Group of the Board of Educational Affairs, 1997). Among the principles they prescribed are students' ability and responsibility to self-direct and self-regulate their learning to eventually become life-long learners.

In learner-centered instruction, there is an assumption that students need to play a more active role in their learning processes. In a traditional classroom, teachers play a significant role in students' learning, such as deciding what to learn, when to learn, and how to learn. In contrast, students in learner-centered instruction have more control over their learning activities. The phrase "From a sage on the stage to a guide on the side" well represents the new roles of teachers and students in learner-centered instruction. With increased learner control, the ability of learners to regulate their learning has become more important for their success. In the current Information-Age paradigm of education, learner-centered instruction is central (Reigeluth et al., 2008), and SRL has been noted as an essential skill or competency for 21st-century learners (Wolters, 2010).

From time to time SRL is used interchangeably with self-directed learning (SDL). The concept of SDL was derived from andragogy (Knowles, 1968) and adult learning (Merriam, 2001). SRL and SDL share many characteristics, but the biggest difference is that SDL assumes learners initiate learning because they feel the need for new knowledge based on their experience. For example, a marketing associate feels that she has difficulties in answering some of the client's questions and needs more knowledge in accounting for her job

responsibility, so she decides to enroll in online accounting courses at one of the online universities. She can be defined as a self-directed learner. SRL is a more process-oriented concept wherein learners regulate their cognition, behavior, motivation, and environments to achieve their goals.

In this chapter, the focus is mainly on K-12 contexts in which there is a curriculum and learners are not completely free to choose what they want to learn, so SRL is more suitable. However, it is our hope that K-12 students will eventually be encouraged to be self-directed learners in the learner-centered paradigm of education, and an ability to self-regulate their learning from early grades in the K-12 system will definitely help them ultimately become self-directed learners and effective, avid, life-long learners.

Why Is SRL More Important with the Development of Educational Technology?

Personalized learning (Clarke, 2003) is one of the essential characteristics of the learner-centered paradigm of instruction.* Every learner is different. Learners have different learning styles, different paces of learning, different interests, different career goals, and so on. In teacher-centered classroom instruction that is based on the Industrial-Age paradigm of education, students are supposed to receive the same instruction and move forward at the same pace regardless of their individual differences and varying degrees of mastery of content.

However, in learner-centered instruction, students take ownership of their learning, and learning is customized to their individual differences. When describing the concept of learning for mastery, Bloom (1968) noted that every learner can reach mastery if instructional methods and time can vary for them. In addition, based on a number of research studies that were implemented to test Bloom's concept of mastery learning, private tutoring was found to be the best instructional method for customizing learning experiences, whereby each tutor adjusted learning strategies and/or pace of learning based on each individual student's differences (Guskey, 2007). However, Guskey argued that private tutoring was impossible to accomplish because of the lack of such resources as budget, time, and available tutors.

Recently with the development of technology, we see more possibilities for personalized and customized learning, and consequently SRL. The development of technology has allowed new forms of learning in education, such as authentic online multi-media learning environments and computer-based, adaptive tutorials,** which facilitate SRL considerably more than traditional forms of learning can. As witnessed in many cases of online and blended learning, students can take courses they like at their own pace whenever and

* *Editors' note: See Chapter 4, Principles for Personalized Instruction.*

** *Editors' note: See Chapter 11, Designing Technology for the Learner-Centered Paradigm of Education.*

wherever they want (e.g., the Khan Academy). Because they are taking courses via Web-based instruction on their own, the ability to regulate their learning becomes more critical for them to achieve their learning goals and accomplish desired learning outcomes.

Theoretical Background

There are multiple theoretical explanations and perspectives on SRL such as social cognitive theory, volitional theory, and phenomenology (Zimmerman, 2001). However, social cognitive theory is the most popular theoretical explanation for SRL (Bandura, 1977, 1986). In social cognitive theory, Bandura views human functioning as a triadic and dynamic interplay of personal, behavioral, and environmental influences (see Figure 9.1). People are viewed to have certain capabilities, such as to symbolize, to plan strategies, to self-regulate, and to self-reflect, which make up major characteristics of SRL (Bandura, 1986).

In Figure 9.1 the bidirectional arrows stand for self-regulation of a person between the two determinants. For example, if a learner finds a Starbucks has become too noisy for study, she may move to a library. In this case, an environmental determinant (i.e., a noisy place for study) influenced her behavior (i.e., moving to a library). The opposite is also true in that how she interprets the result of her behavior also alters the environment. If she finds that moving to a less noisy place was successful for her study, she may remove a television from her room or install curtains on windows for future study.

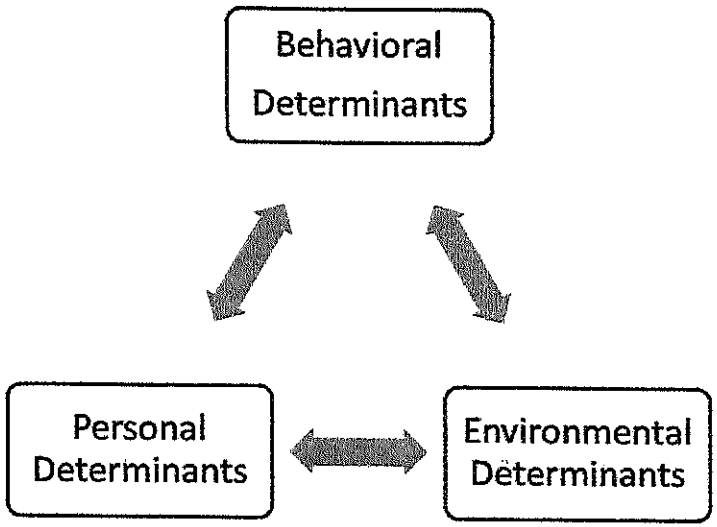

FIGURE 9.1 Triadic Interplay in Social Cognitive Theory

TABLE 9.1 Key Concepts of Past SRL Frameworks

Schunk (1990)	*Boekaerts (1996)*	*Zimmerman (2002)*	*Pintrich (2004)*
Goal setting Self-efficacy Self-regulation • Self-observation a. Self-monitoring b. Self-recording • Self-judgment a. Comparing performance with goals • Self-reaction a. Belief/ Satisfaction	Regulatory systems • Cognitive information processing system • Motivational-emotional system Levels within systems • Domain-specific knowledge • Strategy use • Goals	Forethought phase • Task analysis • Self-motivation beliefs Performance phase • Self-control • Self-observation Self-reflection phase • Self-judgment • Self-reaction	Phases • Forethought, planning, and activation • Monitoring • Control • Reaction and reflection Areas of regulation • Cognition • Motivation/ Affect • Behavior • Context

Several researchers have developed conceptual frameworks to better understand SRL. Table 9.1 shows a summary of the four major conceptual frameworks of SRL.

Even though they seem slightly different, all four frameworks share similar elements of SRL and the notion of phases. Based on the past conceptual frameworks, the first author has developed a modified conceptual framework to present the entire SRL process with sub-processes, along with overarching roles of self-efficacy and motivation belief (see Figure 9.2).

II. Values

Self-regulated learning can be applied to any contexts of learning (e.g., traditional brick-and-mortar school instruction as well as online virtual instruction), any content area and most learner populations, including K–12 students and adult learners.

It is important that both teachers and learners acknowledge the importance of SRL in achieving learning goals. The ability to self-regulate learning not only helps learners accomplish learning tasks and achieve the goals, but also helps learners become effective life-long learners, which is important now because we are living in a knowledge society where continuous learning and innovation are so important.

Effectiveness and appeal are important values underlying SRL instruction. Self-regulation skills improve the effectiveness of instruction, and self-regulation improves the appeal by offering control and pursuit of interests to learners

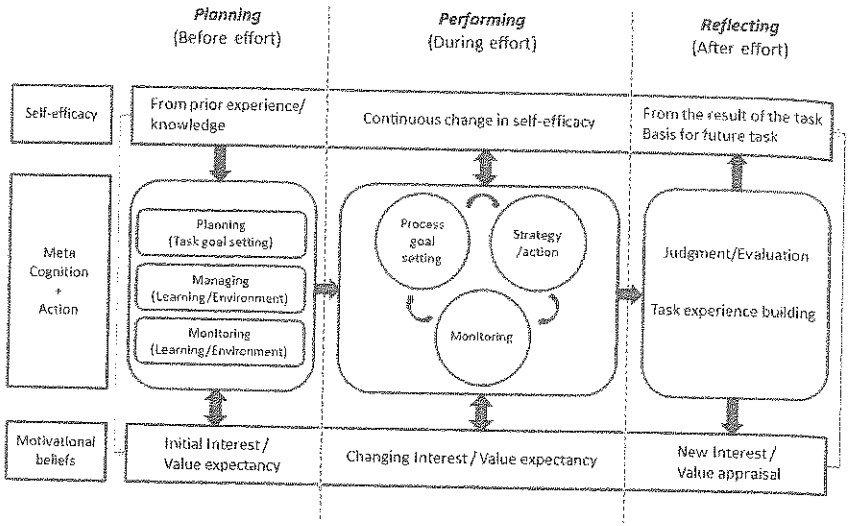

FIGURE 9.2 The Continuous-Change Framework for Self-Regulated Learning (Huh & Reigeluth, 2015)

Instructional methods for SRL should always:

- Provide as much learner control over what to learn, how to learn it, and when and where to learn it as the learner can deal with effectively.
- Help each learner to further develop his or her self-regulation skills.
- Help learners to develop each other's self-regulation skills"
- Treat each learner with respect and caring.
- Embrace individual differences, capitalize on individual strengths, and address individual weaknesses.

III. Universal Principles and Methods for SRL

There are two ways to understand SRL instruction. On one hand, teachers can redesign current content-based instruction to facilitate learners' SRL by utilizing certain instructional approaches and methods and providing specific learning environments. For example, teachers may ask learners to set goals for their learning, which is one of the essential parts of SRL, and they may utilize project-based learning with a one-to-one computer ratio as a learning environment to support learners' SRL. In this case, learning goals are still content-specific knowledge and skills, but SRL is a method that learners utilize to achieve their goals. On the other hand, teachers can specifically design and implement instruction to teach learners SRL skills utilizing various content domains. There is agreement among researchers that SRL is a skill that can be taught (Boekaerts, 1997; Zimmerman, 2002).

Thus specific instruction or coaching may be utilized to teach learners SRL skills, as is done in Montessori classrooms. In this case, the primary learning goal is SRL skills, and various other kinds of methods should be utilized by instructors.

The focus of this chapter lies on the former: how to facilitate learners' SRL by redesigning current instruction using various instructional principles and methods, including providing a different kind of learning environment and culture. However the latter, designing instruction to better teach learners SRL skills, is also of great interest and importance, and one of the six universal principles describes how to better design such instruction.

1. Use a Problem- or Project-Oriented Task

Learning is better promoted when learners are engaged in real-world tasks* (M.D. Merrill, 2002, 2007, 2009), and this is especially true for SRL. Motivation is one of the overarching elements that affects learning, self-efficacy, and learners' exercise of SRL skills (Huh & Reigeluth, 2015). Moreover, learner interest (Eccles & Wigfield, 2002) and value expectancy (Wigfield, 1994) help learners develop higher motivation (Keller, 1983). That means the learner should have a high level of interest in the task and/or accomplishing its goal in order to have higher motivation for SRL.**

Choice of task

The task for the project or problem should be of considerable learner interest and encompass the learning of multiple standards across several content domains. Teachers should encourage each learner to identify real-world problems or issues that they are facing in their everyday lives or that are otherwise of interest to them, should match those with required standards, and should choose one of them as their task. It is important to invite learners to make decisions at the very first stage of their learning to give them responsibility and ownership. When learners are looking for a task, the teacher should encourage them to come up with a rationale for choosing it and the benefits its successful completion would bring to them or to others. Learners can identify several tasks at first, then narrow them down to the best one. In this process, teachers and peer learners can help each learner determine the final task. For example, teachers should take time to have each individual present their ideas to their peers, discuss the pros and cons of each task, and help the presenter choose the best one. Learners may want to work individually on their task or form a team around a task of mutual interest.

* *Editors' note: This is addressed by Principle 2 in Chapter 1, all of Chapter 3, Principle 2 in Chapter 4, much of Chapters 6 and 7, and Principle 2 of Chapter 8.*

** *Editors' note: Enhancing intrinsic motivation is an extremely important principle for the learner-centered paradigm of education and is inherent in most of the theories in this volume.*

Instructional approaches

Some instructional approaches offer more opportunities for SRL than others. Teacher-centered instruction should be replaced by such learner-centered options as problem-based learning, project-based learning, and inquiry-based learning. In these instructional approaches, teachers play the role of a guide or a mentor instead of an instructor.*

2. Provide Learners with Enough Time and Guidance for Preparation

Preparation means planning for accomplishing the task in the planning phase.** It entails the learner setting a task goal, setting process goal(s), identifying resources, and planning for strategies. This is one of the most critical principles of SRL instruction for its success. Traditionally teachers do not have to allocate much time to preparation because every learner receives instruction with the same learning goals, process goals, resources, and time to complete them, so teachers directly jump into planning instructional content. However, in learner-centered instruction, teachers must direct much attention, time, and effort to accommodate various individual differences.

Articulate learning goals and tasks clearly

Good SRL skills include: a) setting one's learning goals based on state standards, career interests, and other learner interests; b) selecting a task and setting performance goals and standards (criteria for success) for the task based on their learning goals; and c) identifying processes and strategies for performing the task. Learner understanding about the task and its related learning goals are central to effective SRL. Teachers should help each learner to develop the SRL skills to do this well.

Embrace individual differences in goals

When learners set goals for their learning, teachers should embrace individual differences in such goals. Teachers should acknowledge that different learners have different competencies that need to be exploited. In addition, for the same competencies, different learners may have different levels of prior knowledge,

* *Editors' note: This new role for the teacher is also an extremely important principle for the learner-centered paradigm (see Principle 4 in Chapter 1, Implementation Issues in Chapter 5, and Principle 4 in Chapter 7); and it is an implicit part of most of the other theories.*

** *Editors' note: Planning for instruction is a crucial design principle addressed as Principle 4 in Chapter 1, Principle 1 in Chapter 4, Principle 2 in Chapter 10, and Principle 2 in Chapter 11. However, what is planned, how, and by whom tend to vary from design theory to design theory.*

experience, and skills, which require them to start in different places. Teachers also need to be aware that learners not only start in different places but also learn at different paces, which means some learners can accomplish more during a project period, and teachers need to think about how to further support their learning, such as preparing for additional, more advanced tasks.

Furthermore, any given complex task can be accomplished using different processes and strategies. Process goals are lower-level (instrumental) goals for achieving the task goals, given that a task consists of at least one process. For example, a learner has a task goal of writing up a 10-page essay on the U.S. Civil War. Process goals can include developing an outline, collecting data, writing the report, and proofreading. Given the same task, different learners may benefit from using different processes and different strategies.

Additionally, research shows that learners can be motivated by different goal orientations (Midgley et al., 2000). For example, one type of learner is motivated by their pure desire to learn. Their goal orientation is categorized as mastery goals, which in this case are synonymous with learning goals. Another type of learner is motivated by their desire to look good in front of their teachers and peers (i.e., performance approach goals) or not to look bad in front of them (i.e., performance avoidance goals). In cases when teachers are familiar with learners' goal orientations, the teacher may ask individual learners to set their goals in a way that is consistent with their goal orientation.

Ensure learners' recall of relevant past experience

Next, teachers should help learners develop the habit and SRL skills to recall relevant prior knowledge and experience.* In order to better help learners for this process, teachers may initially prepare some prompting questions such as "What was your past learning experience on this topic? Was it successful? Did you enjoy it?" "What kinds of strategies did you use to accomplish the task?" "Did any strategies not work well?" "Why do you think they did not work well?" and "How would you do it differently?" Teachers can encourage learners to use these questions now and in the future, individually and in teams.

3. Ensure Ongoing Assessment

Assessment in SRL is related to monitoring and feedback events. Assessment should be happening constantly and also be integrated into instruction.** As seen

* *Editors' note: This is one of Merrill's five "first principles" (M.D. Merrill, 2013) and is described by Principle 2 in Chapter 3.*

** *Editors' note: These are consistent themes for the learner-centered paradigm, addressed by Principle 1 in Chapter 1, Principles 4–6 in Chapter 2, Principle 4 in Chapter 3, Principle 4 in Chapter 4, and Principle 2 in Chapter 7.*

in Figure 9.2, the performing phase (i.e., during learning) requires the learner to go through at least one cycle of strategy use, monitoring, and evaluation; and often it requires multiple iterations of strategy use, monitoring, evaluation, and strategy re-planning. More complicated tasks may be divided into several processes, each of which may require multiple iterations of this SRL cycle.

For example, Ryan was asked to write a mock newspaper article about water pollution in the U.S. as an individual project. This task entailed multiple sub-processes, such as creating an outline, gathering data, analyzing data, interpreting data, writing, and proofreading. For the gathering-data process, Ryan set his process goal as to identify water pollution figures from such credible sources as government reports for at least 10 states within 30 minutes. His initial strategy was to use Google search because he had a computer with Internet access as a resource and he had successful past experiences in gathering data using Google search. He monitored his progress toward meeting his process goal, but he found that the data from Google search lacked credibility of the source and did not cover 10 states. Then he decided to change his strategy by asking experts.

Formative ongoing self-assessment

As seen, when there are multiple processes to complete a complex task, it is very important for learners to assess their progress and change their plan or strategy if necessary. Thus, the teacher should help learners develop the SRL skill of ongoing self-assessment—to keep asking themselves questions such as "Is my strategy working?" throughout the SRL process. This may include prompting learners to see whether they are doing fine and whether they need to make changes to their task process or strategy.

Summative authentic integrated assessment

Summative assessment is also important in that its results can improve performance on future tasks. For example, if a learner receives a positive and satisfactory result from the summative assessment on completion of a task, the successful experience contributes to learners' self-efficacy and motivation in related areas (Keller, 1983), and detailed success information such as strategies used will help them succeed in related tasks in the future.

It is helpful to think of assessment in two different areas. One is assessing learners' task performance and the other is assessing their attainment of competencies. Learners need to attain certain competencies in order to accomplish their tasks successfully. In SRL instruction, summative assessment can be done in the form of authentic integrated assessment to see learners' task performance. Authentic assessment means assessing learners' performance in a way

that is consistent with the real-world context where the performance would normally occur (Gulikers, Bastiaens, & Kirschner, 2004). Especially in SRL instruction, learners' task performance can be assessed by their project outcomes. And teachers may invite experts or other community members into the assessment procedure. For example, in a secondary social studies class, a learning objective was to understand the reasons why World War II broke out. Learners were asked to create a website presenting various reasons behind the war. Teachers, of course, participated in the assessment, but also they invited local university experts in international relations and politics for the assessment process.

On the other hand, teachers also need to assess whether learners have attained certain competencies throughout the process of completing the project. The fact that a learner completed a project once does not always mean the learner mastered the necessary competencies, and moreover in a team-based project some learners may have mastered the competencies while others have not, even though there was still had a good project outcome. Thus teachers also need to assess learners' attainment of competencies. Especially in SRL instruction and when the class size is large with team-based activities going on, it can be very difficult for teachers to assess individual learners' attainment of competencies. Teachers in this situation can integrate assessment of competencies, such as a quiz or practice in the learners' instruction, and also help learners set their goals with conditions for mastery, such as getting the quiz questions right five times in a row or summarizing a three-page article in one paragraph in 15 minutes. Moreover, teachers can create a checklist for assessing attainment of competencies and provide learners with it for promoting their self-assessment skills, too. In all assessments, teachers should make sure there is an alignment between the goals and the assessment.

Feedback from others

Another important kind of assessment is to give learners feedback. It is extremely important to provide learners with timely feedback when the need is identified. Feedback can come from both teachers and peer learners. The feedback should be both informative (so the learner can improve their performance) and motivational (positive). As noted before, self-efficacy is one of the important elements of SRL, and it is promoted when learners receive positive feedback from teachers, peers, and digital systems. Teachers can provide feedback to learners when monitoring their progress and playing the role of a guide or mentor, and peer feedback activities can entail learners discussing their progress and products and giving each other feedback. If necessary, teachers may give a lesson to learners on how to give positive and informative feedback.

4. Model SRL for Learners

This universal principle is well aligned with Merrill's demonstration principle* (M.D. Merrill, 2002, 2013). Teachers are encouraged to model SRL so that learners can learn from observation. Demonstration and modeling are more powerful ways to promote learning than mere description of what to do and how to do it. Bandura (1986) also presented modeling as one of the five core elements of his social cognitive theory. Modeling can be of two kinds based on who is the role model: teacher or peer.

Teacher modeling

Along with Bandura's social cognitive theory, other social learning theorists such as Vygotsky also emphasized the importance of a model (Vygotsky, 1978). When he discussed the learner's zone of proximal development (ZPD), the importance of more knowledgeable others (MKO) is emphasized. That is, learners can learn from a MKO, and they are likely to learn more from an MKO who has greater credibility. Hence teachers are perfect matches for a MKO, given their considerable credibility. The teacher's role as a self-regulated learner was also described in Volume II of this series (Corno & Randi, 1999).

Teacher modeling should happen both within and outside instruction. Outside instruction means any time period other than instruction, such as a break or lunchtime. During instruction teachers can integrate SRL modeling into their pedagogy. For example, when teaching the concept "mammal" to early education learners, a teacher chose to use direct instruction to provide the learners with characteristics of a mammal based on her previous teaching experience and let them solve the practice questions to identify mammals among multiple options. The teacher walked around the classroom and monitored how they were doing with answering the questions, and she realized most of the learners were doing poorly. Then she decided to use a different instructional strategy in that she gave examples and non-examples of mammals with an explanation of why each is or is not a mammal using the provided characteristics. This is an example of a teacher modeling SRL in terms of strategy planning, implementation, monitoring, evaluation, and another cycle of strategy planning, implementation, monitoring, and evaluation.

When modeling SRL, teachers also have to make sure they take some time to communicate what they are doing and debrief their SRL process to learners. This can be done by labeling their activities, providing learners with a summary, and engaging learners in reflection activity. Modeling does not always mean a live demonstration, and a written document such as a summary paper or a reflective essay can be an example of indirect modeling (Pajares, 2002).

* *Editors' note: See Principle 3 in Chapter 3, Principles for Task-Centered Instruction, and Chapter 3 in Volume III.*

Peer modeling

Peer learners are another good agent for modeling SRL, and peer modeling is also a good way to promote learners' self-efficacy. As mentioned earlier, self-efficacy is an overarching element in the entire SRL process, along with motivation. In addition, self-efficacy has been shown to have a strong positive relationship with learners' SRL in that learners with higher self-efficacy are likely to show higher levels of SRL and subsequently higher learning outcomes (Harrison, Rainer Jr, Hochwarter, & Thompson, 1997; Schunk, 1984; Schunk & Ertmer, 2000; Williams & Williams, 2010). The reason that peer modeling is effective in promoting self-efficacy is that learners are likely to develop self-efficacy by vicariously observing other learners doing well in the task. Moreover if learners think the model shares many similar characteristics with them, they can develop even greater self-efficacy. Hence, if Jane saw that her friend Kate did a wonderful job in goal setting tasks and she thinks Kate is very similar to her in many ways, such as GPA, academic ability, personality, and even height and looks, Jane would be likely to develop higher self-efficacy by believing she could also do a good job in goal setting. Thus, teachers may pick a learner and ask her to demonstrate SRL to the class or utilize a method such as reciprocal teaching and group presentation so that learners have an opportunity to model SRL to each other.

As in teacher modeling, it is also important for teachers to take time to discuss examples of SRL witnessed in peer modeling. For example, a teacher could have a class debrief session in which a learner or a group of learners demonstrates what they did regarding SRL, and the entire class could participate in discussion on what they did, how well they did, and what they would do differently.

5. Provide Learners with Opportunities for Application

In Merrill's first principles of instruction, the application principle states that learning is promoted when learners use their knowledge or skill to solve problems* (M.D. Merrill, 2002). Because SRL is encouraged based on a problem-based or a project-based task, learners have plenty of opportunities to apply their new knowledge and skills of SRL to perform the task and learn from it.

Teachers can facilitate learners' application stage by grouping them and having them demonstrate what they do well in terms of SRL to their peers. Group members can discuss each other's SRL practice, and teachers should give helpful feedback or comments on it.

In addition, teachers can ask learners to practice SRL or any SRL processes in their everyday lives outside the class** and have them create a short report

* *Editors' note: See Principle 4 in Chapter 3, and Chapter 3 in Volume III.*

** *Editors' note: Linking learning to the learner's life is an important principle and is addressed by Merrill's integration principle (see Chapter 3 in Volume III), Principle 5 in Chapter 3, Principle 7 in Chapter 6. This principle is similar to selecting real-world tasks that the learner will perform after the designed instruction has ended.*

on their SRL practices. For example, the report may include description of the task, what goals they set, what strategies and resources they used, how they monitored their progress and modified their plan if necessary, and how well they achieved their goals and how they reflected on the experience. Based on this report, learners can give group presentations to provide an opportunity to learn from each other.

6. Provide Learners with Direct Instruction on SRL Skills and Knowledge

As noted before, from time to time teachers may need to teach SRL skills and knowledge to learners to promote their SRL, because each learner's level of SRL can vary tremendously. If learners are not familiar with certain SRL skills and related knowledge, providing them with ownership and responsibility for learning does not guarantee their successful learning. In the worst case, those learners may experience difficulties in SRL and eventually lose interest in and motivation for learning.

Hence, teachers may need to design instruction to teach learners SRL skills and knowledge, and the guidelines on how to do this are as follows. There are two levels in instruction to teach SRL skills: micro and macro.

Micro-level instruction

First, micro-level instruction covers teaching individual elements of SRL (e.g., goal setting, monitoring, evaluating). Since the instruction deals with knowledge on "how to," teachers can refer to Merrill's (2006, 2007) standard three-part skill development model.* Figure 9.3 depicts the three-part model.

Generality. It is helpful for teachers to provide learners with a general description of what the elements of SRL are. For example, teachers can explain what learning goals are, including the characteristics of learning goals, why learning goals are important for learners, and when they need to set up goals. Basically learners receive information about the skill that they are going to learn. Another aspect of the generality provides learners with a description of how to do it. With the same goal setting example, teachers should describe to learners how to set learning goals. For example, teachers might explain a step-by-step procedure of how to set learning goals, or they could describe what the criteria are to determine a good learning goal.

Demonstration. Demonstration is where teachers demonstrate what was just described in the generality part of the micro-level instruction. Teachers demonstrate what it is and how to do it. One of the effective methods to demonstrate a concept-classification skill is to utilize examples and non-examples.

* *Editors' note: See also Volume I, Chapter 9, Component Display Theory.*

FIGURE 9.3 Merrill's Three-Part Skill Development Model

Using some of the information provided in the generality (e.g., criteria for a good learning goal), teachers can demonstrate how to set a good learning goal, and they can provide examples and non-examples of a good goal setting process in order to promote learners' understanding. It is typically beneficial that teachers describe the skill and demonstrate it at the same time.

Practice with feedback. The last part of micro-level instruction is having learners practice the skill by themselves and providing them with immediate feedback when they are practicing it.

Macro-level instruction

The second level of instruction is the macro level. While micro-level instruction teaches each individual SRL element, such as goal setting or monitoring, macro-level instruction covers an entire SRL process. The entire SRL process has three phases, and each phase includes several sub elements (see Figure 9.2). Learners' being able to do individual SRL elements does not necessarily mean they are able to successfully complete the entire SRL process. It is necessary for learners to understand and accomplish the entire SRL process.

The elaboration theory's simplifying conditions method (Reigeluth, 1999)* and the whole-task approach (P.F. Merrill, 1980; van Merriënboer, Clark, & de Croock, 2002) present methods for scope and sequence decisions for a whole SRL process. The instruction can be designed for an entire phase or even the entire SRL process at once in the whole-task approach, for which it would be wise to use the elaboration theory's simplifying conditions method (Reigeluth, 1999) to avoid cognitive overload. This entails first teaching the simplest real-world version of the performance of SRL, before teaching progressively more complex versions. Even artificial simplifying conditions can be created to make sure the first version is simple enough to avoid cognitive overload for teaching a complete SRL process. For instance, in the planning phase, a task goal can be given to the students so that they can move to the next phase with minimal cognitive load and get experience in the whole SRL process quickly and easily. Once they master a version of the whole SRL process that meets the simplifying conditions, they can move on to more complex versions of SRL.

* *Editors' note: This is Chapter 18 in Volume II.*

IV. Situational Principles

In addition to the abovementioned universal principles, it is evident that there are situations that may affect how instruction should be designed differently (Reigeluth & Carr-Chellman, 2009). Some of the major situationalities for SRL instruction include class sizes, time constraints, learners' developmental levels, learners' SRL levels.

When Class Size Is Large

It is true that the principles for SRL instruction are more suitable for small class sizes.* Because learner-centered instruction and SRL both embrace individual differences and let learners have as much responsibility for and ownership of their learning as possible, it is much harder for teachers to implement such instruction in a large class. From a research effort to identify learner-centered schools in the U.S., many of the identified learner-centered schools are charter schools or schools with small class sizes, such as the schools in Chugach, Alaska (Reigeluth & Karnopp, 2013).

If the class size is large, teachers may have to sacrifice a certain degree of embracing individual differences and meeting individual needs. However, teachers can actively utilize team-based learning activities** to meet different learners' needs. For example, instead of letting each learner choose the task of their interest, teachers may group learners based on similarities in interests and have them complete the same task as a team. In most cases, project-based learning and problem-based learning are implemented in teams to promote collaborative learning. In addition, when forming a team, purposive grouping can be done to include learners with different degrees of understanding in the same team, which promotes social learning, peer coaching, and peer tutoring. Constructs such as individual leadership traits can also be used for purposive grouping, which can promote collective efficacy of a team (Huh, Reigeluth, & Lee, 2014). Other examples of team-based learning activities include peer review, group discussion, and peer feedback on presentations.

When Time Is Limited

This situationality is closely related to the first one (i.e., when class size is large). Instructional approaches more suitable for SRL (e.g., task-based learning) typically require more time for preparation and implementation than traditional,

* *Editors' note: As the learner-centered paradigm organizes learning around projects rather than courses, class size becomes the issue of how many students a teacher is responsible for.*

** *Editors' note: Team-based learning activities are beneficial not only when the class size is large, but also when the class is smaller.*

teacher-led, direct instruction. Moreover, with a large class teachers may feel more time constraints than they may with a smaller class.

If time is limited,* designing and implementing interdisciplinary and multidisciplinary instruction can help improve efficiency while maintaining core characteristics of SRL instruction and learner-centered instruction. For example, instead of having one project cover one subject area, teachers from different subject areas can collaborate to create a project that encompasses multiple subject areas and multiple academic standards. Hence, teachers can reduce time demands by implementing one project for multiple subject areas.

Furthermore, if teachers feel time constraints, they may not be able to provide learners with necessary instruction on SRL skills. Such instruction is needed for learners who have low levels of SRL skills and experience. However, that instruction is not directly related to the content domain, so it can be difficult for teachers to take the time. If this is the case, a relatively new but popular instructional strategy, the flipped classroom, can be one solution (Bergmann & Sams, 2012). For example, instead of using class time to give content-area instruction to learners, teachers can create a podcast or video recording of the instruction and let learners watch it and bring questions about it to class, so that the teacher and learners can save some class time for developing SRL skills.

When Learners Are Young

Some people may argue that young learners such as kindergartners and grade 1–3 learners do not possess enough skills for SRL developmentally. This may seem logical because SRL is a higher-order skill set that includes metacognitive skills, and learners typically develop SRL by accumulated experience and observation. However, research findings suggest that even elementary school students show a decent degree of SRL (Dignath, Buettner, & Langfeldt, 2008; Schunk & Zimmerman, 2007), and the experience in Montessori schools bears this out. Even though younger students showed some degree of SRL, it is apparent that their SRL skills are typically less than those of older learners.

Therefore, differentiated guidance may better support early education learners' SRL. Reigeluth's simplifying conditions method (Reigeluth, 1999) as well as van Merriënboer's design model, the four-component instructional design (4C/ID)-Model for complex learning (van Merriënboer et al., 2002) can be utilized for this type of differentiation. The simplifying conditions method calls for giving students who lack many SRL skills several simple, whole, real-world self-regulation tasks (a simple version of SRL tasks) first until simple SRL skills have been mastered. Once they get experience from cases that meet the simplifying conditions, they can move on to more complex versions of SRL. Similar to that, the 4C/ID-Model

* *Editors' note: Since the learner-centered paradigm uses learning-based student progress rather than time-based student progress, this will largely cease to be a problem in the future.*

recommends simple-to-complex versions of the whole task, progressing from simple versions with a high level of embedded support to complex versions with a lower level of support. For example, a very young learner might assume the task of cleaning a table after having snacks. Her teacher would prompt her to set the goal and standards to be met, recalling any relevant prior experience, then plan the process and strategies for cleaning the table, seek formative feedback, and finally self-evaluate the final result and reflect on ways she might do the task differently in the future. With repetition, this process will become automatic, and she is ready to take on a slightly more complex case of SRL.

V. Implementation Issues

In order to implement SRL instruction as the universal and situational principles describe, the following issues can be anticipated. First of all, teachers must value SRL and learner-centered instruction. Teachers who do not believe that learners should have more control and ownership over their learning will not use SRL successfully. Second, teachers need experience in utilizing SRL and learner-centered instruction, because both require massive changes in teachers' roles and skills, based on being a mentor or a guide instead of a "sage on the stage."

Schools may utilize professional development opportunities for educating teachers on the importance of SRL and learner-centered instruction and on how to do them. Moreover, pairing novice SRL teachers with expert SRL teachers can help transform their mindset and develop their skills in implementing SRL instruction. This is a sort of apprenticeship in which novice teachers learn from experts by observing what and how they are designing and implementing SRL and learner-centered instruction and by asking questions.

Another important implementation issue is related to administrative structure and flexibility. SRL instruction requires learner-centered instructional approaches such as problem based learning or project based learning (PBL), and those usually require more preparation and implementation time. Moreover, in order to improve efficiency, multi-disciplinary tasks are beneficial. However, in general teachers do not have as much time as they need for PBL or to collaborate with other teachers to design and implement multi-disciplinary projects. Thus, organizational flexibility is a key implementation issue for successful SRL instruction. Teachers might use a "proof of concept" approach by starting with a small task to show administrators the effectiveness of SRL and get their support to expand the concept to the entire school.

VI. Closing Remarks

For a long time, self-regulated learning has been studied as an effective way to promote learning. Learners who have higher levels of SRL skills are likely to have higher learning outcomes compared to those who have lower levels.

Moreover, online learning and learner-centered instruction are gaining popularity, and SRL is an essential part of both because learners must assume greater responsibility for, and ownership of, their learning.

Successful SRL instruction can be achieved by implementing the universal principles in this chapter and using the situational principles in appropriate situations. SRL instruction should use a problem- or project-oriented task in which learners play an active and central role in their learning. Teachers should make sure they allow learners to have enough time and guidance for planning, and make sure to embrace individual differences in the planning phase. Ongoing assessment should be realized throughout the entire SRL process, and both teachers and learners should be responsible for modeling SRL to learners. Finally, teachers should provide opportunities for learners to practice the SRL skills and knowledge with feedback, and if necessary teachers should also provide instruction on SRL skills.

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