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Supplemental Instruction:
Critical Thinking and Academic Assistance

More than 700 colleges and universities worldwide use Supplemental Instruction (SI) to improve student performance in challenging college coursework. Targeting traditionally difficult coursework, SI provides regularly scheduled, out-of-class, peer-facilitated review sessions. In this model, the collective knowledge and wisdom of successful students and of the whole group become the primary source for reconstructing the professor's lecture and for encouraging the kind of critical thinking that leads to correct answers. Students who elect to participate in SI sessions consistently earn one-half to one full letter grade higher than nonparticipants.

Academic Support and Access to Higher Education

Higher education is in the business of providing people with choices. It is one of the few remaining avenues for individuals to carve out for themselves a better world in which to live. Without postsecondary training, persons in a postindustrial world are unlikely to do as well as their parents. Blue collar jobs of substance are in short supply. Hence the following joke: "Our economy produced 20,000 new jobs last month and I will need to work at least three of them." A bachelor's degree is widely perceived to be the minimum price of admission to interviews for well-paid employment. As the avenues that provide choices dwindle, access to higher education is increasingly valued.

Providing access to higher education, however, has wider social and economic implications than simply improving an individual standard of living. Postsecondary training has become a justifiable matter of concern for a society struggling to stabilize itself in a transitional economy. Higher education is a valve that opens the pipeline to jobs, jobs that keep the American dream alive. If large segments of the population are underrepresented in higher education, they will also be underrepresented in the job market.

It is critically important to keep higher education accessible. However, a growing number of students are academically underprepared for the rigors of academic life. Each year more students arrive on the first day of class unprepared to meet the expectations of professors and the challenges of difficult curricula. Colleges are still better at recruiting new students than supporting them after they have enrolled. To retain and graduate higher proportions of students, we are told, we must develop academic assistance programs that will move them through the pipeline. Unfortunately, for most institutions this leads to the development and funding of questionable remedial programs.

Even highly selective institutions, historically unconcerned about academically underprepared students, are rethinking their positions on providing academic support. Being "highly selective" can also mean being highly homogeneous and monocultural. Increased consciousness about campus diversity, or the lack of it, has raised awareness and concern about whose picture is missing in the photograph of the graduating class. For some university faculty and staff, the notion that remedial or developmental education is now a necessary part of what colleges and universities must do is unbearable.

While we are sympathetic with those who feel that only college courses should be taught at a college level, we also believe there are workable alternatives to traditional remedial programs. One such alternative is the Supplemental Instruction (SI) program at the University of Missouri-Kansas City (UMKC). Supplemental Instruction is a nontraditional academic assistance program developed by Deanna Martin at UMKC in the mid 1970s. What follows is a description of the SI program and why we believe it represents a workable alternative to traditional forms of remediation. It will be argued that the primary goal of remedial education must be the development of critical thinking skills.

The Supplemental Instruction Program at UMKC

Tracing the genesis of most college-level academic support programs, one discovers that the design of these programs was preceded by a predictable series of questions about at-risk students. Who are they? How do we identify them? What is wrong with them? How do we fix them? The assumption was that they (the students) had the problem. We developed diagnostic tests for them, bridge programs for them, special noncredit bearing remedial courses for them, as well as counselors, tutors, and learning specialists for them. Them, we did it all for them. From the perspective of many

faculty and staff, they were not supposed to be here anyway. This may, in part, explain how remedial and developmental education programs quickly came to be treated with disdain by both faculty and students, and how developmental educators came to be viewed by some as academic social workers.

The Supplemental Instruction program at UMKC began with a profoundly different assumption: it targeted courses rather than students. This alternative way of viewing the problem began as a field-based observation that study skills and academic survival skills are not easily developed in isolation from mainstream courses. There is also no research that supports the notion that study skills taught in a vacuum transfer to core curriculum courses. From a programmatic view, knowing where students are having trouble is more important than knowing who is having trouble. Students flunk out of college courses before they flunk out of college. As a point of clarity, targeting high-risk courses rather than high-risk students does not mean targeting high-risk professors. In most cases, it makes no more sense to blame the professor for the high rates of attrition in historically difficult courses than it does to blame the students themselves. The fruitless search for someone to blame only delays the first step in solving the problem: approaching the problem as a systemic failure rather than a personal one.

After a rigorous review process in 1981, the SI Program became one of the few postsecondary programs to be designated by the U.S. Department of Education as an *Exemplary Educational Program*. The National Diffusion Network, the national dissemination agency for the U.S. Department of Education, has provided federal funds for dissemination of SI to hundreds of institutions across the nation. This program is presently used in more than 600 colleges and universities around the U.S., as well as at nearly 100 institutions in other countries. The largest programs in the world are presently outside the United States and have resulted in various kinds of formal relationships between the University of Missouri and international institutions.

Supplemental Instruction targets traditionally difficult academic courses, those which have a high percentage rate of D or F grades and withdrawals. SI provides regularly scheduled, out-of-class, peer-facilitated review sessions that encourage mastery, discovery, invention, and play. The key persons in the SI program are the SI leaders. SI leaders are typically students who have previously and successfully completed the targeted course and have been approved by the course instructor to conduct organized study sessions for the targeted course. SI leaders re-attend all course lectures, take notes, read

all assigned materials, and facilitate three to five group study sessions per week. The SI leader assumes the role of the model student. The leader's task is to assist students in integrating course content and learning/study strategies. SI leaders are paid paraprofessionals who receive training in proactive learning and study strategies, and are regularly supervised by a professional staff person.

The SI program has shown statistically improved student performance and increased student retention. Data from recent studies (Martin and Arendale, 1992) involving 146 institutions (two-year public, four-year public and four-year private colleges and universities) reveal that students who elect to participate in SI sessions consistently earn one-half to one full letter grade higher than nonparticipants (see Table 1). This has held true when controlling for predictors of academic ability such as grade point averages and high school rank. SI has also proven effective with respect to gender and for students from various ethnic backgrounds. In courses where SI is offered, minority students participate in SI sessions at rates equal to or higher than nonminority students. On the average, minority students who participate in SI earn one-half letter grade higher for the course than minority students who do not elect to participate.

Table 1. National SI Field Data: FY 1982-83 to 1992-93
(N=146 Institutions; 2,875 Courses; 298,629 Students)

Student Grades		All Institutions N = 2,875	Two Year Public N = 460	Four Year Public N = 1,832	Four Year Private N = 547
Final Course	SI	2.30*	2.30*	2.28*	2.39*
Grade	Non-SI	1.85*	1.63*	1.85*	2.05*
Percent A & B	SI	47.5%**	50.6%**	45.9%**	50.0%**
Final Grades	Non-SI	35.8%**	32.9%**	35.0%**	41.0%**
Percent D, F, & W	SI	23.7%**	25.9%**	23.8%**	21.3%**
Final Grades	Non-SI	38.0%**	46.2%**	37.8%**	31.9%**

*Level of significance of difference: 0.05 using chi-square test. **Level of significance of difference: 0.01 using independent t-test.

Also, in studies conducted at the University of Missouri-Kansas City, (Martin and Arendale, 1991) students who participated in SI sessions reen-

rolled and graduated at higher rates (see Tables 2 and 3).

Table 2. Reenrollment Rates of UMKC Students Enrolled in SI Courses, Fall 1989
(N=1,689)

Group Composition	Number Students	Mean High School Rank Percentile	Reenrollment, Spring 1990
SI-Participant, Fall 1989	479	72.4	90.0%*
Non-SI Participant, Fall 1989	1,210	72.0	81.5%*

*Level of significance of difference: 0.05 using chi-square test.

Table 3. Graduation Rates of Fall 1983 UMKC First-Time, First-Year Students
Cumulative Graduation Rate by End of Four Time Periods

Group Composition	By Summer 1987	By Summer 1988	By Summer 1989	By Fall 1989
SI Participant	19.4%**	25.8%**	28.2%**	30.6%**
Non-SI Participant	9.3%**	15.1%**	17.8%**	18.2%**

**Level of significance of difference: 0.01 using chi-square test. Includes all 349 UMKC First-Time, First-Year Freshman who were not enrolled in professional degree programs. SI participants = 124. SI was offered in 12 courses during Fall 1983.

Empowering Students to Learn

While few dispute the value of students mentoring fellow students through courses, some question the ability or content competency of an undergraduate student when it comes to giving answers to course content questions. They believe these questions are better fielded by professional tutors or graduate assistants. In the SI model, the *collective* knowledge and wisdom of the group becomes the primary source for reconstructing the professor's lecture. Again, it should be pointed out that this is material that has already been presented by the course instructor. In this sense SI does not replace, repeat, or reinvent the role of the content expert, but, rather, provides an alternative method for processing the information. Because SI leaders are not presented as content experts, but only as model students, they are under no pressure to answer all content questions. Questions are, instead, redirected to the group. No one student has the responsibility of singlehandedly answering all questions or clarifying all of the perplexing information. Rather, all of the students attempt to answer questions. The group as a collective provides a check on the accuracy of the answers presented by individual participants,

which happens, in part, because of the absence of the expert. No one can automatically assume the answer given is the right one. The group assumes a critical position that leads to self-correction. In other words, they engage in critical thinking.

In SI, because leaders are also peers, their role is to act as a facilitator expert rather than a content expert. Students attending the study sessions are placed in a more active role in processing of information and are made to assume more responsibility for their own learning. It should not be overlooked that when students are engaged in answering each others' questions, they are, in fact, engaged. Engagement represents the first step toward critical thinking and away from the passiveness that characterizes learning dependency. In this case, engagement is not the result of an artificial and contrived attempt to get students to do critical thinking as much as it is the desirable outcome of removing the temptation to let the expert do all the thinking for the group. Passively accepted answers are also uncritically accepted answers. Students in SI must move beyond the role of a passive recipients of information to that of active processors of information.

SI stands in contrast to many traditional forms of academic assistance where the content expert may be expected to give the student the (1) right answers or the (2) right answers again or the (3) right answers again and more slowly. SI sessions structurally depart from this tradition in an attempt to develop the student's ability to think independently and critically about the issues as they unfold. When a lecture has already been presented, students do not need another lecture. What they need is an alternative way of processing the information. The student must learn to deal with information as a good teacher might. This means not only mastering course content, but developing the ability to judge whether and how the information itself has meaning.

Students sometimes do well in difficult courses not because they possess superior intellectual ability, but because they become adept at thinking as the professor thinks. The SI leader's task is to mentor others through this process of learning to think as the professor thinks. If this appears to be too much to expect from undergraduate students, it should be remembered that these SI leaders are typically veterans of both the professor and the course. The sorts of things that previously allowed SI leaders to be successful in the targeted course are matters of personal experience, not pedagogical theory. Students are typically more than willing to engage in conversations about

teachers, tests, readings, assignments, and grading with a student who has had the course.

These conversations about the professor's expectations and ways of thinking have existed in the informal system since the very first freshman class became sophomores and gave the lowdown about difficult courses to the succeeding freshman class. SI attempts to capture some of the energy that exists in this informal system, then formalize it and make it available to students who are outside the network. SI is not a matter of teaching students how to discover antiintellectual methods to beat the system, but rather an attempt to help students develop an intelligent understanding that systems do, as a matter of fact, exist. Learning about these systems represents an important part of the overall competencies required for mastering historically difficult courses or disciplines.

Learning to Question and Questioning to Learn

Organized peer-facilitated study sessions encourage students to go beyond blindly accepting presented material as unquestionable truth. Presumptuous clarity serves only to paralyze thought. Scientific researchers rarely make definite statements in unequivocal terms about the implications of their findings. Their training has taught them to remain open to the processes of inquiry. The goal of SI is to draw upon the social dynamics of the group to tap the otherwise natural and uninterrupted processes of inquiry. Inquiry begins when some aspect of the subject matter is unsettling, problematic, or just not understood. Critical thinking skills are only required when knowledge is perceived to be uncertain.

In his classic 1955 essay, "The Fixation of Belief," Peirce described classroom learning as a *community of inquiry.* Such a community of inquiry is bent on following inquiry wherever it leads and by whatever means. Genuine inquiry recognizes no disciplinary boundaries, nor does it limit itself to mechanical processes. It is the perception of the classroom as a community of inquiry upon which this research has seized.

In the end students discover that the only way to get the right answer is not to approach the material with the intention of memorizing it. Rather, the material must be openly questioned to be truly understood. Good students know that when preparing for exams it is sometimes better to go with the flow of uncertainty than to hastily accept an answer that is not fully understood. In the company of others who are also uncertain, the entire range of

issues related to not knowing becomes less threatening and involvement may even become playful.

Playfulness is rarely mentioned in the discussion of critical thinking or academic pursuits in general. Sartre first distinguished between the "serious man" and the "playing man." For Sartre, the serious man regards his or her beliefs as products of the world, giving more credence to the existence of the world than to themselves. This corresponds to the traditional concept of education through imitation. The playing man gives more weight to himself and relates his beliefs by to his own choices. In choosing his own beliefs he necessarily forms a critical relationship to those ideas, and for Rorty the playing man is one guided by a metaphor of invention. Theoretically then, when one attempts a pattern of instruction that allows for learning as discovery, invention and play, there is hope that a critical thinker may emerge.

Study Skills in a Meaningful Context

SI is a departure from traditional forms of remedial academic assistance because skills are developed within the framework of regular core curriculum courses. Study skills are more easily developed when they are not taught in isolation from course content, a position similar to the one held by some theorists who affirm that general critical thinking skills cannot be developed in isolation from a discipline-specific context. McPeck (1990) contends that giving people general skills for problem solving "is like giving people a language with a syntax but no semantic. It is functionally meaningless" (p. 14). He insists that critical thinking is not removed from the subject of inquiry but invariably bound to it.

Lipman (1991) contrasts two separate paradigms within educational practice, which he calls the "standard paradigm of normal practice" and the "reflective paradigm of critical practice" (p. 13). His presentation of the paradigms is as follows.

The Standard Paradigm

- Education consists in the transmission of knowledge from those who know to those who don't know.
- Knowledge is about the world, and our knowledge of the world is unambiguous, unequivocal, and unmysterious.
- Knowledge is distributed among disciplines that are nonoverlapping and

together are exhaustive of the world to be known.
- The teacher plays an authoritative role in the education process, for only if teachers know can students learn what they know.
- Students acquire knowledge by absorbing information, i.e., data about specifics; an educated mind is a well-stocked mind.

The Reflective Paradigm
- Education is the outcome of participation in a teacher-guided community of inquiry, among whose goals are the achievement of understanding and good judgment.
- Students are stirred to think about the world when our knowledge of it is revealed to them to be ambiguous, equivocal, and mysterious.
- The disciplines in which inquiry occurs are assumed to be neither nonoverlapping nor exhaustive; hence their relationships to their subject matters are quite problematic.
- The teacher's stance is fallibilistic (one that is ready to concede error) rather than authoritative.
- Students are expected to be thoughtful and reflective, and increasingly reasonable and judicious.
- The focus of the education processes is not on the acquisition of infor mation but on the grasp of relationships within the subject matters under investigation (p.14).

It is probably not difficult to determine which paradigm Lipman endorses. At issue here is not that, as thoughtful and educated persons, we should choose the "right" paradigm. The issue is that we are forced to choose only one and choose it at the expense of the other.

The paradigms, as presented, may represent contrasting points of view, but, as practiced they represent two complementary rather than exclusive processes. SI attempts to reconcile and integrate both ends of this continuum by providing a model in which both paradigms may be considered useful. As stated earlier, SI does not attempt to replace the traditional role the professor plays in delivering course content to the student; rather, it attempts to insure that learning is enhanced through alternative processes. Faculty, by virtue of their expertise and experience, should be allowed to deliver factual information to students. Likewise, students, by virtue of the fact they are students, should be held responsible for processing that infor-

mation in a meaningful way. There are some things faculty must do for students and there are some things that students must do for themselves.

Frequently Asked Questions about Supplemental Instruction (SI)

How do Faculty Respond to SI?

SI is not a substitute for poor teaching, and we do not recommend that SI be attached to courses where faculty are unsupportive. If the delivery of the content is weak, SI will likely be weak as well. Students simply cannot use SI to process material that was not adequately presented in the first place. SI may, however, improve good teaching by doing for faculty what they themselves would do if they had both the time and the rewards for doing so. In 600 institutions in at least 11 countries, faculty overwhelmingly support SI as an academic support program because SI supports rather than undermines teaching. It is truly supplemental instruction, not alternative instruction. Because most faculty are already devoted to helping students learn, they are also open to tools that will genuinely contribute to that end. Faculty are sometimes unfairly criticized because they are unwilling to water down course content to improve the pass rates of underprepared students. SI does not ask them to do so; rather, it attempts to develop the academic skills of the student within the context of the course, so that students can *meet* the expectations of the faculty. Faculty are sometimes concerned that SI is hand holding and are rightly skeptical of any academic support program that creates more dependency in the student than it eliminates. SI encourages students to take more responsibility for their own learning by removing the expert from the study sessions, forcing students to engage the content rather than attempt to passively absorb it.

What are the Criteria for Choosing SI Leaders?

The most qualified SI leaders are those who have taken the course with the professor and earned a high grade. While SI leaders are not completely responsible for the course content, they are responsible for the course. That is, their job is to pass on to other students the things they did to make them successful in the course. The SI leaders' most valuable contribution is their ability to articulate their own experience of success. Beyond that we look for students who have time, dedication, facilitation skills, maturity, and so on. We find it generally easier to teach facilitation skills to students who are

content-competent than to teach content competency to those who have facilitation skills.

What are the time requirements for students who are SI leaders? It varies by how quickly leaders can prepare themselves for SI sessions. The average for a sixteen-week semester course is about ten hours per week for each course in which they are SI leaders. This breaks down to three hours in class, three hours conducting the SI sessions, and four hours of preparation time. Most SI leaders attempt only one SI course, treat it as a part-time job, and are paid only a little more than work-study students. At UMKC, SI leaders are paid a stipend of $850 per semester. Most, however, find being an SI leader a more rewarding experience than being a work-study student.

What are the Costs for the Program?

The biggest cost is the salary of the SI supervisor, the professional staff member who administers the program. Second is the salary of SI leaders and the costs associated with the program such as training, text books, and photocopying. This cost should be compared to the cost of not providing Supplemental Instruction. For instance, what does it cost to recruit students, as compared to retaining them? What do students bring to the institution in terms of tuition dollars? Faculty are usually paid the same whether they start with 100 students and end with 50, or start with 100 and end with 75 (repeating courses is not cost effective for the student or the institution). The bottom line is that student retention is good business.

What are the Weaknesses of the Program?

SI, in its generic form, is limited in what it can do and whom it can adequately serve. As a retention tool, SI is primarily successful with students who are only on the verge of failure (today, however, this is not a small number). SI is not intensive enough to overcome severe academic difficulties or learning disorders. In short, SI does not leap tall buildings in a single bound. The program is time and work intensive. SI leaders must be hired, trained, and supervised. Faculty, administrators, and other stakeholders must regularly receive information on how the program is being evaluated. To that end, data must be collected on how many students are attending, how they are performing compared to nonparticipating students, the demographics of students who attend the sessions, the mean size of the sessions, the true cost of the program in student utilization hours, and the attrition rates in the

course before and after SI. For an institution to have longevity in the program, the program must be understood and supported at every level—student, faculty, administration, and staff.

What are the First Steps in Starting a Supplemental Instruction Program?

There are two alternatives. One is just to start; that is, to find a student who has successfully completed a historically difficult course and hire that student to conduct study sessions. That is not, however, the alternative we recommend. The other choice is to become systematically involved in the program. The U.S. Department of Education, through the National Diffusion Network, funds the dissemination of SI training through UMKC. UMKC conducts three-day workshops four times each year to train Supplemental Instruction supervisors. Topics covered during training include: gaining faculty support; funding SI; selecting, training, and supervising SI leaders; SI program evaluation; common mistakes and troubleshooting; adaptations of SI for special situations; and other administrative issues. Workshop participants also receive two SI Training Manuals—one for training leaders and one for supervising and administering the program. Free informational brochures about SI workshops in Kansas City can be obtained by phoning (816) 235-1166 or faxing (816) 235-5156. Interested parties may also write to: Supplemental Instruction Workshops, The University of Missouri-Kansas City, Center for Academic Development, 5100 Rockhill Road, Kansas City, MO 64110.

Summary

Many institutions of learning unwittingly develop academic support programs that emphasize the memorization of information rather than the development of student competencies to deal with difficult learning structures and conflicting points of view. The capability of students to evaluate situations without clear-cut answers and to make informed decisions has been a neglected aim of education in general. When Dewey (1938) spoke about the failure of education, he claimed it was because education confused the finished end product of education with the crude subject matter of inquiry. His preferred methods were to investigate problems rather than to learn solutions. He suggested that the responsibilities of these in a democratic society are not only to be informed, but to be capable of critically evaluating infor-

mation. Students of the twenty-first century, more than ever before, must develop the skills needed for self-directed inquiry.

Supplemental Instruction contributes to the larger discussion of academic support by casting remediation issues in a new light—that of critical thinking. SI is a field-based program that picks up where the classroom lecture leaves off. For students it is an intelligent response to the contemporary problem of information overload.

Developing students' critical thinking skills as the ultimate goal of academic support may be like advocating justice or patriotism; typically everyone approves of the idea but no one is exactly certain how to go about it. SI, as an academic support program, is important because it provides a programmatic example of how theory can guide practice in this area.

Suggested Readings

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