

Learning Strategies

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Glossary

Comprehension monitoring – This occurs when learners check their understanding of something they are trying to learn using some form of self-assessment.

Domain-dependent learning strategies –

The learning strategies that are specific to a particular content area or type of academic task.

Domain-independent learning strategies – The learning strategies that are widely applicable across content areas and academic tasks.

Elaboration strategies – The deep-level strategies used to build bridges or meaningful connections between what the learner is trying to learn and their prior knowledge, experience, attitudes, and/or beliefs.

Learning strategies – Any behavioral, cognitive, metacognitive, motivational, or affective process or action that facilitates understanding, learning, and meaningful encoding into memory.

Organization strategies – The deep-level strategies used to meaningfully translate or transform information into a configuration or form that creates some sort of coherent scheme that makes the information more understandable and easier to encode and remember.

Rehearsal strategies – The surface-level repetition strategies used to memorize discrete information or hold information in working memory so that it can be processed further.

Self-regulation learning strategies – The strategies used by learners to control, manage, and oversee cognitive, motivational, emotional, and environmental factors that influence learning.

Our desire to understand our world and learn what we need to know and do to survive and thrive has existed since the origin of mankind on the earth. However, it is only since the 1970s that the psychological study of the strategies we use to learn about our world began in earnest. In the broadest sense, a learning strategy is any behavioral, cognitive, metacognitive, motivational, or affective process or action that facilitates understanding, learning, and

meaningful encoding into memory. The problem with such a broad definition is that it includes almost any psychological variable. Everything affects learning to at least some extent. For this reason, educational psychologists study variables that have been found to have the greatest direct or indirect impact on learning and encoding into memory, and that can be modified by some type of training or educational intervention. This second criterion excludes some variables such as personality traits because, although they may affect learning, they are not amenable to change by an educational intervention (however, we can teach students learning strategies that reduce the negative impact of some individual variables such as impulsivity or attention deficit disorders).

The major categories of learning strategies include: cognitive information acquisition and processing strategies, motivational strategies, self-regulation and monitoring strategies, affect regulation strategies, and behavioral strategies. Several of these strategies are discussed further after the presentation of a brief historical overview of this area. This is followed by a discussion of the ways in which models of strategic and self-regulated learning incorporate learning strategies, how learning strategies are assessed, and types of instruction used to teach learning strategies.

Historical Overview

From the time humans first appeared on the earth, they were concerned about learning and memory. Some anthropologists have hypothesized that cave drawings were at least in part an attempt to learn and remember animal migrations and the seasons for different foods. They may also have been a way to help the young learn the knowledge, culture, and norms of life as it then existed. The Greeks are famous for the development of mnemonic devices, or mental memory aids, some of which are still used today (e.g., using the ABC song in the United States to learn the alphabet, associating a new item we are trying to remember with an existing image, or the first letter mnemonic HOMES (Huron, Ontario, Michigan, Erie, and Superior) to remember the five Great Lakes in America). In the 1800s and early 1900s many parlor entertainers at parties or gatherings would use mnemonics to perform prodigious feats of learning and memory. Today, advertising experts use mnemonic tunes and phrases to help people remember to buy their brand when they see it in a store.

For the first half of the twentieth century the study of mnemonics or any other cognitive learning strategy lay dormant as the overwhelming charge of behaviorism swept through psychology. Behaviorists, in their attempt to make psychology a science, rejected not only philosophical or introspective methods of research but also any theoretical or empirical work involving mental processing. The world of environmental manipulations, reinforcement, and extinction had little interest in the black box (mind).

It was not until the late 1960s and 1970s that the study of mental processes made its way back into psychological theories and research. Once again, mnemonics played a key role. Some of the earliest studies during this period focused on mnemonics but this time, once it was established that they were not just parlor tricks, the focus shifted to why and how mnemonics worked and what we could learn about human information processing from them. What cognitive processes were involved in the creation and use of mnemonics? What fundamental information did this give us about human information processing? In the 1970s, this work was greatly enriched by other early researchers in the area of what we now call cognitive educational psychology. For example, a major influence was the work of John Flavell and his colleagues who developed the concept of metacognition, or thinking about our thinking. Basically, metacognition is thinking that focuses on knowledge, self-reflection, and analyses of how we think and learn. As a direct result of this early work examining cognition, variables that might influence cognition and the degree to which cognition might or might not be influenced through some form of educational intervention, the area of learning strategies developed as a field of study.

Types of Learning Strategies

There is general agreement about the basic types of learning strategies as originally codified by Weinstein and Mayer (1986) and expanded upon by continuing theoretical and research work in this area. The development of interactive models of strategic and self-regulated learning at all educational levels has, however, changed the ways we explore, study and teach students how to use learning strategies. This is discussed further later in this article.

Rehearsal Strategies

These are the most basic of all learning strategies and can be used most effectively in the first stages of building a knowledge base in a content domain. Rehearsal strategies are most useful for basic memorization, processing new information at a surface level, but are not generally useful for creating a deep and sophisticated understanding of the material. Researchers differentiate between passive

rehearsal, which is not very effective for most learning tasks, and active rehearsal, which can be more beneficial. Passive rehearsal is based on early mental muscle models of learning which assumed that the mind is like a muscle – the more you practice, the more you will build up the strength of your memory. It involves learners repeating something over and over until they remember it (similar to the use of flash cards) or using other memory aids, such as mnemonics. While these methods may be useful for learning discrete bits of information (e.g., isolated facts and lists of information), they are not very effective as learning strategies for more complex content or learning tasks involving reasoning. In addition, these methods do not contribute efficiently to the integration of new information one is trying to learn with existing knowledge and expertise, a major goal for many learning tasks.

Active rehearsal, while using some of the same methods as passive rehearsal, differs in terms of the goals for using this strategy. In passive rehearsal, repetition is the end point of the process, while in active rehearsal, repetition is used as an enabling tool to hold onto information so that it can be further processed and encoded into more stable areas of memory. Highlighting important information in class notes or a textbook and then reviewing the highlighted material at a future time would be examples of using repetition to help learn the content by creating additional opportunities to further process it. Even something like flash cards could be used for active repetition, if the goal was to continue thinking about and encoding the information on the cards.

Elaboration Strategies

Elaboration strategies are the largest and most diverse category of learning strategies. Fundamentally, elaboration involves building bridges or connections between what the learner is trying to learn and their prior knowledge, experience, attitudes, and beliefs. Building these bridges forces the learner to actively process the new information and it is this engagement that is believed to be the core cognitive mechanism involved in reaching learning goals. It is not just the elaborations that result from using these strategies but the process of creating those elaborations that facilitates meaningful encoding into memory. In addition, elaboration has been found to increase related variables such as task focus and concentration, task interest and enjoyment, motivation, and positive attitudes and emotions toward the learning content and task itself.

Elaboration learning strategies take many forms depending on the nature of the content, the learning task, and the learner's individual differences and learning goals. The most basic forms of elaboration involve paraphrasing and summarizing. Even though these are fundamentally a form of repetition, unlike rehearsal strategies, they are not simple verbatim recall which does not involve higher-level

cognitive processes. To paraphrase or summarize what a student is trying to learn requires some degree of encoding and transformation of the targeted information so active cognitive engagement is required. More advanced and complex forms of elaboration include: using everyday experience to try to understand a new concept, applying what the student is learning to new and diverse tasks, trying to teach the material to someone else, perspective taking, visualization, using a problem-solving strategy in a new context, creating analogies, using compare-and-contrast methods to highlight the differences and similarities between two related concepts, and creating and responding to questions about the material being studied.

Research has shown that the active processing involved in using elaboration strategies is what is key to learning and that the specific elaboration strategy used for a learning task is not as important. However, it has been shown that it is important for students to learn a repertoire of diverse strategies so that they can both develop their preferences and have alternative strategies to fall back on if their preferences do not work for a particular learning task. This issue also relates to what strategies students should learn and in what context they should learn them. The instructional issues this raises are discussed further in later sections.

Organization Strategies

Organization strategies involve translating or transforming information into another configuration and creating some sort of scheme to provide structure to this new way of characterizing or representing the information. These strategies are used to organize information into meaningful categories, hierarchies, and sequential structures so that it can be visualized, analyzed, understood, and encoded meaningfully into memory. Similar to elaboration strategies, organization strategies facilitate deep processing of the information and meaningful encoding into memory. By organizing the new information the learner is actively engaged with the material and it is believed that this active engagement underlies much of the benefit of using organization strategies. In addition, the product that results can be used in the future to review and deepen understanding. Moreover, similar to elaboration, organization strategies have been found to increase related variables such as task focus and concentration, task interest and enjoyment, motivation, and positive attitudes and emotions toward the learning content and task itself.

Creating outlines, concept maps, and concept matrices are types of organizational strategies. Creating an outline involves organizing material into a hierarchical structure with a logical flow using an outline format (e.g., I. Thesis statement; A. Major point; 1. Supporting detail). Creating concept maps is another organizational strategy that is

used to graphically represent relationships among and between concepts. For example, connecting concepts with arrowed lines and identifying those relationships with phrases such as: results in, contributes to, decreases, is a defining attribute of, or is a subcategory of is a common type of organization strategy. Creating concept matrices refers to graphically organizing information about related concepts into a matrix of rows and columns in order to learn and analyze those concepts (e.g., organizing the names of concepts in the first column, concept definitions in the second column, and examples of the concepts in the third column). Organizational strategies have been found to help students analyze, learn, and remember their course material at a deep level. Research suggests that the effectiveness of organization strategies derives not only from the active processing that is required to create the organizational structure but also from the product itself since it can be later used for review, as a study aid, or incorporated into a larger and more encompassing scheme in that knowledge domain.

Self-Regulation Learning Strategies

Self-regulation learning strategies are used by students to control, manage, and oversee cognitive, motivational, emotional, and environmental factors that influence learning (both positively and negatively). Goal-setting/planning, implementing/monitoring, and evaluating both process and outcomes are types of self-regulation strategies. Goal-setting/planning refers to setting learning goals and planning for how one will reach those goals (e.g., choosing one rehearsal strategy, two elaboration strategies, and one organizational strategy that will be used to reach the learning objectives for an upcoming exam). Implementing/monitoring involves implementing these learning plans and monitoring the pursuit of the learning goals (e.g., implementing and monitoring a plan to summarize each section of a textbook). Evaluating the success of one's strategic approaches to achieve a learning goal is another type of self-regulation strategy (e.g., evaluating whether or not the cost in time of creating a concept map was worth the payoff in learning). Self-regulation learning strategies can help students fine-tune their strategic approaches to reaching their learning goals and develop more effective and efficient study routines. These strategies can also be used to oversee and manage the regulation of motivational, emotional, and environmental variables that influence learning.

Metacognitive Strategies – Comprehension Monitoring

An important component of self-regulation involves using metacognitive strategies for learning. Within this broad

area, the most relevant type of metacognitive strategy for the purposes of this article is comprehension-monitoring strategies. Basically, comprehension monitoring involves checking our understanding of something we are trying to learn using some form of reviewing or self-testing. Comprehension strategies both support and contribute to meaningful learning. Without them, learning could be incomplete or errors might persist undetected. Reviewing and self-testing also contribute to knowledge consolidation and integration across topics. Using mental reviews, going over notes and course materials, thinking of potential questions to guide reading or help prepare for an exam, trying to use new information in novel ways, and trying to apply a principle or method are all important methods for checking understanding, consolidating new knowledge, and integrating related information (both from what is being learned and from what is already known). Although comprehension-monitoring strategies include many of the strategies discussed under elaboration, the purpose is different. When learning new content material, using a strategy like applying a principle is designed to enhance understanding and encoding into memory. When applying a principle such as a comprehension-monitoring strategy, the goal is to see if that understanding and accessible memory encoding has been established.

Need for a Learning Strategies Repertoire

Rehearsal, elaboration, and organization strategies can be used to help students actively process and learn new information. However, students differ over which learning strategies work best for them both within and across different types of learning tasks and contexts. For this reason, it is important that students learn and develop a repertoire of learning strategies both within and across all three of these categories so that they can mindfully develop their preferences and have a range of strategies to fall back on if their preferences do not work.

Domain-Independent Strategies Versus Domain-Dependent Strategies

In current theory, research, and practice, the applicability, or generalizability, of particular learning strategies to different learning content areas or tasks is still being debated. The general issue is whether it is best for students to learn domain (content or task)-specific strategies (e.g., strategies for solving a particular type of physics problem or learning a new vocabulary term in a foreign language) or more generalizable, or domain (content or task)-independent strategies that can be applied to many content areas (e.g., how to approach an

unfamiliar textbook or using self-testing to check your understanding of what you are learning). In fact, if you think about it in terms of a generalization gradient, they are really just different points on the line. If the strategy has a narrower domain of applicability (i.e., it can only be used for a relatively small number of learning or performance activities), then it is domain dependent. If, on the other hand, it can be used in a wide variety of situations or content areas, then it has a wide domain of applicability and is domain independent. Like many controversies, it appears that it takes a bit of both to help students become self-regulating, strategic learners. Some strategies may be more effective and efficient for the content and tasks in one particular academic area, while others may be helpful for a wider variety of academic areas and tasks.

Learning Strategies in Models of Strategic and Self-Regulated Learning and College Readiness

The study of learning strategies has evolved from an isolated area of study into a critical component of most models of strategic and self-regulated learning. This integration of learning strategies into more complex and interactive models of academic learning is exemplified by the work of Pintrich (2004), Weinstein *et al.* (2004), and Zimmerman and Schunk (2001). As an example of these theoretical models that guide much of the current research and instructional development designed to help students become more strategic and self-regulated learners, the most recent version of the Model of Strategic Learning (MSL) developed by Weinstein *et al.* (2006) is briefly discussed (see Figure 1).

Model of Strategic Learning

Similar to other recent models, the MSL is a multidimensional, interactive model where the focus is on the interactions among the components rather than the simple effects of one or two elements. Even many of the recent advances in statistical analyses are based on the need for analyzing interactive models. The core of the model (within the triangle) is the learner and all of the individual differences, self-system variables, and long-term goals learners bring to any learning event. In addition, most meaningful learning is goal-driven and the model will be used in different ways by students with different learning tasks and goals.

The variables outside the rectangle (e.g., requirements of the task and instructor expectations) are important variables for completing a learning activity but they are not usually under the student's direct control. The three

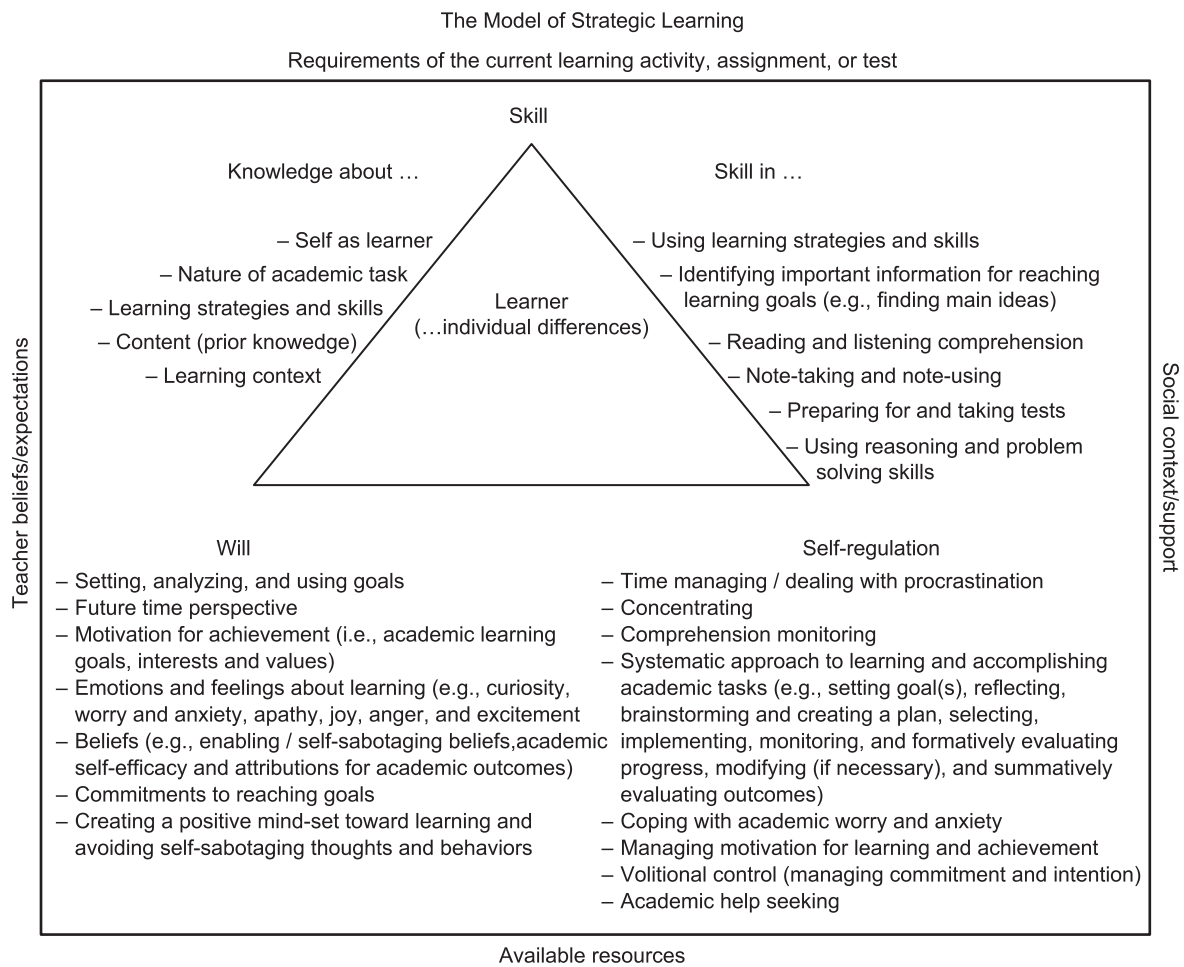


Figure 1 The Model of Strategic Learning.

main components of the model are listed at the three points of the triangle: skill, will, and self-regulation. Skill focuses on declarative (knowing what to do), procedural (knowing how to do it), and conditional (knowing when to use the strategies) knowledge that students need to develop in order to become more strategic learners (e.g., not only knowing about different learning strategies but also knowing how to use them effectively and when it is most appropriate to use a particular strategy). Will focuses on attitudes, beliefs, and goals that help students thrive and persist when faced with roadblocks to learning (e.g., setting specific and challenging, yet realistic, learning goals and avoiding or coping with self-sabotaging beliefs and attitudes). The self-regulation component focuses on managing the learning process and one's own cognition, motivation, and emotion related to the task (e.g., time management, comprehension monitoring, and coping with anxiety). For any given learning task, the student must take into account variables from each of the three components. Like the systems of the body, variables related to skill, will, and self-regulation need to function

together in order to facilitate strategic learning. Which elements of each component will be most important to think about or use for completing a task will be largely determined by the learner's goals, prior knowledge, past experiences, and the nature of the task.

Assessment of Student Learning Strategies

Purposes for Assessment

The primary purpose of most learning strategy instruments is to identify students' knowledge and use of learning strategies in order to:

1. investigate correlational and causative relations with other variables, such as motivational goal types, class participation, or academic performance;
2. identify students' strengths and weaknesses in different areas of learning strategies to identify students who might need additional instruction in the areas where they scored low;

3. use as a pre–post and/or delayed outcome measure for interventions designed to teach learning strategies;
4. provide information to educators about individual needs of their students so they can target part of their instruction to helping their students learn or enhance their use of learning strategies; and
5. help developmental educators, student affairs counselors, and advisors who work with at-risk students to identify students who may be at risk of failure or dropping out from higher education settings because of their lack of knowledge and use of learning strategies so that they can be placed in learning strategies courses or other types of interventions.

Approaches and Instruments Used to Assess Students' Learning Strategies Knowledge and Use

There are a number of experimental and published instruments that assess students' knowledge and use of learning strategies. These instruments use some type of self-report method, usually involving some type of instrument or questionnaire. Some studies do have students describe or explain their strategies as they are using them, or just after completing a learning task, but these assessment methods still rely on self-report. While the limitations of self-report methods have been repeatedly documented, it remains the best method for providing a window on the mind.

Some of the more commonly used measures include: The Learning and Study Strategies Inventory (2nd edition) by Weinstein *et al.* (2002), the Learning and Study Strategies Inventory – High School Version (2nd edition) by Weinstein and Palmer (1990), the Motivated Strategies for Learning Questionnaire by Pintrich *et al.* (1991), the Approaches and Study Skills Inventory for Students by Entwistle (1997), the Learning Process Questionnaire by Biggs (1987), the Survey of Study Habits and Attitudes, Form C by Brown and Holtzman (1984), and the Study Behavior Inventory by Bliss *et al.* (2000).

Teaching of Learning Strategies

Another controversy in the current literature focuses on the best way to teach students about learning strategies and how to use various learning strategies. This controversy also relates to the debate over the domain of applicability issue and whether we should teach content-dependent or content-independent strategies. Proponents on one side of the controversy believe that learning strategies should be taught in content courses, such as math, history, or biology, and not as a separate course. Proponents on the other side of the controversy believe that learning strategies should be taught as part of a course or

training program in strategic or self-regulated learning. Recent research literature indicates that both groups are right – for students who are highly deficient in their knowledge and use of learning strategies, an adjunct course is best. For students who already have some level of skill, refining their knowledge and skills in content-dependent settings appears to be more helpful.

However, the most powerful instructional model appears to be a combination of the two. Using an adjunct course to help teach students general knowledge and skills in using strategies with a broad domain of applicability combined with what Weinstein has called the metacurriculum in content courses. Basically, a metacurriculum involves purposefully teaching learning strategies while also teaching course content. It can be as simple as paraphrasing a lesson and then teaching the class to do the same thing on their own to check their understanding, or as complex as teaching students how to develop, implement, monitor, and modify a test-preparation plan for an upcoming exam. For example, implementing a metacurriculum would involve not only teaching students what to learn in a history course but also how to learn and think like an historian.

Concluding Statement

It has often been said that the present belongs to those who have learned but the future belongs to those who are learning. Increasing longevity and our increasingly complex and technologically sophisticated world requires that students be prepared to be lifelong learners throughout the different stages of their life span. Having an extensive repertoire of learning strategies is one step toward helping individuals become more effective and efficient learners.

See also: Knowledge Domains and Domain Learning; Metacognition; Personal Epistemology in Education; Self-Regulated Learning and Socio-Cognitive Theory.

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Relevant Websites

- <http://www.howtostudy.org> – How to Study.
- <http://www.muskingum.edu> – Muskingum, CAL Learning Strategies Database.
- <http://www.studygs.net/index.htm> – Studies Guides and Strategies.