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This chapter presents information on the transformation of higher education, the learning theories on which the Supplemental Instruction (SI) model is based, and the characteristics of today's student population, and concludes with a look at the benefits and challenges of implementing SI in the twenty-first century.

The Impact of Supplemental Instruction on Teaching Students *How* to Learn

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In the past thirty years, cognitive scientists and educators have gained a vast amount of knowledge about the learning process. During this period, concepts such as active learning, collaborative learning, learning communities, learning styles, and student engagement have emerged as prominent components of a new paradigm in education. The new paradigm is necessary because students today are in many ways very different from their counterparts of three decades ago. They are much more diverse in background, interests, entering skill level, and motivation than were their predecessors.

This chapter examines the changes to higher education over the past thirty years, the learning theories on which the Supplemental Instruction (SI) model is based, today's student population, and some of the issues that SI must address to continue to be effective in teaching students *how* to learn.

Transformation of Higher Education

During the past thirty years there has been a significant change in the landscape of higher education. A larger percentage of high school graduates are

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attending college (Hansen, 1998), the diversity of the students has increased significantly, and there are considerably more options for students interested in continuing their education past high school. Online degree programs and national universities, such as the University of Phoenix, have sprung up and blossomed. In addition, there has been a shift in the focus of the institutions themselves.

In the early 1990s, institutions of higher education began to transform themselves from "teacher-centered" to "learner-centered" institutions. The focus shifted from the quality of the teaching to the quality of the learning that is occurring (Barr and Tagg, 1995). The shift is also evident in the way that accrediting agencies are now evaluating institutions. Whereas the focus as recently as the 1980s was on course offerings, faculty credentials, and other institutional characteristics, the focus in the past five years has shifted to student learning outcomes—with the requirement that institutions both identify learning outcomes and demonstrate that students have met them. Colleges and universities can no longer be content simply to offer excellent courses taught by outstanding faculty in a variety of disciplines; they must document that student learning outcomes are being met.

This emphasis on student learning is laudable, but student learning outcomes will not be realized if we do not teach specific learning strategies to those who come to higher education institutions with little or no understanding of the learning process. These students must be taught that performing well in college requires higher-level thinking skills: analysis, synthesis, and evaluation. Though most of these students performed quite well in high school by memorizing and regurgitating information, they will discover quite rapidly that these skills will not produce the same results in college. In order for meaningful, lasting learning to occur, students must understand the learning process and recognize that learning occurs at different levels, as described by Bloom's taxonomy, shown in Figure 1.1.

Although faculty generally assume that students know that memorizing information is not the same as learning for application, analysis, synthesis, or evaluation, this assumption is unwarranted. Formally introducing them to differences in the levels of learning is crucial to developing their understanding of these distinctions.

Furthermore, students must have the motivation to use those strategies. The majority of today's students, however, do not come to college with the motivation to assume responsibility for their own learning and must therefore be provided with experiences that increase motivation for strategic learning. As this introductory chapter and later chapters in this volume will illustrate, SI can play a major role both in this seemingly daunting task of teaching students *how* to learn and in motivating them to *want* to learn. SI is an important mechanism for introducing students to the learning process, engaging them in collaborative learning activities, and providing a collegial environment that increases motivation to engage in learning.



Figure 1.1. Bloom's Taxonomy

Modern Learning Theories

The SI model has as its theoretical underpinnings the most widely accepted learning theories. These theories emphasize information processing and student-centered learning activities, rather than simply effecting a change in the learner's behavior. A brief overview of the three dominant learning theories that have emerged in the last century will provide readers with a greater understanding of SI's role in shaping student learning.

Behaviorism. B. F. Skinner, the father of behaviorist thought, proposed that learning is represented by a change in behavior, and that this change can be brought about by training the learner to respond appropriately to stimuli. The learning activities suggested by this theory include the drill-and-practice (often referred to as "drill-and-kill") worksheets of the 1960s, and the computer-assisted instruction (CAI) repetitive exercises that were quite prevalent during the 1970s (Rubin, 1996). From the behaviorist vantage point, the learner is viewed as a somewhat passive respondent to the stimuli provided by the instructor, and learning occurs when the correct response is provided the majority of the time—for example, at a rate of 90 percent or higher.

Cognitivism. Jerome Bruner and others proposed that the learning process could not be adequately judged by simply observing behavior, but that it was important to understand what was happening in the mind of the learner (Bates, 1999). Unlike behaviorists, who train the learner to respond in a certain way to certain stimuli, cognitivists view learners as active information processors who are receiving information, processing it, storing it, and retrieving it for use in problem solving and other learning tasks.

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Cognitivists emphasize the need for active, engaged learning, and assert that passive learning is not really learning. In *Reading and Language Arts Worksheets Don't Grow Dendrites*, Marcia Tate presents twenty instructional strategies that engage the brain (Tate, 2005). Some of the strategies she presents are brainstorming and discussion, games, and reciprocal teaching and cooperative learning. These strategies are consistent with the cognitivist view of learning. Employing these strategies and others that she presents will produce a different type of learning than that which results from memorization of lecture notes or textbook material.

Constructivism. Vygotsky and other constructivists view learning as a process during which learners construct their own understanding of a subject by integrating information they are receiving with information they already know (Vygotsky, 1992). Constructivists emphasize the importance of building on the learner's prior knowledge to build new knowledge. The ultimate goal is for the learner to develop his or her own conceptual framework.

Whereas components of all three learning theories are evident in the SI model and activities, it is constructivism that is most closely related to SI activities. In the peer-led, cooperative learning setting of SI sessions, students are required to examine what they know and understand when they come to the session, and are challenged to build new knowledge in collaboration with their peers. The four theories are summarized in Table 1.1.

Numerous research studies have shown SI to be very effective in improving student learning and performance across a number of institutional types (community colleges through medical schools) and educational levels (high school through graduate and professional school) (Bridgham and Scarborough, 1992; Martin, Arendale, and Associates, 1993; Martin, 1980). However, a great challenge to the future effectiveness of SI is enticing a significant number of students in high-risk courses to participate regularly in SI sessions. (Courses are determined to be high-risk when a certain percentage of students taking them repeatedly

Learning Theory	Learning Process	Learning Activities		
Behaviorism	Learner is trained to respond appropriately to stimuli.	Drill and practice; "drill and kill."		
Cognitivism	Learner receives, processes, stores, and retrieves information for use in solving a problem.	Engage in active learning.		
Constructivism	Learner integrates new informa- tion with what she or he already knows.	Integrate "new" information with "old" information to form a conceptual framework.		
Supplemental Instruction (SI)	Learner builds new knowledge in collaboration with peers.	Group discussion and problem solving; prediction of test items.		

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earn D's or F's or withdraw; see Chapter Two for more on this.) When students come to institutions thinking of learning as involving rote memorization and cramming for examinations, they do not understand the need for regular attendance at SI sessions. Many of the characteristics of today's students inhibit their ability to thoroughly understand the importance of attending SI sessions, and therefore undermine their attempts to master college-level course material.

Precollege Learning Habits of Today's Student Population

Most students enter college without knowing how to learn or how to study, and they therefore have difficulty succeeding in courses that require critical thinking. The reasons for their lack of knowledge about how to learn can often be traced to their high school experiences.

Discussions with numerous Louisiana State University (LSU) students about their experiences in high school often reveal that the emphasis was on memorization of information and the examinations involved simply regurgitating the information that they had memorized. Past discussions with students at several other institutions in New York, Tennessee, and Alabama revealed experiences quite similar to those of the LSU students. After their successful academic experience in high school, when these students take university courses they are confident that they can begin studying one or two nights before the test, memorize facts and formulas, and do well on the examinations. They get a rude awakening when this is not the case.

In addition to students knowing little about the learning process, other factors hamper their ability to learn. One of the most important factors is their lack of awareness of the need to spend time studying outside of class. The Higher Education Research Institute (HERI) reported that in 2003 66 percent of entering first-year students at a large Western university spent fewer than six hours per week doing homework in their senior year of high school. Yet 48 percent of these students reported that they graduated from high school with an A average! Furthermore, 70 percent of them felt that their academic ability was above average, or in the upper 10 percent of people their age (Sax, Hurtado, Lindholm, Korn, and Mahoney, 2005). Given such precollege experiences, it is important for today's students to be taught *how* to learn and provided with specific learning tools for success in college-level learning tasks. Supplemental Instruction provides the perfect environment in which to introduce students to the tools they need for success.

SI: Teaching Students How to Learn

Cognitive psychologists make a distinction between rote learning and meaningful learning (Ausubel, Novak, and Hanesian, 1978). Rote learning is verbatim memorization of information, and it is not necessarily accompanied by

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any understanding of the material. Students are unable to explain information that is learned by rote, and they are not able to paraphrase the information in their own words. Meaningful learning, in contrast, is learning that is tied to previous knowledge; students understand the material well enough to manipulate, paraphrase, and apply it to novel situations. Most learning is neither completely rote nor entirely meaningful, and can be placed on a rote-meaningful learning continuum (Ausubel, 1968). Students in SI sessions work collaboratively to understand the course concepts, brainstorm ideas, and engage in discussions of how the concepts relate to each other. Students participating in SI sessions are involved in paraphrasing the course information, using it in different contexts, and even writing potential examination questions. These activities facilitate their greater conceptual understanding, and their success on problem-solving tasks and examinations increases substantially. SI programs at a variety of types of institutions have increased graduation rates, increased the level of confidence of SI participants, and created a welcoming climate for all students-especially minority and women students who may otherwise feel somewhat isolated (Barlow and Villarejo, 2004).

Institutions implementing Supplemental Instruction report that the program benefits all segments of the university population (Arendale, 1997). Participating students report that the SI sessions allow them to view the course material from a different perspective, and that the SI leaders engage them in activities that make learning fun and motivate them to excel. In this engaging, inviting environment, most students shift their learning paradigm from simply memorizing information to perform well on a test or a quiz to learning the material for conceptual understanding. This results in an increase in critical thinking, problem-solving skills, test performance, and grades.

The SI leaders—who are students themselves—also benefit because their own learning improves when they structure learning experiences for the students they are guiding. SI leaders also develop leadership skills, learn how to influence group dynamics, and learn strategies for motivating others to excel. Graduate and professional school admissions committees often find SI leaders particularly attractive candidates for admission because they understand the learning process and are most likely to excel in the graduate or professional school environment.

Faculty members who teach courses in which SI is offered often report that SI allows them to be more in touch with their students' needs. Meetings with their SI leaders provide information on student understanding, problems, and potential trouble spots. This information was not as accessible prior to having SI in their courses.

Future Challenges

Supplemental Instruction has had a substantial impact in a wide variety of institutions. However, significant challenges must be overcome if SI is to meet the needs of twenty-first-century students. Three of the biggest chal-

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lenges are described here. Subsequent chapters will suggest strategies for addressing them.

Increasing Participation in SI Sessions. Regular attendance at SI sessions has been shown to increase student performance, often quite dramatically (Arendale, 1997). However, many students are reluctant to attend the sessions on a regular basis, opting to attend only before an examination or a quiz. Students can be motivated to attend regularly when the SI leader consistently uses activities that engage students and teach them new strategies for learning, rather than simply reviewing the course content and solving problems. SI leaders who use games and other interactive activities generally get more consistent attendance at their sessions.

Increasing Faculty Buy-In for the SI Program. Because SI is targeted at high-risk, high-enrollment courses, and not simply provided based on instructor request, some faculty do not strongly encourage their students to attend SI sessions regularly. When course instructors enthusiastically embrace SI and vigorously promote it during their lectures, regular attendance at SI sessions is higher than in courses in which this is not the case. It is therefore important for institutions to help faculty members understand the relationship between SI and student learning, and to disseminate information on how the SI program benefits the institution, the students, and the faculty.

Making SI Attractive to the Net Generation. Effective SI sessions involve extensive discussions among the students in the group, with the SI leader serving as a facilitator. However, many of today's students appear to be much more interested in interacting with their computers (e-mailing or gaming), using their cell phones (talking or text-messaging), or playing games on their Xboxes than in interacting with one another to learn course content. If SI is to reach these students, new strategies may need to be used. For example, when leaders e-mail SI participants the discussion topics for upcoming SI sessions, consistency in attendance increases.

Conclusion

This chapter presented information on the current transformation of higher education, the evolution in our understanding of the learning process, characteristics of many of today's students, and some of the benefits and challenges facing Supplemental Instruction as it seeks to continue to increase student learning. The chapters that follow will develop these topics further and present an in-depth look at the historical development of SI, its successes over its thirty-two-year history, its effectiveness with a wide range of students in a variety of settings, and the new directions in which it is moving.

The prognosis for SI is excellent, because it has proven its effectiveness in helping higher education institutions achieve their most important objective: producing graduates who have achieved the student learning outcomes necessary for success in their courses, in their careers, and in making a significant contribution to the global society.

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