Postsecondary Peer Cooperative Learning Programs:

Annotated Bibliography

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This manuscript is undergoing major revision.
Check back later in August 2007 for an updated version.

Postsecondary Peer Cooperative Learning Program Annotated Bibliography

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Overview of the Programs Contained in the Annotated Bibliography

Peer collaborative learning has been popular in education for decades. As both a pedagogy and learning strategy, it has been frequently adopted and adapted for a wide range of academic content areas throughout education at the elementary, secondary, and postsecondary levels due to its benefits. The professional literature is filled with reports of individual professors integrating this approach into postsecondary classrooms in diverse ways. Increased attention has been placed on this practice due to claims by some programs that carefully coordinated and managed learning programs with specific protocols can increase student persistence rates towards graduation, supporting both student goal aspirations as well as bolstering institutional revenues. Much of the narrative from this overview to the bibliography is drawn from a recent article published by me on peer cooperative learning groups (Arendale, 2004).

This annotated bibliography does not attempt to be inclusive of this broad field of literature concerning peer collaborative learning. Instead, it is focused intentionally on a subset of the educational practice that share a common focus with increasing student persistence towards graduation. At the end of this overview, several suggestions are made for differentiating the models from each other and the level of institutional resources and resolve with implementing them.

The six student peer learning programs included in this bibliography meet the following characteristics: (a) the program must have been implemented at the postsecondary or tertiary level; (b) the program has a clear set of systematic procedures for its implementation that could be replicated by another institution; (c) program evaluation studies have been conducted and are available for review; (d) the program intentionally embeds learning strategy practice along with review of the academic content material; (e) the program outcomes include increased content knowledge, higher final course grades, higher pass rates, and higher college persistence rates; and (f) the program has been replicated at another institution with similar positive student outcomes. From a review of the professional literature six programs emerged: Accelerated Learning Groups (ALGs), Emerging Scholars Program (ESP), Peer-Led Team Learning (PLTL), Structured Learning Assistance (SLA), Supplemental Instruction (SI), and Video-based Supplemental Instruction (VSI). As will be described in the following narrative, some of the programs share common history and seek to improve upon previous practices. Other programs were developed independently.

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[1]The author gratefully recognizes the contributions of Gertrude Hewapathirana who has served as his Graduate Research Assistant at the University of Minnesota-Twin Cities from 2002 through 2004 and also the funding provided by General College at the University for her research position. Hewapathirana's research identified additional references regarding the Emerging Scholars Program and the Peer-Led Team Learning Program.

When possible, original text from the author's document overview or summary paragraphs were used in this annotated bibliography. Frequently when peer collaborative programs are adopted for use outside the institution or country of origin, it is often contextualized for the educational system and needs of each individual setting. Nearly one fourth of the entries in this database are from authors and researchers outside of the United States. Sometimes particular program are renamed. For example, while the Supplemental Instruction Program is the common term used in the United States, in other countries it is sometimes called PASS (*Peer Assisted Study Sessions*) or PALS (*Peer Assisted Learning Sessions*). The Emerging Scholars Program sometimes operates under different names as well. If the reader of this document is aware of a publication related to one of the peer collaborative learning programs that has not ben included or have corrections to the annotations, please contact the compiler/editor by telephone (612-625-2928) or send an e-mail (David@Arendale.org).

Collaborative Learning, Cooperative Learning, and Learning Communities

A review of the professional literature finds that the terms collaborative learning, cooperative learning, and learning communities are sometimes used interchangeably with one another. Although they share similarities with one another, a more precise differentiation is needed to help explore the area and the utility of each for its intended educational outcomes (Cooper, Robinson, & Ball, 2003). Regarding their historical development and appearance within the professional literature in the United States, collaborative learning appeared first, cooperative learning second, and learning communities last. A search of the ERIC Database (2004) found more than 8,000 entries regarding descriptive and research studies that contained one or more of these three terms indexed within their documents.

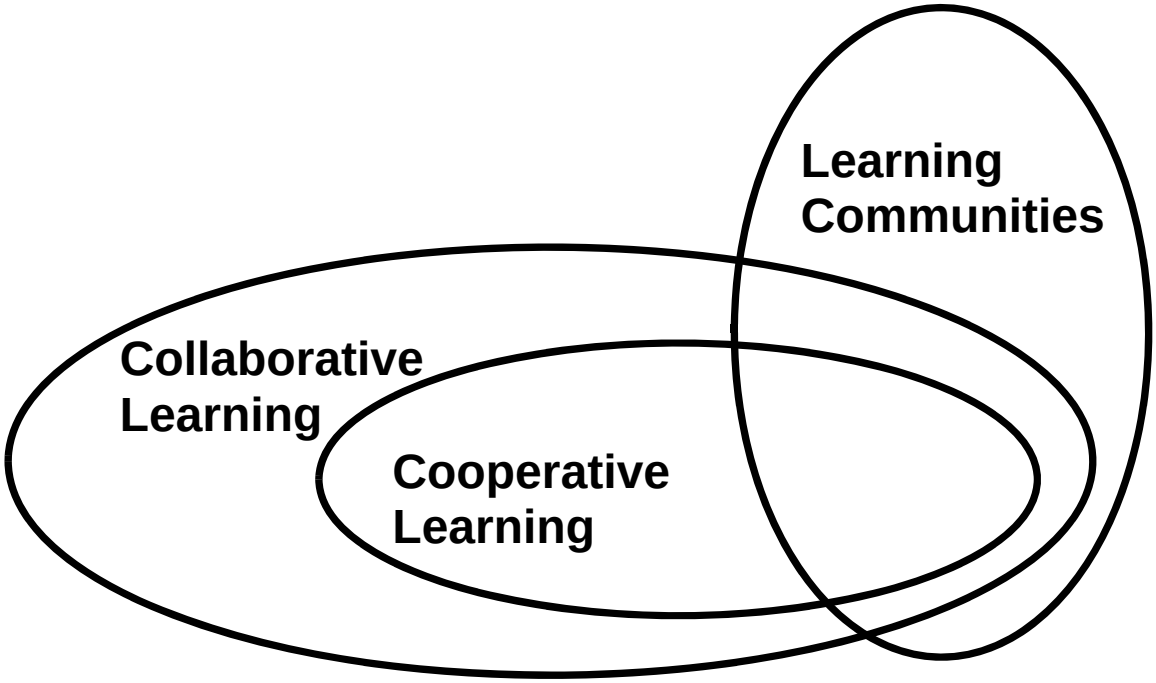
Collaborative learning refers to a wide range of formal and informal activities that include any form of peer student interaction. This is the broadest and most general of the three terms. This term describe any classroom activity by an instructor that involves student peer-to-peer involvement. Cooperative learning is more narrowly defined as a subset of collaborative learning. It often follows these principles: (a) positive interdependence is established in the group through adoption of different roles that support the group moving to complete a goal, (b) peers interact with one another, (c) activities are structured to establish individual accountability and personal responsibility, (d) development of interpersonal and small group skills, and (e) group processing of small group activities through verification of information accuracy (Cuseo, 2002; Johnson, Johnson, Holubec, & Roy, 1984).

Collaborative and cooperative learning groups, learning communities are distinguished by their focus on interactive peer learning. Learning communities are often more focused on enhanced curricular and pedagogical outcomes. In addition to often employing some version of student interactive learning, learning communities take several approaches to modifying the classroom experience by restructuring the curriculum. Some of the ways that courses may be modified is through linked courses, learning clusters, freshman interest groups, federated learning communities, and coordinated studies (Gabelnick, MacGregor, Matthews, & Smith, 1990).

A way to understand the relationships among these three terms is through a Venn visual diagram, most often used in mathematics. Collaborative learning is considered to be the largest construct, both due to its general definition as well as its numerical

ranking as most frequently cited in professional literature (ERIC, 2004). A smaller construct lies within collaborative learning. This is cooperative learning. While it holds to the same generalizations and goals of collaborative learning, it is much more specific in its implementation and following of specified protocols for its use. A related term to both collaborative and cooperative learning is that of learning communities. While learning communities often utilize some peer collaborative or peer cooperative learning activities as part of its pedagogy, it is generally focused more on curricular transformation. However, it is possible to implement some aspects of learning communities without extensive use of either collaborative or cooperative learning since the focus may be more on team teaching by instructors and the integration of academic content material (i.e., cluster course that merges the content of an introduction to science with an ethics course) rather than extensive use of student peer interactive learning activities.

Relationship Among Selected Learning Pedagogies



In this bibliography, the focus will be on peer cooperative learning programs that embed learning strategies practice within review of the academic content material and which also meet the other selection criteria previously mentioned. This is an important topic in the field of developmental education and learning assistance in particular and with postsecondary education in general. This is due to the need by institutions to both meet the needs of a more diverse entering student body while maintaining or increasing academic rigor (Bastedo & Gumport, 2003). The institution must make systemic changes in the educational environment that will increase the academic success and persistence rates of all students to meet the expectations of stakeholders such as

parents, legislators, and funding agencies. Although the number of academically underprepared students is increasing, historic delivery systems of academic development for students such as remedial and developmental courses are being reduced or eliminated by some states (Barefoot, 2003; Damashek,1999; Parsad & Lewis, 2003). Many institutions have already adopted one of more of the six programs described in this chapter. The need for such approaches may increase due to the demands to meet the needs of access to an increasingly diverse student body without the traditional approaches offered by developmental education in the past.

Six Major Postsecondary Peer Cooperative Learning Programs

Six postsecondary peer collaborative learning programs were selected for inclusion in this chapter based on the criteria mentioned earlier in the narrative: (a) Accelerated Learning Groups (ALGs), (b) Emerging Scholars Program (ESP), (c) Peer-Led Team Learning (PLTL), (d) Structured Learning Assistance (SLA), (e) Supplemental Instruction (SI), and (f) Video-based Supplemental Instruction (VSI). The six programs have been divided into two groups.

The first group are those that provide adjunct support through outside-of-class activities with little change by the primary course instructor. The first in this category is SI. In recent years two programs have been developed to address limitations of the SI model: ALGs and SLA. The second group of peer cooperative programs are those that share a common characteristic of a transformed classroom learning environment by all enrolled students. Major changes have been made by the primary course instructor through either integration of the peer learning model into the basic course delivery or heavy involvement by the instructor with the peer learning activities. The first of these programs is ESP, developed at approximately the same time as SI in the 1970s. In the 1990s two programs were created with similar purposes and protocols to ESP: PLTL and VSI. Most of these six programs cite in their literature reviews references concerning the other peer learning programs as it appears that each have been an incremental improvement upon previous peer learning models.

Categorization, Relationship, and Historical Development of Peer Cooperative Learning Programs

Adjunct to the Course	Embedded Within the Course
1. Supplemental Instruction	1. Emerging Scholars Program
2. Accelerated Learning Groups	2. Video-based Supplemental Instruction
3. Structured Learning Assistance	3. Peer-Led Team Learning

Selecting the Cooperative Learning Model for Institutional Needs

To display the relationship between the six identified peer cooperative learning programs and learning assistance programs in general, it would be helpful to compare them with Keimig's (1983) Hierarchy of Learning Improvement Programs. In the Hierarchy of Learning Improvement Programs, four basic program types are described and ranked, differentiated by the extent by which they are comprehensive in response to the various needs of students and institutionalized into the academic mainstream. Level 1: Isolated courses in remedial skills. Level II: Learning assistance to individual students. Level III: Provides course-related supplementary learning activities outside the class for some objectives. Level IV: Comprehensive learning system in the course. (p. 21)

Using Keimig's hierarchy it is possible to arrange the six peer cooperative programs into the following figure. According to Keimig, the highest level of student outcomes occurs when a comprehensive learning system is integrated throughout the course learning experience. This requires a transformative experience by the institution due to: (a) heavy involvement of the course professor with curriculum development; (b) training, monitoring, and supervision of peer group facilitators; (c) alignment of educational objectives among all course components; (d) changes in institutional and course policies and expectations; (e) release time for professors to complete essential tasks; and (f) stable, long-term institutional funding since outside grants are difficult to obtain or maintain. ESP, PLTL, and VSI fit into this fourth level category. While these programs have a higher likelihood of improved student outcomes, they are also the most demanding of institutional resources and changes in the campus environment.

The next level of programs, according to Keimig, are those that are adjunct to the course and provide support for it through either voluntary or required participation. ALGs, SLA, and SI are placed into this group. The expectancy for results, based on Keimig's model, is not as high as for the level four comprehensive programs as described in the previous paragraph. But ALGs, SLA, and SI are predicted to yield higher student outcomes that either individual assistance to students such as tutoring or enrollment in remedial courses. This third category is less expensive and less labor intensive to implement, but may yield lower desired student outcomes.

Placing Postsecondary Peer Cooperative Learning Programs Within Keimig's Hierarchy of Learning Improvement Programs

Levels of Integration	**Peer Cooperative Learning Programs**	**Likelihood of Improved Student Outcomes**
Level Four: Comprehensive learning system in the course	ESP, PLTL, SLA, and VSI	High
Level Three: Course-related supplementary learning activities	ALG and SI	Above average
Level Two: Learning assistance to individual students	Tutoring	Below average
Level One: Isolated courses in remedial skills		Low

Higher levels of institutionalization of peer learning programs require high levels of funding and support from administration and faculty members. This investment may pay high dividends. The future political and economic environment may be more supportive for these types of programs for supporting higher student persistence rates in comparison with traditional remedial or developmental education courses which are under considerable pressure for curtailment as described earlier in this chapter. It is recommended that before adoption of any of the six programs, that both a careful review of the published literature be undertaken as well as personal communication with those successfully operating the programs.

Some of the programs, such as PLTL and SI, offer national training workshops to enable other to implement the programs. On site observations can probably be

negotiated with any of the six programs. The investment in such telephone and onsite observations will help to reveal the mirid of essential elements needs for successful implementation of the specific practice. Often these essential details are not revealed in the published literature which tend to be more focused on statistical studies and not on the detailed implementation protocols. Based on personal experience as a former national training director for one of the six programs, the author of this chapter strongly recommends careful planning before attempting to implement the programs. While the educational outcomes described in the published literature are replicable, it generally requires careful implementation and constant monitoring to assure continued quality.

Further Research Issues Regarding Peer Cooperative Learning

One of the most perplexing issues facing peer cooperative learning groups is dealing with student motivation and goal orientation. Sometimes the students who could most benefit from the positive effects of peer learning are the ones least likely to participate due to fear of exposing their academic weaknesses to others or even to themselves. Many of these six programs have dealt with the issue through mandatory attendance at sessions. Although brute force does compel attendance, it does not necessarily follow that students willingly adopt the new academic behaviors and implement them in other courses when not under the dictates of program requirements. Exploring the complexity of student motivation is being carefully studied among elementary and secondary education student populations. However this important construct is often ignored in the study of postsecondary education in general, and the provision of learning assistance at the college level, in particular.

Creating peer cooperative learning programs that provide both structure and an environment that encourages students to modify their motivations for learning will require more work by program designers. Too often students have been expected to adopt the expectations and learning conditions of the institution without direct instruction. This literature supports the notion that it is necessary for institutions to implement programs that are more attentive to individual differences among students. Much work has yet to be done.

For More Information on This Topic Area

By its very nature, this document is dated as soon as it is printed. A way to locate up-to-date information on these six postsecondary peer cooperative learning programs is through this author's web site that contains a searchable database of citations that were used to identify the professional literature which served as the basis of this chapter. This Web-based database will be regularly updated with addition of new references and accompanying annotations. In addition, the Web site permits a user to search the database of more than 600 references by more than 40 search terms. For example, it would be possible to identify references to SI programs in chemistry that primarily served students of color. In addition to the interactive database, a print version of the annotated bibliography is available in the Acrobat PDF format for users to read online or to print on their computer. This document is available at http://www.tc.umn.edu/~arend011/Peerbib03.pdf An on-line database of this same information and instructions for its use are available at http://www.tc.umn.edu/~arend011/peerbiboverview.htm Users are encouraged to read through the on-line documentation to gain the most benefit from using the database search engine.

Overview of the Six Peer Cooperative Learning Programs

Accelerated Learning Groups (ALGs)

Accelerated Learning Groups (ALGs) were developed at the University of Southern California in Los Angeles in the early 1990s by Dr. Sydney Stansbury. ALGs were designed the meet the needs of students who had significant skill or knowledge deficiencies that often inhibited their effective use of other peer collaborative learning programs such as SI. ALGs combined peer-led small group learning activities, assessment, frequent feedback by a learning skills specialist, and development of an individual education plan (IEP) for each students. ALG students were concurrently enrolled in a challenging entry level course while they developed the necessary skills and knowledge prescribed by the IEP. The ALG students were placed into a triad with another student with similar IEP objectives and a peer leader who worked intensely with the students under the supervision of a learning skills specialist. Participation in ALGs continued in the academic term until the learning skills specialist deemed it appropriate to transition into another peer development program such as SI or individual tutoring.

Emerging Scholars Program (ESP)

Developed at the University of California, Berkeley in the early 1980s, the Emerging Scholars Program (ESP). ESP is also known as the Calculus Workshop Program, the Mathematics Workshop Program, and the Treisman model after its creator, Philip Uri Treisman. The original ESP program has several critical elements: build a cohort community of first-year students of color that is academically-oriented and a source of peer support; provide the cohort with an extensive orientation to the college and with ongoing academic advising; advocate the interests of the cohort and monitor their academic progress and adjustment to the environment; provide the cohort with ongoing supplementary instruction in order to develop independent learning; and link high school-level and undergraduate-level affirmative action efforts. The ESP program has been adopted and adapted by more than 100 institutions across the U.S.

Peer-Led Team Learning (PLTL)

Peer-Led Team Learning (PLTL) is an innovative model in science education. PLTL was originally developed at the City University of New York in the mid 1990s. Support through a grant from the National Science Foundation has assisted in the model being adopted by more than 100 institutions. Student-leaders (peers) guide the activities of small groups of students in weekly Workshop meetings. The students work through challenging problems that are designed to be solved cooperatively. The peer leaders are trained to ensure that the students are actively and productively engaged with the material and with each other. This methodology offers a number of educational opportunities: the supportive format encourages questions and discussions that lead to conceptual understanding; students learn to work in teams and to communicate more effectively; peer leaders learn teaching and group management skills.

The following are guiding principles of PLTL: the program is integral to the course through required attendance at two hours of workshop time weekly; peer leaders are trained in group leadership and course content; activities and materials are challenging yet accessible; faculty are deeply involved in the program; physical space and environments are conducive to discussion and learning; and the program has strong support from the institution.

Structured Learning Assistance (SLA)

Initiated in 1994 at Ferris State University (OH), Structured Learning Assistance (SLA) workshops assist students in developing the background needed to connect to the course content and to develop and apply the learning strategies most appropriate to the content area. All students in the targeted classes are required to attend the sessions until they demonstrate content mastery by high marks on units exams. Attendance becomes optional for these students and continues to be mandatory for others. A faculty development component is also part of SLA which supports higher academic achievement for students. SLA has been recognized through several national awards and is currently supported by a USDOE Grant from the Fund for the Improvement of Postsecondary Education. Results indicated that SLA can significantly improve student pass rates, even for at-risk students.

Supplemental Instruction (SI)

The Supplemental Instruction (SI) model of academic assistance helps students in historically difficult classes master content while they develop and integrate learning and study strategies. The program was originally developed at the University of Missouri-Kansas City in 1973 and has been adopted by hundreds of institutions in the U.S. and abroad. Goals of SI include: (1) improve student grades in targeted courses; (2) reduce the attrition rate within those courses; and (3) increase the eventual graduation rates of students. All students in a targeted course are urged to attend SI sessions, and students with varying ability levels participate. There is no stigma attached to SI since *historically difficult courses* rather than *high risk students* are targeted. SI is scalable and can be implemented in one or more courses each academic term.

There are four key persons involved with SI. The first is the *SI supervisor*, a trained professional on the SI staff. The SI supervisor is responsible for identifying the targeted courses, gaining faculty support, selecting and training SI leaders, and monitoring and evaluating the program. Once the historically difficult courses have been identified, the SI supervisor contacts the faculty member concerning SI for their course. The second key person for SI is the *faculty member* who teaches one of the identified courses. SI is only offered in courses in which the faculty member invites and supports SI. Faculty members screen SI leaders for content competency and approve selections. The third key person is the *SI leader*. SI leaders are students or learning center staff members who have been deemed course competent, approved by the course instructor and trained in proactive learning and study strategies. SI leaders attend course lectures, take notes, read all assigned materials, and conduct three to five out-of-class SI sessions a week. The SI leader is the *"model student*," a facilitator who helps students to integrate course content and learning/study strategies. The fourth key member of the SI program are the *participating students*.

Video-based Supplemental Instruction (VSI)

VSI was developed at the University of Missouri-Kansas City in the late 1980s and has been implemented by dozens of institutions in the U.S. and abroad. VSI differs from SI in several respects. The students enroll in required, core curriculum courses. The course professor records all didactic presentations on videotape for use with underprepared students as well as other students who opt for this highly interactive way of learning. Instead of attending the professor’s regular lecture classes, students enroll

in the *video section* of the professor's course. Students in both sections are held to the same performance standards. Specially designed facilitator and student manuals support the video sections.

VSI students, led by a trained facilitator, start and stop the videotaped presentation at pre-determined times and, in addition, whenever they have a question or want clarification. Professors design the video presentations to include periodic small group assignments to insure mastery of one concept before the next is introduced. Students complete these tasks under the supervision and with the guidance of the facilitator. When the taped lecture resumes, the professor models how he/she thinks about the assigned tasks. In this way, the students have time to construct and verify their understanding as well as compare their own thinking to that of the expert.

References

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Barefoot, B. O. (2003). *Findings from the Second National Survey of First-Year Academic Practices, 2002.* Brevard, NC: Policy Center for the First Year of College. Retrieved June 22, 2004 from http://www.brevard.edu/fyc/survey2002/findings.htm

Bastedo, M.N., & Gumport, P.J. (2003). Access to what? Mission differentiation and academic stratification in U.S. public higher education. *Higher Education: The International Journal of Higher Education and Educational Planning, 46*(3), 341-359. Retrieved January 15, 2004 from http://www.kluweronline.com/0018-1560

Cooper, J. L., Robinson, P., & Ball, D. B. (Eds.). (2003). *Small group instruction in higher education: Lessons from the past, visions of the future*. Stillwater, OK: New Forums Press.

Cracolice, M. S., & Deming, J. C. (2001). Peer-Led Team Learning*. The Science Teacher, 68*(1), 20-24.

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Damashek, R. (1999). Reflections on the future of developmental education, Part II*. Journal of Developmental Education, 23*(2), 18-20, 22 Retrieved June 22, 2004 from http://www.ced.appstate.edu/centers/ncde/reserve%20reading/V23-2damashek%20reflections.htm

ERIC (2004). *The educator's reference desk*. [On-line]. Retrieved June 21, 2004 from http://www.eduref.org/

Gabelnick, F., MacGregor, J., Matthews, R.S., & Smith, B.L. (1990). *Learning communities: Creating connections among students, faculty, and disciplines*. San Francisco: Jossey-Bass.

Johnson, D.W., Johnson, R.T., Holubec, E.J., & Roy, P. (1984)*. Circles of learning: Cooperation in the classroom*. Washington, DC: Association for Supervision and Curriculum Development.

Keimig, R. T. (1983). *Raising academic standards: A guide to learning improvement*. ASHE-ERIC Higher Education Report No. 4. Washington, DC: Association for the Study of Higher Education.

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Accelerated Learning Groups (ALGs)

Accelerated Learning Groups (ALGs) were developed at the University of Southern California in Los Angeles in the early 1990s by Dr. Sydney Stansbury. ALGs were designed the meet the needs of students who had significant skill or knowledge deficiencies that often inhibited their effective use of other peer collaborative learning programs such as SI. ALGs combined peer-led small group learning activities, assessment, frequent feedback by a learning skills specialist, and development of an individual education plan (IEP) for each students. ALG students were concurrently enrolled in a challenging entry level course while they developed the necessary skills and knowledge prescribed by the IEP. The ALG students were placed into a triad with another student with similar IEP objectives and a peer leader who worked intensely with the students under the supervision of a learning skills specialist. Participation in ALGs continued in the academic term until the learning skills specialist deemed it appropriate to transition into another peer development program such as SI or individual tutoring.

Arendale, D. (2004). Pathways of persistence: A review of postsecondary peer cooperative learning programs. In I. M. Duranczyk, J. L. Higbee, & D. B. Lundell (Eds.), *Best practices for access and retention in higher education* (pp. 27-42). Minneapolis, MN: Center for Research on Developmental Education, General College, University of Minnesota. Retrieved March 15, 2005, from http://www.gen.umn.edu/research/crdeul/monographs.htm

This chapter focused intentionally on a subset of the educational practice that share a common focus with increasing student persistence towards graduation. Rather than a meta-analysis of all published research studies, this chapter is a preliminary review and a description of six models. At the end of the chapter several suggestions are made for differentiating the models from each other and the level of institutional resources and resolve with implementing them. The six student peer learning programs included in this chapter meet the following characteristics: (a) the program must have been implemented at the postsecondary or tertiary level, (b) the program has a clear set of systematic procedures for its implementation at an institution, (c) program evaluation studies have been conducted and are available for review, (d) the program intentionally embeds learning strategy practice along with review of the academic content material, (e) the program outcomes include both increased content knowledge with higher persistence rates, and (f) the program has been replicated at another institution with similar positive student outcomes. From a review of the professional literature six programs emerged: Accelerated Learning Groups (ALGs), Emerging Scholars Program (ESP), Peer-Led Team Learning (PLTL), Structured Learning Assistance (SLA), Supplemental Instruction (SI), and Video-based Supplemental Instruction (VSI). As will be described in the following narrative, some of the programs share common history and seek to improve upon previous practices. Other programs were developed independently.

Stansbury, S. L. (2001). Accelerated Learning Groups enhance Supplemental Instruction for at-risk students. *Journal of Developmental Education, 24*(3), 20-22, 24, 26, 28, 40.

In order to increase Supplemental Instruction (SI) attendance, Accelerated Learning Groups (ALGs) were developed. A pilot study investigated whether at-risk students who

participated in an ALG/SI combination demonstrated higher self-efficacy and SI attendance than those who participated in only SI. Results suggested that at-risk students were more likely to participated in 12 or more SI sessions if they attended an ALG/SI combination than if they attended only SI. In addition, the range of final grades was higher for those who attended an ALG/SI combination than for those who attended only SI. The development of prerequisite skills was essential for the efficacy of SI to serve academically underprepared students who may shun the very academic intervention that would be of most help to them. Additional research is warranted to investigate this area.

Stansbury, S. L. (2001). *How to turn Supplemental Instruction nonparticipants into participants*. Unpublished manuscript, University of Missouri-Kansas City. Available from the author at Sydbury@Yahoo.com

This study investigated the outcomes of the Supplemental Instruction (SI) model with 215 students enrolled in General Biology and 200 students in General Chemistry at the University of Missouri-Kansas City. A variety of preentry attributes were collected from the students including self-reported grade in a previous course of the same academic sequence, mastery goal orientation, performance-approach goal orientation, performance-avoidance goal orientation, self-efficacy, and interest in group study. While the findings were complex, several general statements include: higher SI attendance was correlated with higher final course grades, academically weaker students were less likely to attend SI sessions, academically weaker students reported higher levels of self-efficacy suggesting that they were less likely to accurately assess their strengths and weaknesses. This may also partly explain why these students were less likely to participate in SI sessions. The author recommends that the course professor administer a content-valid pretest during the first class period to provide feedback to all students and hopefully motivate the low scoring students to attend SI sessions. The paper concludes with an overview of Accelerated Learning Groups (ALGs), an intervention designed by the author at the University of Southern California to increase the academic success of at-risk students. The objective of ALGs is to identify students who have below average prerequisite skills for a course and assist them in strengthening these skills while they attend SI. ALGs were designed to work simultaneously with the campus SI program. Procedures for implementing ALGs is provided with data from a study of the effectiveness of ALGs in a chemistry course.

Emerging Scholars Program (ESP)

Developed at the University of California, Berkeley in the early 1980s, the Emerging Scholars Program (ESP). ESP is also known as the Calculus Workshop Program, the Mathematics Workshop Program, and the Treisman model after its creator, Philip Uri Treisman. The original ESP program has several critical elements: build a cohort community of first-year students of color that is academically-oriented and a source of peer support; provide the cohort with an extensive orientation to the college and with ongoing academic advising; advocate the interests of the cohort and monitor their academic progress and adjustment to the environment; provide the cohort with ongoing supplementary instruction in order to develop independent learning; and link high school-level and undergraduate-level affirmative action efforts. The ESP program has been adopted and adapted by more than 100 institutions across the U.S.

Alexander, B. B., Burda, A. C., & Millar, S. B. (1997). A community approach to learning calculus: Fostering success for underrepresented ethnic minorities in an Emerging Scholars Program. *Journal of Women and Minorities in Science and Engineering, 3*(3), 145-159. (ERIC Document Reproduction Service No. ED408180).
This document contains the final evaluation of the Wisconsin Emerging Scholars Program (ESP) for the year 1993-94. The evaluation report includes an executive summary, a discussion of the parameters of the evaluation including research questions and methods, implementation processes and outcomes for faculty and administrators, student learning processes and outcomes including those indicated by both qualitative and quantitative data; conclusions related to the use of the ESP program; and recommendations related to pedagogical issues, out-of-class issues, and implementation issues. Critical factors for ESP success included the student small group work, the careful construction of the problem worksheets, and the involvement of the faculty members.

Arendale, D. (2004). Pathways of persistence: A review of postsecondary peer cooperative learning programs. In I. M. Duranczyk, J. L. Higbee, & D. B. Lundell (Eds.), *Best practices for access and retention in higher education* (pp. 27-42). Minneapolis, MN: Center for Research on Developmental Education, General College, University of Minnesota. Retrieved March 15, 2005, from http://www.gen.umn.edu/research/crdeul/monographs.htm
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Asera, R. (1988). *The mathematics workshop: A description*. Unpublished manuscript. This report describes the Mathematics Workshop, also known as the Emerging Scholars Program (ESP), The paper describes the history of the program, the students targeted for participation, the types of activities that occur inside the ESP sessions, samples of the workshop problem sets, and some student perceptions of its benefit.

Asera, R. (1998). Supporting student persistence. *Black Issues in Higher Education, 15*(10), 104
This article provides a short overview of the Emerging Scholars Program (ESP).

Bonsangue, M. V. (1993). The effects of calculus workshop groups on minority achievement and persistence in mathematics, science, and engineering. *Cooperative Learning and College Teaching Newsletter, 3*(3), 8-9.
This report describes the Academic Excellence Workshop Program, also known as the Emerging Scholars Program (ESP) at California Polytechnic State University (Cal Poly), Ponoma. This articles presents a short summary of a research study investigated four questions: What effect did the workshop have on achievement and persistence of workshop students in first quarter calculus? What effect did the workshop have on achievement and persistence of workshop students in subsequent calculus courses? What effect did the workshop have on achievement and persistence of workshop students within their mathematics-based majors? What socio-academic effects did the workshop experience have as defined and interpreted by workshop students? The students in the study were minority and non-minority students enrolled in a first-year calculus course and also were a mathematics-based major. In comparison between workshop and non-workshop participating students, the workshop students earned higher mean grades in first-quarter Calculus, higher rate of persistence in a math/science/engineering major in college, higher mean grade in first two years of Calculus, and lower course attempt ratio in first-year Calculus (lower withdrawal and subsequent reenrollment). The data suggested that self-selection into the program was not a major variable in explaining the positive differences for the workshop participants. In addition, the data suggested the cost effectiveness of the workshop model by demonstrating the cost savings through lower numbers of students reenrolling in first-year calculus courses due to their initial academic success and progression through their required math course sequence.

Bonsangue, M. V. (1993). The effects of calculus workshop groups on minority achievement and persistence in mathematics, science, and engineering [Dissertation, The Claremont Graduate University, 1992]. *Dissertation Abstracts International, 53*(09), 3132.

The following is a dissertation study from The Claremont Graduate University. Among the most successful academic intervention programs has been the calculus workshop model developed for African-American students at the University of California, Berkeley, by Uri Treisman. The present research represents the first longitudinal investigation of the effects of workshop participation upon persistence and achievement of underrepresented minority students enrolled in mathematics, science, and engineering majors. Based on the Academic Excellence Workshop Program at California Polytechnic State University, Pomona, 133 workshop and 187 non-workshop minority students, including 86 % of Latino ethnicity, were individually tracked throughout their academic careers over a period of five years. There were no statistically significant differences between workshop and non-workshop groups in pre-college academic measures, including SATV, SATM, HSGPA, and precalculus diagnostic test, suggesting no initial academic advantage by either group. Multiple linear path analysis was used to estimate the effects of workshop participation upon achievement and persistence. Within three years after entering the institution, forty percent of the non-workshop students had withdrawn or been academically dismissed from the institution, compared to five percent of the workshop students. Non-workshop students required an average of one full quarter more to complete their three-quarter calculus sequence due to course failure or withdrawal. Ninety-one percent of the workshop students still enrolled in mathematics, science, and engineering majors after three years had completed their mathematics requirement, compared to fifty-eight percent of the non-workshop students. Interviews with former workshop students indicated that participation in the workshop sessions was of critical importance in adapting to and attaining the level of performance required in their technical courses, as well as building peer communities within their subsequent upper-division courses. Moreover, University fiscal data indicated that the cost of the calculus workshop program was less than the institutional or state costs of course-repeating for the non-workshop students. This study demonstrates that an intervention program promoting academic excellence and peer interaction in academic contexts can directly affect student performance in technical majors independently of pre-intervention cognitive factors. The data strongly suggest that achievement among underrepresented minority students in mathematics, science, and engineering disciplines may be less associated with pre-college ability than with in-college academic experiences and expectations.

Bonsangue, M. V. (1994). An efficacy study of the calculus workshop model. In E. Dubinsky, A. H. Schoenfeld, & J. Kaput (Eds.), *Research in collegiate mathematics education I* (pp. 117-137). Providence, RI: American Mathematical Society.
This chapter provides an in depth investigation of the Emerging Scholars Program (ESP). Three questions were studied: are there effects on academic performance of students beyond the first year when they are ESP participants; does the ESP program only enroll the best students who would have done well academically; and are the academic and social issues dealt with by the ESP approach important not only for the target population of underrepresented students in the sciences, but actually good pedagogy for all students. In addition to the study, a comprehensive literature review, ESP description, and theoretical basis for ESP is provided. While the self-selection bias issue was an intervening variable that had an impact on program effectiveness, it appears that ESP contributed to higher achievement for the participating students. The

results were less clear for the impact on future academic terms. A cost-benefit analysis suggested that ESP reduced dropouts and reenrollment in courses due to poor marks. Both results contributed to lower costs to the institution and made the program cost neutral if not a cost saver.

Bonsangue, M. V. (1990). *Long-term effects of the Calculus Workshop model*. Unpublished manuscript, California State University, Fullerton.
This report describes the Calculus Workshop Model, also known as the Emerging Scholars Program (ESP), and displays several research studies conducted concerning a set of research questions. The three questions were: are there effects on academic performance past the first year of college when ESP was available? Does the ESP program merely "skim" the best students or does program participation affect achievement in the course? Are the types of academic and social issues addressed by the ESP program relevant only for underrepresented minority students, or for non-majority students as well? After providing a program description and theoretical underpinning to the model, the paper presents several research studies focused on the previously described research questions. The students in the study were minority and non-minority students enrolled in a first-year calculus course and also were a mathematics-based major at the College of Engineering or the College of Science at California Polytechnic State University, Pomona (also known as Cal Poly). In comparison between ESP and non-ESP participating students, the ESP students earned higher mean grades in first-quarter Calculus, higher rate of persistence in a math/science/engineering major in college, higher mean grade in first two years of Calculus, and lower course attempt ratio in first-year Calculus (lower withdrawal and subsequent reenrollment). The data suggested that self-selection into the program was not a major variable in explaining the positive differences for the ESP participants. In addition, the data suggested the effectiveness of the ESP model for improving academic achievement of female students who are underrepresented in the area of math/science/engineering.

Bonsangue, M. V., & Drew, D. E. (1995). Increasing minority students' success in calculus. In J. Gainen, & E. W. Willemsen (Eds.), *Increasing student success in quantitative gateway courses,* (pp. 23-33). New Direction for Teaching and Learning, No. 61. San Francisco: Jossey-Bass.
The Emerging Scholars Program (ESP), called the Academic Excellence Workshop at California State Polytechnic University-Ponoma, has supported higher academic outcomes in academic achievement and persistence for nontraditional students in science, math, and engineering majors. The study focused on students enrolled in college calculus which serves as a gatekeeper course for these majors. Higher outcomes were reported for women and Latinos who participated in the program. Procedures for conducting the ESP are also shared. An analysis of the cost effectiveness of the program is documented.

Bonsangue, M. V., & Drew, D. E. (1990). *Long-term effects of the Calculus Workshop model*. Unpublished manuscript, California State University, Fullerton.
This report describes the Academic Excellence Workshop Program, also known as the Emerging Scholars Program (ESP) at California Polytechnic State University (Cal Poly),

Ponoma. A research study investigated four questions: What effect did the workshop have on achievement and persistence of workshop students in first quarter calculus? What effect did the workshop have on achievement and persistence of workshop students in subsequent calculus courses? What effect did the workshop have on achievement and persistence of workshop students within their mathematics-based majors? What socio-academic effects did the workshop experience have as defined and interpreted by workshop students? The students in the study were minority and non-minority students enrolled in a first-year calculus course and also were a mathematics-based major. In comparison between workshop and non-workshop participating students, the workshop students earned higher mean grades in first-quarter Calculus, higher rate of persistence in a math/science/engineering major in college, higher mean grade in first two years of Calculus, and lower course attempt ratio in first-year Calculus (lower withdrawal and subsequent reenrollment). The data suggested that self-selection into the program was not a major variable in explaining the positive differences for the workshop participants. In addition, the data suggested the cost effectiveness of the workshop model by demonstrating the cost savings through lower numbers of students reenrolling in first-year calculus courses due to their initial academic success and progression through their required math course sequence.

Born, W. K., Revelle, W., & Pinto, L. H. (2002). Improving biology performance with workshop groups. *Journal of Science Education and Technology, 11*(4), 347-365.
This article describes a two-year quasi-experimental study of the effect of a program similar to Emerging Scholars Program (ESP) on both minority and majority students enrolled in an undergraduate biology course. Outcomes from the study include: participants outperformed their nonparticipant counterparts, interest in biology was increased, and a reduction of anxiety. An extensive review of the professional literature identifies factors that may have a negative impact upon minority students including stereotype threat. Included with the data analysis is an investigation of the potential impact of student motivation for both participation and performance.

Born, W. K. (2001). The effect of workshop groups on achievement goals and performance in biology: An outcome evaluation [Dissertation, Northwestern University, 2000]. *Dissertation Abstracts International, 61*(11), 6184.
This two-year quasi-experiment contained in a dissertation study from Northwestern University evaluated the effect of peer-led workshop groups on performance of minority and majority undergraduate biology students in a three-course series and investigated motivational explanations for performance differences. The workshop intervention used was modeled after a program pioneered by Treisman (1992) at the University of California. Majority volunteers randomly assigned to workshops (n = 61) performed between ½ and 1 standard deviation better than those assigned to the control group (n = 60; p <.05) in each quarter without spending more time studying. During Quarter 1, workshop minority students (n = 25) showed a pattern of increasing exam performance in comparison to historic control minority students (n = 21), who showed a decreasing pattern (p <.05). Although sex differences in biology performance were a focus of investigation, none were detected. Motivational predictions derived from the hierarchical model of approach and avoidance achievement motivation (Elliot & Church, 1997) were partially supported. Self-report survey measures of achievement goals, modeled

after those used by Elliot and colleagues, were requested from all enrolled students. Volunteers (n = 121) reported higher average levels of approach and avoidance goals than nonvolunteers (n = 439; p <.05) and the relationship of goals to performance was moderated by volunteer status. Performance of volunteers was negatively related to avoidance of failure goals ® = .41, <p <.01) and unrelated to performance approach goals. Performance of nonvolunteers was unrelated to avoidance of failure goals and positively related to performance approach goals ® = .28, p <.01). Mastery goals were unrelated to performance for all students. Results were inconsistent with Dweck and Leggett's (1988) theory of mastery vs. performance orientation, but were similar to results found by Elliot and colleagues. Contrary to hypotheses, motivational goals did not mediate performance for any group of students. Results suggest that challenge interventions can be highly beneficial for both majority and minority participants and that institutions can promote excellence by incorporating workshop programs like the one described here. These interventions have been shown to be more effective and cost less than remedial interventions.

Clubine, B. J. (1993). *An evaluation of the Emerging Scholars Program at the University of Texas at Austin: A non-remedial approach to the advancement of minority students and women in mathematics*. Unpublished Master of Arts thesis, University of Texas at Austin.
This MA thesis evaluates the Emerging Scholars Program (ESP) at the University of Texas at Austin. ESP was evaluated in the School of Natural Sciences concerning student involvement in the 1990-91 academic year. The program was found helpful in increasing academic success of historically underrepresented students of color and females in mathematics. Five questions were examined: how do students perceive and respond to the experience of ESP; how does the ESP fit into students' overall experience at the large university; what kinds of secondary school experiences are most instrumental in introducing minority and other students to mathematics and the natural sciences; what kinds of academic and other experiences confirm them in their choice of science and/or mathematics as an area of endeavor; and what kinds of academic and other experiences lead to their successful commitment to research in mathematics and the natural sciences as life-long careers.

Conciatore, J. (1990). From flunking to mastering calculus: Treisman's retention model proves to be "too good" on some campuses. *Black Issues in Higher Education, 6*(22), 5-6.
This short article describes the Emerging Scholars Program (ESP). The background for the development of ESP is provided through Treisman's observation and research of the study behaviors of students of color who were taking calculus courses. Rather than being offered as a "remedial" program, ESP is presented as an honors program. Some information is provided about the adoption and adaptation of ESP by 24 other colleges in the U.S.

Dancis, J. (1991). Group learning helps minority students excel at university. *Cooperative Learning, 12*(1), 26-27.
This article provides a short overview of the Emerging Scholars Program (ESP). ESP is an honors-type program that challenges students. Key elements in the ESP program are: small group learning; work on interesting hard problems; guidance and mentorship

from a faculty member; a comprehensive support system for the participating students; many opportunities to correct the homework problems without grading; peer discussion; requirement that students explain to one another how to understand and solve problems; and minor emphasis on study skills and memorization of facts.

Drew, D. E. (1996). *Aptitude revisited: Rethinking math and science education for America's next century*. Baltimore, MD: John Hopkins University Press. (ERIC Document Reproduction Service No. ED405207).
Chapter six of the book provides an overview to the Emerging Scholars Program (ESP) developed at the University of California, Berkeley.

Duncan, H., & Dick, T. (2000). Collaborative workshop and student academic performance in introductory college mathematics courses: A study of a Treisman model math excel program. *School Science and Mathematics, 100*(7), 365-373.
This article reports on the effectiveness of Math Excel, an implementation of the Emerging Scholars Program (ESP) at Oregon State University over five academic terms. Results suggest a significant effect on achievement favoring the Math Excel students (.671 grade points on a 4-point scale). After adjusting for prior mathematics achievement using linear regression with SAT-M as predictor, Math Excel groups grade averages were over half a grade point better than predicted (significant at the .001 level).

Epperson, J., & Treisman, P. U. (2001). *Collaborative learning* [Videorecording]. Arlington, TX: Academy of Distinguished Teachers, University of Texas at Arlington. Available by interlibrary loan from the University of Texas at Arlington.

Fullilove, R. E. (1986). *Sealing the leaks in the pipeline: Improving the performance and persistence of minority students in college*. Unpublished manuscript, University of California, Berkeley.
This report provides both an overview of the Emerging Scholars Program (ESP) as well as a research study evaluating its impact upon student outcomes. The initial part of the document provides an overview of the problems with academic success and persistence of students of color with academic majors in math, science, and engineering. Then the report provides an overview of ESP with some details concerning specific activities that occur within the program. The report then concludes with inclusion of several data tables from Uri Treisman's doctoral dissertation study on ESP. The data suggested that ESP participants earned higher grades, persisted longer both at the university as well as within their original SME academic major.

Fullilove, R. E., & Treisman, P. U. (1990). Mathematics achievement among African American undergraduates at the University of California, Berkeley: An evaluation of the Mathematics Workshop Program. *Journal of Negro Education, 59*(3), 63-78.
This article describes the Mathematics Workshop Program (MWP), sometimes also known on other campuses as the Emerging Scholars Program (ESP). Data from the program evaluation between 1978-1984 at the University of California, Berkeley suggested that the program has succeeded in promoting high levels of academic performance among African American mathematics students. To provide comparison

data, a baseline of student performance was established during the period of 1973 to 1977 before the ESP program was provided to students. The percentage of nonparticipants earning grades of D or below ranged from 33% to 41%. The participants ranged between 3% to 7% in comparison. The percentage of nonparticipants earning grades of B- or higher ranged from 10% to 28%. The participants ranged between 39% to 61%. The persistence and graduation rates favored the participants, 65% vs. 41%. The study took into account preentry attributes such as SAT scores on the verbal and mathematics subtests.

Ganter, S. L. (1991). Improving the achievement of minorities in mathematics: A formative evaluation of a community college program [Dissertation, University of California, Santa Barbara, 1990]. *Dissertation Abstracts International, 52*(05), 1673. The following is a dissertation study from the University of California, Santa Barbara. By 1980, the interest for improving mathematics education at the post-secondary level had become so great that a committee was formed by NSF to discover the needs of the mathematics community as seen by educators in the field. The results indicated that a lack of guidance in developing math courses has led to discontinuity and a general state of confusion for many math programs and for the students in them. The Professional Development Program (PDP) is one post-secondary program that has been developed and implemented across the country. This program was conceived by Uri Treisman at UC Berkeley in response to the low completion rate of Black students in freshman calculus. Treisman developed a workshop program that would provide peer support for minority students, as well as other students, in lower division undergraduate mathematics courses. Santa Barbara City College (SBCC), a two-year community college, implemented the workshops developed by Treisman during the 1989-90 school year in first semester pre-calculus. This study examined the initial implementation and effects of the SBCC program. The major goal was to examine the program's success in increasing the persistence and performance of students in mathematics. It also examined how well the program was implemented, since faulty implementation can jeopardize intended outcomes just as much as a faulty program design. In order to assess the degree to which the program was implemented, each student involved in the workshops was involved in a brief interview to obtain student impressions of the workshops. In addition, weekly observations of the workshop sessions were made and compared to the UC Berkeley workshops. To assess student performance, comparisons were made between workshop and non-workshop students. These comparisons could not be made through random assignment since students volunteered to participate in the workshops. Therefore, it was necessary to make comparisons that utilized matching, a within-subject design. The workshop effect on student performance was then obtained by comparing the student matches in five areas: attrition rates, attitudes toward math, course grades, scores on a posttest, and mathematical understanding as determined by individual interviews. Although the program appears to be successful at UC Berkeley, it was not true that this apparent success was easily transferable to a community college. The major difference in this new setting was that the program was working with an entirely different student population than would be found at most four-year institutions. Many students wanted to, and did, commit to the program only to find that the workshops were very difficult to attend on a regular basis because of job and family commitments. This greatly influenced the effectiveness of the program.

Garland, M. (1983). The Mathematics Workshop Model: An interview with Uri Treisman. *Journal of Developmental Education, 16*(3), 14-16, 18, 20, 22.
This articles provides an interview with Dr. Uri Treisman, creator of the Emerging Scholars Program (ESP) that was initially developed at the University of California, Berkeley. The interview topics include: background and history of the ESP program, core ideas that the program is based upon, structural impediments to success in the curriculum, other ESP programs in the U.S., and related issues.

Hildebrand, J. (1988 January). Math tutor finds strength in numbers. *Chicago Sun-Times*, Chicago, IL, p. 42.
This newspaper story provides some information about the Emerging Scholars Program (ESP). One of the features of the program is that it is not about surviving calculus, but excelling with the academic content material.

Hobby, B. (1993, January 25). Professors ease fear of math monster. *Austin American Statesman*, Austin, TX, p. A9.
This newspaper article describes the Emerging Scholars Program (ESP) implemented at Rice University. The article provides the rationale for the program and includes quotations from Uri Treisman, originator of ESP.

James, D. W., Jurich, S., & Estes, S. (2001). *Raising minority academic achievement: A compendium of education programs and practices*. Washington, D.C.: American Youth Policy Forum. Retrieved March 15, 2005, from http://www.doe.state.la.us/lde/uploads/3434.pdf
This report provides an overview of a wide variety of programs that have been effective for students of color in increasing their academic success in secondary and postsecondary education. The Emerging Scholars Program (ESP) is one of the featured programs with and overview and preliminary data studies included.

Johnson, S. D., & Fischbach, R. M. (1992). *Teaching problem solving and technical mathematics through cognitive apprenticeship at the community college level*. (ERIC Document Reproduction Service No. ED352455).
This report describes a program called "Cognitive Apprenticeship" that is partially based on the Emerging Scholars Program (ESP). The traditional format of mathematics instruction has not succeeded in providing the skills students need to work cooperatively to solve problems in industry. New models of instruction have been proposed to resolve this deficiency. Schoenfeld has used a technique that incorporates coaching, modeling, and fading strategies with college-level students. Treisman has improved minority student performance in calculus using a model based on collaborative problem solving. A hybrid model called cognitive apprenticeship merges the coaching-modeling-fading components of Schoenfeld's model and Treisman's collaborative workshop model to enable students to become better problem solvers while working together as members of a community of learners. Cognitive apprenticeship instruction was tested in community college industrial technology classes: two instructors each taught a traditional and an experimental technical mathematics class. Quantitative data from indicated students in the cognitive apprenticeship group scored slightly better than the control group on a problem-solving exam and the final exam, although not significantly.

The scores of the cognitive apprenticeship students on a standardized exam were slightly lower than the control group, but not significantly. Two recommendations were proposed based on the results of the study: first, to explore the model further after certain suggestions were incorporated and second, to test it in other math-based classes.

Kosciuk, S. (1997). *Impact of the Wisconsin Emerging Scholars first-semester calculus program on grades and retention from Fall 1993-1996*. Madison, WI: Unpublished manuscript, University of Wisconsin-Madison. Retrieved March 15, 2005, from http://homepages.cae.wisc.edu/~lead/oages/oroducts/wescalc.pdf
The Emerging Scholars Program (ESP) at the University of Wisconsin-Madison was evaluated between 1993 and 1996. The ESP was designed to increase the academic success of students enrolled in several first-semester calculus and persist at higher rates in science, math, engineering, or technology academic majors. The success rate was increased for participating students.

Leapard, B. B. (2001). Affective, metacognitive, and conceptual effects of an Emerging Scholars program on elementary teacher preparation: An application of the Treisman workshop model [Dissertation, The University of Toledo, 2000]. *Dissertation Abstracts International, 61*(10), 3958.
This study addresses the problem of preservice elementary mathematics teaching preparation. It analyzes the effects of an Emerging Scholars program utilizing the Treisman model. The basic principles of this model include the reconceptualization of mathematical ideas for the under-prepared mathematics student and the emphasis on the social aspect inherent in learning mathematical concepts. The study involves an elementary mathematics content course that was constructivist in nature and which emphasized the tenets of the NCTM Standards Qualitative measures included in the study are student interviews, mathematical autobiographies and classroom observations. Quantitative measures consist of surveys on metacognition and mathematics anxiety and concept maps. Data concerning affective, metacognitive, and conceptual changes was analyzed both qualitatively and quantitatively. Results indicate an increase in metacognitive skills, measured both qualitatively and quantitatively and a decrease in mathematics anxiety levels measured qualitatively. Effects of the program on conceptual understanding are inconclusive. However, a significant increase in the preservice teachers' level of self-confidence in teaching is noted. The Emerging Scholars program appears to have a positive effect on preservice elementary teachers when considering affective and metacognitive attributes related to mathematics but appears to have a neutral effect on the reconceptualization of mathematical ideas. Improvement in affective variables related to teaching elementary mathematics are the most significant effects of the program.

Leggett, J. M. (1998). Linked case studies of the dissemination of the Emerging Scholars Programs in three community colleges [Dissertation, The University of Texas at Austin, 1997]. *Dissertation Abstracts International, 59*(01), 1998.
This dissertation study examined the dissemination attempts of three community colleges in adapting an Emerging Scholars Program (ESP) on their campuses. Using linked case studies, the study focused on the description of the role of faculty and

administrators in implementing the Emerging Scholars Program. Of key significance was the perceived need for the ESP, the problem to be addressed, the combined effort used within the institution to adapt the program, how dissemination occurred, and the results obtained. The Emerging Scholars Program evolved from the work of Dr. Philip Uri Treisman, a University of California at Berkeley mathematician, who was intrigued by the success of Asian American students and the lack of success of African American students in freshman calculus. Treisman's study led to the development of a set of strategies and a framework for addressing the persistent under-performance of African American, Hispanic, and Native American students in introductory collegiate mathematics courses. The ESP is an academic excellence program with six characteristic elements. The Emerging Scholars Program focuses on students' strengths rather than their weaknesses. The existence of several well-established Emerging Scholars Programs at four-year institutions has permitted numerous studies on the program. In community colleges, however, the Emerging Scholars Program is still in its infancy, and additional research is needed. The dissemination of the ESP has evolved from a grass roots effort conducted by the Charles A. Dana Center at the University of California at Berkeley to its current broad dissemination through building connections among mathematicians to encourage underrepresented minority students to seek careers in mathematics. A major finding of this study of the dissemination of the ESP in three community colleges is that underrepresented minority and other students who participated in ESP workshops successfully completed courses in mathematics and the sciences consistently at a success rate up to a grade higher than non-ESP students. Other findings are: (1) the ESP model cannot be translated in its entirety across all sectors of higher education; (2) real creativity is needed to establish an ESP at a community college; (3) stable funding is key in establishing and institutionalizing an ESP; (4) institutional planning, evaluating, and customizing are required in establishing an Emerging Scholars Program; and (5) only a small number of students will be served.

MacGregor, J. (2000). Restructuring large classes to create communities of learners. In J. MacGregor, J. L. Cooper, K. A. Smith, & P. Robinson (Eds.), *Strategies for energizing large classes,* New Directions for Teaching and Learning, No. 81 (pp. 47-61). San Francisco: Jossey-Bass.
This article provides an overview of a variety of programs for providing peer collaborative learning groups either inside or outside the classroom. The Emerging Scholars Program (ESP) and Supplemental Instruction (SI) have several pages of text devoted to both of them providing a basic program overview and several citations to research studies that support their program claims of effectiveness for improved student outcomes.

Mason, K. I., Hrbowski, F. A., & Schmitt, C. L. (2000). African American college students excelling in the sciences: College and postcollege outcomes in the Meyerhoff Scholars Program. *Journal of Research in Science Teaching, 37*(7), 629-654.
This article describes the Meyerhoff Scholars Program at the University of Maryland, Baltimore County which was based on the Emerging Scholars Program (ESP). Outcomes for the participating students are higher grade point averages, higher rates of persistence in science and engineering degrees, and higher rates of admission to graduate schools than nonparticipating students. Critical factors cited by focus groups

with participating students included the following: program community, study groups, summer bridge program, financial support, program staff, research internships, and mentors.

McCreary, P. (1994). The Merit Workshop Program in calculus at the University of Illinois at Urbana-Champaign: Description of a successful intervention program for underrepresented groups in mathematics. In A. Solow (Ed.), *Preparing for a new calculus: Conference proceedings* (pp. 80-84). Washington, D.C.: National Academy Press, Mathematics Association of America.
This paper reports on Merit Workshop Program at the University of Illinois at Urbana-Champaign. This program is based on the Emerging Scholars Program (ESP). Program participants earn nearly a full letter grade higher final course grades in calculus than similar nonparticipants. The target population for service are historically underrepresented student populations in the sciences. Typical program activities are described.

Millar, S. B. (1996). *A community approach to learning calculus: Fostering success for underrepresented ethnic minorities in an Emerging Scholars Program*. Madison, WI: University of Wisconsin-Madison. (ERIC Document Reproduction Service No. ED408180).
This article contains an evaluation of the Emerging Scholars Program (ESP) regarding its utility regarding learning calculus. In addition to focusing on helping students from historically underrepresented populations to be academically successful, ESP also provides a learning community that addresses the problems of isolation and lack of support that nontradtional students may experience.

Millar, S. B., Alexander, B. B., Lewis. Heather A, & Levin, J. R. (1995). *Pilot Wisconsin Emerging Scholars Program*. Unpublished manuscript, The University of Wisconsin-Madison. (ERIC Document Reproduction Service No. ED408179).
This document provides the script for an audio-cassette that contains the final evaluation of the Wisconsin Emerging Scholars Program (ESP) for the year 1993-94. The evaluation report includes an executive summary, a discussion of the parameters of the evaluation including research questions and methods, implementation processes and outcomes for faculty and administrators, student learning processes and outcomes including those indicated by both qualitative and quantitative data; conclusions related to the use of the ESP program; and recommendations related to pedagogical issues, out-of-class issues, and implementation issues. Critical factors for ESP success included the student small group work, the careful construction of the problem worksheets, and the involvement of the faculty members.

Mills, S. R. (1999). Academic excellence workshops in chemistry and physics (Uri Treisman) [Dissertation, The Claremont Graduate University, 1999]. *Dissertation Abstracts International, 60*(06), 1968.
In the mid-1970's, Uri Treisman, at the University of California, Berkeley, developed an academic excellence workshop program that had important successes in increasing minority student achievement and persistence in calculus. The present dissertation research is an in-depth study of chemistry and physics workshops at the California

State Polytechnic University, Pomona. Data for the first, longitudinal component of this study were obtained by tracking to Spring 1998 all workshop minority students, i.e., Latino, African American, and Native American workshop students, a random sample of non-workshop minority students, and a random sample of non-targeted students, i.e., Anglo and Asian students, enrolled in first-quarter General Chemistry or Physics during specific quarters of 1992 or 1993. Data for the second component were obtained by administering questionnaires, conducting interviews, and observing science students during Fall, 1996. Workshop participation was a significant predictor of first-quarter course grade for minority students in both chemistry and physics, while verbal and mathematics Scholastic Aptitude Test (SAT) scores were not significant predictors of beginning course grade for minority science students. The lack of predictive ability of the SAT and the importance of workshop participation in minority students' beginning science course performance are results with important implications for educators and students. In comparing pre-college achievement measures for workshop and non-targeted students, non-targeted students' mathematics SAT scores were significantly higher than chemistry and physics workshop students' scores. Nonetheless, workshop participation leveled the field as workshop and non-targeted students performed similarly in beginning science courses. Positive impacts of workshop participation on achievement, persistence, efficiency, social integration, and self-confidence support the continued and expanded funding of workshop programs. This research also studied how gender and ethnicity affect attitudes, achievement, and persistence in science courses and mathematics-based majors. College-level females, both minority and non-minority, in science showed no differences from males or were in fact more positive about science than males. However, in interviews, minority females expressed concerns about gender and believed gender to be more important in their science experiences than ethnicity. This research suggests intervention programs to increase the number of females in the science- and technology-based job pipeline can be successful.

Moreno, S. E. (2000). *Keeping the door open: Latino and African American friendships as a resource for University mathematics achievement*. Unpublished doctoral dissertation, University of Texas at Austin, Austin, TX.
The Emerging Scholars Program (ESP) is a critical factors in the academic success of historically underrepresented student populations in mathematics courses. This dissertation study delves into the critical factors that help explain the utility of ESP for supporting higher student achievement. The focus for the study is with students enrolled in a calculus course. The friendships and relationships among students are analyzed for their potential impact on encouraging higher student achievement. Results suggest that students who form strong bonds with fellow students within the ESP program are more likely to earn higher grades. An additional layer of analysis also takes into account cultural factors related to the students racial background for the importance of friendship bonds.

Moreno, S. E., & Muller, C. (1999). Success and diversity: The transition through first-year calculus in the university. *American Journal of Education, 108*(1), 30-57.
This article analyzes the influence of calculus performance on choosing a mathematics, science, or engineering major, noting the role of diverse students' participation in the Emerging Scholars Program (ESP) at the University of Texas-Austin. Findings suggest

that ESP students earn higher calculus grades than other students and are more likely to enroll in second-semester calculus. While targeted for African-Americans, Latinos, and females, the ESP program is open to all students.

Moreno, S. E., Muller, C., Asera, R., Wyatt, L., & Epperson, J. (1999). Supporting minority mathematics achievement: The Emerging Scholars Program at The University of Texas at Austin. *Journal of Women and Minorities in Science and Engineering, 5*(1), 53-66.
The Emerging Scholars Program (ESP) at the University of Texas at Austin works to improve the academic achievement of minorities and women in calculus, though it is open to all students. Research studies suggest that ESP students are more likely to earn A or B grades in calculus and pass the next course in the academic sequence than non-participants. Six elements of ESP include: increased class time on task; more personal interaction with peers, graduate students, and faculty; fostering of a student community that is supportive; explores more challenging aspects of mathematics; provides academic advising; and allows students to concentrate on and excel in a smaller number of challenging classes since they receive academic credit for participation in the ESP program.

Murphy, T. J. (1886). College mathematics instruction in transition: A study of reform in a college algebra course for 'at-risk' students [Dissertation, University of Illinois at Urbana-Champaign, 1995]. *Dissertation Abstracts International, 56*(09), 3491.
This dissertation study investigates the Emerging Scholars Program. Historically, students from academically disadvantaged and minority populations have experienced disproportionately high dropout and failure rates in college mathematics. These students often place into courses considered remedial at the college level. The current national reform movement includes initiatives designed to address the failure of mathematics education to meet the needs of underrepresented populations. This research examined an effort to make a college algebra course more effective for 'at-risk' students, admitted to a research university through an academic support program. In particular, the study analyzed the extent of reform in this course and the impact of the course on student outcomes, and identified barriers and enhancers to implementing reform in this context. The reform efforts included employing active learning and student collaboration strategies and attempting to create a 'Treisman-style' workshop environment. These strategies challenge instructors to check their impulse to show and tell, and instead, to facilitate and coach; correspondingly, instructors design challenging activities that differ from the standard manipulation exercises often found in textbooks. This study followed an instructor through her first semester of attempting to implement these strategies. A combination of retrospective and prospective data was utilized. Admissions and transcript records enabled the calculation of background characteristics (demographic and academic) and persistence rates (university retention and course and career paths). Prospective data included classroom observations, instructor and researcher journals, a diagnostic pre- and posttest, and student interviews. The results indicated that (a) the academic support program provided a supportive, inclusive environment for both students and instructor; (b) the course employed active learning and student collaboration, but the content presented remained at lower cognitive levels; (c) the instructor experienced frustration in trying to balance content coverage with

student involvement, in learning to release control to the students, and in discarding traditional notions of remediation; and (d) the treatment did not adversely affect student skills or attitude, and in some cases the course enabled students to pursue their chosen fields. Recommendations include upgrading the cognitive level of the course content, providing instructor development opportunities, and--most importantly--strengthening partnerships between the units involved (program, department, and instructor) in the conduct of the course.

Murphy, T. J., Stafford, K. L., & McCreary, P. (1998). Subsequent course and degree paths of students in a Treisman-style workshop calculus program. *Journal of Women and Minorities in Science and Engineering, 4*(4), 381-396.
The Merit Workshop Calculus Program, based on the Emerging Scholars Program (ESP), was created in 1989 to increase success rates of students from underrepresented populations in mathematics- and science-based academic majors at the University of Illinois, Urbana Champaign. The research study investigated academic performance in first-semester calculus courses, academic performance in courses that require first-semester calculus as a prerequisite, and persistence at the university. Analysis included gender and ethnicity. Positive results were reported for females, African-Americans, Caucasian, and Hispanic students. Dramatic results were reported for females and Hispanics.

Nelson, C. E. (1996). Student diversity requires different approaches to college teaching, even in math and science. *American Behavioral Scientist, 40*(2), 165-175.
The author argues that traditional teaching pedagogies are biased against many non-traditional student populations. Among the changes in the learning environment recommended by the author is the Emerging Scholars Program (ESP). The short description of ESP includes a discussion about the importance of changing the social system for the historically underrepresented students to succeed at the institution. Careful distinction is drawn between traditional recitation sessions which often evoke passive student involvement and structured sessions in ESP where students are highly participatory in the learning process.

Raspberry, W. (1999, February 8). Mechanics of a 'miracle'. *The Washington Post*, Washington, D.C., p. A19.
This newspaper article describes the Emerging Scholars Program (ESP) and its historical origins.

Staff writer. (1995, August 6). Emerging Scholars Program produces success: Students seeking to improve grades get support, guidance. *Syracuse Herald American*, Syracuse, NY, p. C1.
This newspaper article describes the use of the Emerging Scholars Program (ESP) at the State University of New York-Morrisville to improve student success in math courses by historically underrepresented students.

Staff writer. (1999). So much for the theory that Blacks can’t do mathematics. *The Journal of Blacks in Higher Education,* (25), 48-49.
This article provides the rationale for the Emerging Scholars Program (ESP). It provides

an interview with Dr. Treisman who originated the ESP approach to increasing the success of Blacks and other historically underrepresented populations in math courses. A summary of the success of ESP at the University of California-Berkeley is provided.

Treisman, P. U. (1990). Improving academic performance in mathematics. In *The freshman year in science and engineering: Old problems, new perspectives for research universities* Ann Arbor, MI: (ERIC Document Reproduction Service No. ED352249).
This chapter provides a short overview to the Emerging Scholars Program (ESP) developed at the University of California, Berkeley.

Treisman, P. U. (1983). Improving the performance of minority students in college-level mathematics. *Innovation Abstracts, 5*(17). (ERIC Document Reproduction Service No. ED234874).
This article provides an overview to the Emerging Scholars Program (ESP) developed at the University of California, Berkeley. ESP has five functions: Building a community of minority freshmen that is academically oriented and a source of peer support; Providing minority students with an extensive orientation to the University, and with ongoing academic advising; Monitoring of student academic progress and their adjustment to the University environment, and advocating students; collective and individual interests; Providing minority freshmen with ongoing supplementary instruction in reading the technical language of mathematics; and linking high school-level and undergraduate-level affirmative action efforts.

Treisman, P. U. (1989, March). Mathematics workshop revamped. *UME Trends,* 8-9.
This short article describes the Emerging Scholars Program (ESP) and how it has been redesigned to meet current needs of students. Changes in ESP included permitting non minority students to participate, increasing the frequency of the workshops meetings from two to five times weekly, and the use of teaching assistants to facilitate the sessions. These changes were made in response to the need to produce more math, science, and engineering students.

Treisman, P. U. (1985). A model academic support system. In R. B. Landis (Ed.), *Improving the retention and graduation of minorities in engineering handbook* . (ERIC Document Reproduction Service No. ED259042).
This chapter provides an overview to the Emerging Scholars Program (ESP) developed at the University of California, Berkeley. The program has four objectives: build a community of minority freshmen that focuses on achieving academic excellence and that becomes a source of peer support; provide extensive, year-long supplementary instruction for minority students; orient minority students to the university and to assist their adjustment, where necessary, to advocate their collective and individual interests; and monitor the students' academic progress and to furnish ongoing academic advising. The mechanics of establishing the program, recruiting students, training facilitators, and monitoring the workshop activities is provided. The chapter concludes with several data studies concerning academic achievement of the Chicano and African-American students. A sample worksheet is provided in the appendix.

Treisman, P. U. (1986). A study of the mathematics performance of Black students at the University of California, Berkeley [Dissertation, University of California, Berkeley, 1985]. *Dissertation Abstracts International, 47*(05), 1641.
The following is a dissertation study from the University of California, Berkeley. Freshman mathematics courses have all-too-often been a burial ground for the aspirations of many minority students who have entered college with the goal of majoring in some area of engineering, medicine, or natural or mathematical science. The Professional Development Program (PDP) Mathematics Workshop, a project of the U.C. Berkeley faculty, challenges remedial approaches to assisting such students and provides instead a novel honors program promoting academic excellence and the development of leadership skills. Specifically, students obtain instruction, sympathetic and knowledgeable academic and personal counseling, intensive study experience in a peer group, and aid in threading the bureaucratic maze. Since its inception in 1978, the Workshop has had a dramatic effect both on minority students' performance in mathematics and on their persistence in the University. Chapter I of this dissertation describes the development of the PDP Workshop Program and explains the author's assumptions and methods. The status of black students in University mathematics courses is analyzed; their isolated studying behavior is contrasted with the collective studying of identified groups of successful students. Additional barriers to blacks' success in mathematics courses are enumerated. A pilot project, conducted in 1977-78 and involving both academic and non-academic support for a small number of black students is described. Chapter II describes the PDP mathematics Workshop. It details the Workshop's basic elements: a focus on excellence rather than on avoiding failure, an emphasis on collaborative learning, and faculty sponsorship. The recruitment and orientation procedures and instructional strategies employed during the Workshop sessions are described. Chapter III describes the extent to which the Workshop program has met its goals. It concludes that the average Math 1A grade earned by black Workshop participants is consistently above one full grade higher than that earned by black students who did not participate in the program. Moreover, this finding holds true in comparisons involving the following categories of students: regular vs. special admits, Educational Opportunity Program (EOP) vs. non-EOP, College of Engineering vs. others, males vs. females, and low vs. medium vs. high mathematics Scholastic Aptitude Test scores. Other evidence of the program's success includes elevated rates of graduation from the University, and graduation with a math-based degree.

Treisman, P. U. (1992). Studying students studying calculus: A look at the lives of minority mathematics students in college. *College Mathematics Journal, 23*(5), 362-372.
This article describes a project that addresses the problem of the failure of African-America and Hispanic students in calculus. The proposed solution is offering students of color a combination of workshops with intensified sections of the calculus course that challenges the students. The author reviews the history of the Emerging Scholars Program (ESP) developed at the University of California, Berkeley. The early part of the article describes his findings that led to creation of ESP: many Black and Latino students desired to major in math and science but few completed their introductory courses; prevailing ideas about why minority students failed were inaccurate; affirmative action programs were not producing math and science majors; and many minority students did not use the academic services designed to serve them. As a result of the

author's research, the ESP program was crafted to meet the needs of minority math and science students. Rather than trying to change students, the author concluded that it was the institution that needed to make significant changes in the learning environment.

Walker, D. R. (2003). Combating isolation, enhancing success: Emerging Scholars Program in chemistry. *Abstracts of Conference Papers for the 226th American Chemical Society National Meeting* (p. CHED-240). Washington, D.C.: American Chemical Society. For more information, contact the author at the Chemistry Department and Biochemistry, The University of Texas at Austin, A5300, Austin, TX 78712, drwalker@austin.cc.tx.us.
The Emerging Scholars Program (ESP) was implemented with an introductory chemistry course at the University of Texas at Austin. The paper discusses positive student outcomes as well as program implementation challenges.
Watkins, B. T. (1989, June 14). Many campuses now challenging minority students to excel in math and science. *Chronicle of Higher Education, 35*(40), A13, 16-17
This newspaper story describes the adoption of the Emerging Scholars Program (ESP) at other institutions to increase the academic achievement of students of color enrolled in math and science courses. It provides a short history of the development of ESP by Uri Treisman at the University of California, Berkeley.

Wheeler, D. L. (1992, June 17). Teaching calculus to minority students helps them stay in college. *Chronicle of Higher Education,* A15.
This short account about the Emerging Scholars Program (ESP) describes its impact upon student persistence. It was estimated that 125 colleges have implemented some form of ESP to improve academic achievement of students.

Peer-Led Team Learning (PLTL)

Peer-Led Team Learning (PLTL) is an innovative model in science education. PLTL was originally developed at the City University of New York in the mid 1990s. Support through a grant from the National Science Foundation has assisted in the model being adopted by more than 100 institutions. Student-leaders (peers) guide the activities of small groups of students in weekly Workshop meetings. The students work through challenging problems that are designed to be solved cooperatively. The peer leaders are trained to ensure that the students are actively and productively engaged with the material and with each other. This methodology offers a number of educational opportunities: the supportive format encourages questions and discussions that lead to conceptual understanding; students learn to work in teams and to communicate more effectively; peer leaders learn teaching and group management skills.

Adamczeski, M., & Fuller, H. (2001). Peer-led Team Learning as a method to improve student attitudes and perceptions in science. *Abstracts of Conference Papers for the 221st American Chemical Society National Meeting* (p. CHED-980). Washington, D.C.: American Chemical Society. For more information, contact the authors at the Department of Math and Science, San Jose City College, 2100 Moorpark Avenue, San Jose, CA 95128, madeline.adamczeski@sjeccd.cc.ca.us.
Peer-led Team Learning (PLTL) is used at San Jose City College (CA) in chemistry courses. PLTL is offered as a separate one credit pass/no pass course. Several research studies have been conducted with the program: impact with student peer facilitators, grade achievement by student participants.

Adamczeski, M., Ibrahim, S., Santos, P., Castille, A., Kreig, M., Ly, H., Ramirez, J., & Tran, L. (2004). Peer-led Team Learning: Implementation into the first and second semester of general, organic, and biological chemistry curriculum at San Jose City College. *Abstracts of Conference Papers for the 227th American Chemical Society National Meeting* (p. CHED-38). Washington, D.C.: American Chemical Society. For more information, contact the authors at the Department of Math and Science, San Jose City College, 2100 Moorpark Ave., San Jose, CA 95128, madeline.adamczeski@sjcc.edu.
Peer-led Team Learning (PLTL) was used in introductory courses in general, organic, and biological chemistry courses at San Jose City College. Research studies suggest higher student grades, higher levels of persistence,.

Aponie, Y., Castro, L., Naldik, Y., Melendex, D., & Feliu, L. (2002). Organic chem-e-chem, a Peer-led Team Learning mentoring/tutoring program in organic chemistry at Universidad Metropolitana. *Abstracts of Conference Papers for the 223rd American Chemical Society National Meeting* (p. CHED-635). Washington, D.C.: American Chemical Society. For more information, contact the authors at the Department of Science and Technology, Metropolitan University, P.O. Box 21150, San Juan, PR 00928.
Peer-led Team Learning (PLTL) has been used at the Metropolitan University of Puerto Rico to support higher student achievement in introductory chemistry courses. The institutional name for the program is Chem-2-Chem. Participating students earn higher rates of quality grades (A, B, C) and lower rates of D, F, or withdrawals. Both participants and student peer leaders report improved morale and self-esteem.

Arendale, D. (2004). Pathways of persistence: A review of postsecondary peer cooperative learning programs. In I. M. Duranczyk, J. L. Higbee, & D. B. Lundell (Eds.), *Best practices for access and retention in higher education* (pp. 27-42). Minneapolis, MN: Center for Research on Developmental Education, General College, University of Minnesota. Retrieved March 15, 2005, from http://www.gen.umn.edu/research/crdeul/monographs.htm
This chapter focused intentionally on a subset of the educational practice that share a common focus with increasing student persistence towards graduation. Rather than a meta-analysis of all published research studies, this chapter is a preliminary review and a description of six models. At the end of the chapter several suggestions are made for differentiating the models from each other and the level of institutional resources and resolve with implementing them. The six student peer learning programs included in this chapter meet the following characteristics: (a) the program must have been implemented at the postsecondary or tertiary level, (b) the program has a clear set of systematic procedures for its implementation at an institution, (c) program evaluation studies have been conducted and are available for review, (d) the program intentionally embeds learning strategy practice along with review of the academic content material, (e) the program outcomes include both increased content knowledge with higher persistence rates, and (f) the program has been replicated at another institution with similar positive student outcomes. From a review of the professional literature six programs emerged: Accelerated Learning Groups (ALGs), Emerging Scholars Program (ESP), Peer-Led Team Learning (PLTL), Structured Learning Assistance (SLA), Supplemental Instruction (SI), and Video-based Supplemental Instruction (VSI). As will be described in the following narrative, some of the programs share common history and seek to improve upon previous practices. Other programs were developed independently.

Baez, R., & Restro, W. (2002). Is E.Q. a factor in the success of chem-2-chem Peer-Led Team Learning? *Abstracts of Conference Papers for the 223rd American Chemical Society National Meeting* (p. CHED-1246). Washington, D.C.: American Chemical Society. For more information, contact the authors at the Department of Chemistry, University of Puerto Rico at Cayey, Ave. Antonio Barcelo, Cayey, PR 00736, rbaez99@hotmail.com
Peer-led Team Learning (PLTL) has been used at the University of Puerto Rico to support higher student achievement in introductory chemistry courses. A study was conducted with the PLTL program regarding the impact of the emotional quotient (E.Q.) as a determining part of why PLTL is successful.

Bauer, C. F., Rickert, K. A., & Langdon, L. B. (2004). Peer-Led Team Learning at the University of New Hampshire: Contrasts in student achievement, self-concept, attitudes, and implementations. *Abstracts of Conference Papers for the 227th American Chemical Society National Meeting* (p. CHED-18). Washington, D.C.: American Chemical Society. For more information, contact the authors at the Department of Chemistry, University of New Hampshire, Durham, NH 03824, cfb@christa.unh.edu.
Peer-led Team Learning (PLTL) was used in a general chemistry course at the University of New Hampshire since 2000. Data has been collected on students

concerning what they learned, changes in self-concept attitudes, and social networks. Comparisons were made for student performance in a variety of instructional settings.

Becvar, J. E. (2004). Two plus two equals more: Making room for Peer-led Learning. *Abstracts of Conference Papers for the 227th American Chemical Society National Meeting* (p. CHED-20). Washington, D.C.: American Chemical Society. For more information, contact the author at the Department of Chemistry, University of Texas, El Paso, TX 79968, jvecvar@utep.edu.
Peer-led Team Learning (PLTL) was used in a general chemistry course at the University of Texas at El Paso. Due to problems with extending the credit hours for the course to incorporate the required PLTL attendance, the number of hours in lecture each week were reduced from three to two.

Becvar, J. E., Valdez, M., & Aimeida, V. (2003). Peer-led Team Learning: Explorations. *Abstracts of Conference Papers for the 225th American Chemical Society National Meeting* (p. CHED-49). Washington, D.C.: American Chemical Society. For more information, contact the authors at the Department of Chemistry, University of Texas El Paso, TX 79968, jbecvar@utep.edu.
The Peer-Led Team Learning (PLTL) program is used with the general chemistry courses for STEM majors at the University of Texas El Paso.

Burke, K. A., Greehbowe, T. J., & Gelder, J. L. (2004). The multi-initiative dissemination project workshops: Who attends them and how effective are they? *Journal of Chemical Education, 81*(8), 897-902
This article reviews several National Science Foundation dissemination grants, including Peer-Led Team Learning (PLTL) regarding their effectiveness in assisting other institutions to adopt transformative learning practices. The following areas were analyzed: participant demographics, training techniques, workshop goals, participant evaluations of the training workshops.

Butcher, D. J., Brandt, P. F., & Norgaard, C. J. (2003). Sparking IntroChem: A student-oriented introductory chemistry course. *Journal of Chemical Education, 80*(2), 137-139
At Western Carolina University (Cullowhee, North Carolina), the Peer-Led Team Learning (PLTL) approach was adopted for an introductory chemistry course to shift it from the traditional instructor-led model to a student-oriented model. PLTL was helpful not only for the students, but also the student instructors.

Cole, C. S., & Blake, B. (2003). Peer-led Team Learning: The student leader's perspective. *Abstracts of Conference Papers for the 225th American Chemical Society National Meeting* (p. CHED-285). Washington, D.C.: American Chemical Society. For more information, contact the author at the Department of Chemistry and Biochemistry, Texas Tech University, Lubbock, TX 79409, starcsc22@hotmail.com.
The Peer-Led Team Learning (PLTL) program is used with the general chemistry courses at Texas Tech University beginning in Fall 2002.The intent of the program is to improve grades of participating students and provide leadership development for the student PLTL peer facilitators. Peer leaders write a weekly journal entry to describe their experience with the program. This paper reports on the impact with the student leaders.

Cracolice, M. S. (2000). Constructivist models for teaching chemistry: Applying Vygotsky's theories to Peer-led Team Learning. *Abstracts of Conference Papers for the 219st American Chemical Society National Meeting* (p. CHED-154). Washington, D.C.: American Chemical Society. For more information, contact the author at the Department of Chemistry, University of Montana, Missoula, MT 59812, markc@selway.umt.edu.
Peer-led Team Learning (PLTL) is used at the University of Montana in chemistry courses. This paper explores Vygotsky's constructivist theories as they relate to the effective operation of PLTL.

Cracolice, M. S., & Deming, J. C. (2001). Peer-Led Team Learning. *The Science Teacher, 68*(1), 20-24.
This article provides an overview of Peer-Led Team Learning (PLTL) program . The six components of PLTL are discussed. A model is provided for scheduling of classroom activities to allow for integration of the PLTL program activities. The three biggest challenges to implementing PLTL cited by the authors were: finding peer leaders, training the leaders, and selecting appropriate materials for the PLTL sessions. Recommendations are provided to overcome these challenges in providing an effective program. Data comparisons between PLTL and non-participants are provided for six institutions that have implemented the program.

Cracolice, M. S., Deming, J. C., Taylor, B., & Jones, D. (2001). Adapting Peer-led Team Learning to high school chemistry. *Abstracts of Conference Papers for the 222nd American Chemical Society National Meeting* (p. CHED-27). Washington, D.C.: American Chemical Society. For more information, contact the authors at the Department of Chemistry, The University of Montana, 32 Campus Drive, Missoula, MT 59812, markc@selway.ymt.edu
Peer-led Team Learning (PLTL) has been used at institutions to support higher student achievement in chemistry courses. It has ben adapted for use at the high school level by heavy emphasis on interpreting experimental data.

Detchen, J. C., Hershberger, S. A. S., & Sarquis, J. L. (2004). PLTL research Explorations at Miami University. *Abstracts of Conference Papers for the 227th American Chemical Society National Meeting* (p. CHED-17). Washington, D.C.: American Chemical Society. For more information, contact the authors at the Department of Chemistry and Biochemistry, Miami University, 501 E. High Street, Oxford, OH 45056, detchenc@muohio.edu
Peer-led Team Learning (PLTL) was used in a general chemistry course at Miami University (OH). PLTL was first used in 1998. A research study compared the impact of PLTL and Supplemental Instruction on different sections of the same course. All students in the different sections took the same ACS Examinations Institute exam as a final exam and each section was administered the Group Assessment of Logical Thinking instrument (GALT), and were surveyed using the Student Assessment of Learning Gains (SALG) instrument.

Dill, D. (2004). Implementing PLTL in the quantum concepts semester of physical chemistry. *Abstracts of Conference Papers for the 227th American Chemical Society National Meeting* (p. CHED-35). Washington, D.C.: American Chemical Society. For

more information, contact the author at the Department of Chemistry, Boston University, 590 Commonwealth Avenue, Boston, MA 02215, dan@bu.edu
Peer-led Team Learning (PLTL) was used in a year-long physical chemistry course at Boston University. Changes reported included: time for course preparation, student discourse, use of regular class time, and student performance. Students appear to be more prepared for the course lectures due to PLTL sessions resulting in more sophisticated material being presented.

Dreyfus, A. E. (Ed.). (2003). *Internet Homepage of the Peer-Led Team Learning Program* [On-Line]. Retrieved July 1, 2004, from http://www.pltl.org and http://www.sci.ccny.cuny.edu/~chemwksp/index.html
This is the internet web page for the Peer-Led Team Learning (PLTL) Program originally developed at the City University of New York in the mid 1990s. Information and materials available through this website include: program overview, research studies, workshop training and conference schedule, available materials to purchase, grant program to assist with PLTL implementation, PLTL newsletter, calendar of upcoming events, contact information for PLTL program staff and persons from adopting institutions across the U.S., and other information resources. PLTL has been funded by the National Science Foundation to support its national dissemination.

Flintoff, N. L., Shoop, K., Sommers, B., Wittwer, J., & Cavinato, A. G. (2001). Peer-led Team Learning: Active learning strategies to support success in introductory chemistry courses. *Abstracts of Conference Papers for the 221st American Chemical Society National Meeting* (p. CHED-695). Washington, D.C.: American Chemical Society. For more information, contact the authors at the Department of Chemistry, Eastern Oregon University, One University Boulevard, La Grande, OR 97850, flinton@eon.edu.
Peer-led Team Learning (PLTL) is used at Eastern Oregon University in chemistry courses. PLTL is offered as a separate one credit pass/no pass course. Studies regarding student achievement have been conducted.

Gafney, L., & Varma-Nelson, P. (2003). Impact of being a peer-leader on undergraduate students. *Abstracts of Conference Papers for the 226th American Chemical Society National Meeting* (p. CHED-323). Washington, D.C.: American Chemical Society. For more information, contact the author at the PLTL Workshop Project, 147 Wells Hill Road, Lakeville, CT 06039, gafney@pop3.discovernet.net
The Peer-Led Team Learning (PLTL) is dependent upon the student peer facilitators who conduct the sessions. A survey of the effects of serving as a peer leader regarding personal mastery of chemistry concepts, impact on career and graduate education options, and interpersonal skill development.

Goodwin, J. A., & Barrett, J. (2002). Electronic workshops: Development of computer-based activities for Peer-led Team Learning in general chemistry. *Abstracts of Conference Papers for the 224th American Chemical Society National Meeting* (p. CHED-93). Washington, D.C.: American Chemical Society. For more information, contact the author at the Department of Chemistry and Physics, Coastal Carolina University, P.O. Box 261952, Conway, SC 29528, jgoodwin@coastal.edu.
Peer-led Team Learning (PLTL) has been used at the Coastal Carolina University (SC)

to support higher student achievement in introductory science courses. PLTL is supplemented with hybrid print and computer-based study materials. The program has been assessed through surveys, pre- and post-testing, and focus groups.

Gosser, D. K. (2003). Dynamics of peer-assisted active learning. *Abstracts of Conference Papers for the 226th American Chemical Society National Meeting* (p. CHED-237). Washington, D.C.: American Chemical Society. For more information, contact the author at the Chemistry Department, The City College of New York, 138th Street and Convent Ave., New York, NY 10031, gosser@sci.ccny.cuny.edu
Peer-Led Team Learning (PLTL) was used with introductory chemistry courses of the City College of New York. Data from the national study of PLTL as well as recommendations for successful implementation of the program are provided.

Gosser, D. K. (2003). *Peer-Led Team Learning: An introduction*. Unpublished manuscript, City University of New York. Retrieved July 1, 2004, from http://www.pltl.org and http://www.sci.ccny.cuny.edu/~chemwksp/PLTL.INTRO-rev.doc
This article provides an overview of the Peer-Led Team Learning (PLTL) program developed at the City University of New York. PLTL has been implemented at more than 100 institutions that seek to improve student achievement in science courses.

Gosser, D. K. (2004). Peer-led Team Learning: Development, dissemination, and research. *Abstracts of Conference Papers for the 228th American Chemical Society National Meeting* (p. CHED-212). Washington, D.C.: American Chemical Society. For more information, contact the author at the Chemistry Department, The City College of New York, 138th Street and Covent Ave., New York, NY 10031, gosser@sci.ccny.cuny.edu
Peer-led Team Learning (PLTL) was used with undergraduate chemistry students at the City College of New York. The paper focused on the origins of PLTL, national dissemination of the program, and research studies on PLTL.

Gosser, D. K. (1997). The workshop chemistry project: Developing a Peer-led Team Learning model for chemistry instructors. *Abstracts of Conference Papers for the 213th American Chemical Society National Meeting* (p. CHED-109). Washington, D.C.: American Chemical Society. For more information, contact the author at the Chemistry Department, The City College of New York, 138th Street and Covent Ave., New York, NY 10031, gosser@sci.ccny.cuny.edu
Peer-led Team Learning (PLTL) was used with undergraduate chemistry students at the City College of New York.

Gosser, D. K., Cracolice, M. S., Kampmeier, J. A., Roth, V., Strozak, V. S., & Varma-Nelson, P. (2000). *Peer-Led Team Learning: A guidebook*. Upper Saddle River, NJ: Prentice Hall.
This book provides strategies for implementing the Peer-Led Team Learning (PLTL) program by other educators. This book explains the theory behind PLTL, offers suggestions for successful implementation(including how to write effective group problems and how to train peer leaders), discusses how to evaluate the success of the program, and answers to frequently asked questions.

Gosser, D. K., Cracolice, M. S., & Strozak, V. S. (2000). *Peer-Led Team Learning, the workshop project: General chemistry*. Upper Saddle River, NJ: Prentice Hall.
This book provides strategies for implementing the Peer-Led Team Learning (PLTL) program by other educators in a general chemistry course. Each of the 24 units in the consumable workbook addresses a significant topic in chemistry by providing a short narrative summary, structured small-group learning activities, discussion questions, and self-test activities to monitor comprehension of the material.

Gosser, D. K., & Roth, V. (1998). The workshop chemistry project: Peer-Led Team Learning. *Journal of Chemical Education, 75*(2), 185-187.
This article provides an overview of Peer-Led Team Learning (PLTL) program . The program is supported through the National Science Foundation, Division of Undergraduate Education, Course and Curriculum Development Program, part 1. The project involves a new curriculum structure, a two-hour student-led workshop with six to eight students to replace the traditional recitation or a modest amount of lecture.

Gosser, D. K., Roth, V., Gafney, L., Kampmeier, J., Strozak, V., Varma-Nelson, P., Radel, S., & Weiner, M. (1996). Workshop chemistry: Overcoming the barriers to student success. *The Chemical Educator, 1*(1), Article 1.
This article provides an overview of Peer-led Team Learning (PLTL) as it is used in chemistry. A qualitative research study was conducted with PLTL sponsoring faculty members, PLTL student leaders, and PLTL participants. The results suggest positive gains in motivation and science knowledge by the participants. The PLTL leaders reported gains in communication and leadership skills. Sponsoring faculty members reported high satisfaction with the program since it improved scientific learning.

Hewlet, J. A. (2005). In search of synergy. *Journal of College Science Teaching, 33*(4), 28-31.
Peer-led Team Learning (PLTL) is used at Finger Lakes Community College in Canandagua, NY to improve student performance. An innovation was the merging of the Case Study Method (CSM) with PLTL which served as the learning environment in which to engage and interact with the rigorous academic content material. Participating students earned a higher percentage of C or higher grades (87%) vs. the nonparticipants (78%).

Hoffman, M. Z., & Crosby, A. D. (2004). Assessing Peer-led Team Learning in honors-level general chemistry. *Abstracts of Conference Papers for the 228th American Chemical Society National Meeting* (p. CHED-213). Washington, D.C.: American Chemical Society. For more information, contact the authors at the Department of Chemistry, Boston University, 590 Commonwealth Avenue, Boston, MA 02215, hoffman@chem.bu.edu
Peer-led Team Learning (PLTL) was used in an honors college at Boston University. Students provided feedback about PLTL through frequent survey forms and writing assignments. Students reported that the PLTL peer facilitators were more effective than traditional graduate assistants in learning the chemistry content material. Additional reported benefits included higher self confidence and deeper understanding of the role of a teacher.

Hoffman, M. Z., & Crosby, A. D. (2003). Getting general chemistry students to read, write, and speak. *Abstracts of Conference Papers for the 225th American Chemical Society National Meeting* (p. CHED-624). Washington, D.C.: American Chemical Society. For more information, contact the authors at the Department of Chemistry, Boston University, 590 Commonwealth Avenue, Boston, MA 02215, hoffman@chem.bu.edu
Peer-led Team Learning (PLTL) is part of a program to increase the competency of honors-level general chemistry students at Boston University. The sessions provide an environment for students to critically discuss and analyze chemistry concepts.

Hogan, P., Parks, C. X., & Ciotti, A. (2004). Early intervention with peer-led study groups for organic chemistry. *Abstracts of Conference Papers for the 227th American Chemical Society National Meeting* (p. CHED-41). Washington, D.C.: American Chemical Society. For more information, contact the authors at the Department of Chemistry, Suffolk University, 41 Temple Street, Boston, MA 02114.
Peer-led Team Learning (PLTL) was used in an organic chemistry course at Suffolk University (MA). Surveys of students suggest improvements in understanding of difficult course material.

Holladay, S. R. H. (2004). Analysis of PLTL leaders' reflections. *Abstracts of Conference Papers for the 227th American Chemical Society National Meeting* (p. CHED-19). Washington, D.C.: American Chemical Society. For more information, contact the author at the Department of Chemistry, Indiana University Purdue University Indianapolis, 402 N. Blackford St., Indianapolis, IN 46202, holladay@chem.lupui.edu
Peer-led Team Learning (PLTL) was used in a general chemistry course at Indiana University Purdue University Indianapolis. Data was collected from the student peer PLTL leaders through journal entries. The entries included responses to open-ended questions about group dynamics and other questions that allowed the student leaders to reflect about their experience. The study revealed changes in them due to the experience.

Hudson, C., Curtis, M., & Blake, R. E. (2001). Evaluation of the Peer-led Team Learning instructional model: Why does it work? *Abstracts of Conference Papers for the 221st American Chemical Society National Meeting* (p. CHED-680). Washington, D.C.: American Chemical Society. For more information, contact the authors at the Department of Chemistry, Indiana University Purdue University Indianapolis, 402 N. Blackford Street, Indianapolis, IN 46202, blake@chem.iupui.edu
Peer-led Team Learning (PLTL) is used at Indiana University Purdue University Indianapolis in chemistry courses. The critical factors associated with PLTL are explored.

Ibarra, R., & Raikar, A. (2004). Confronting misconceptions in physics using the Peer-led Team Learning format. *Abstracts of Conference Papers for the 227th American Chemical Society National Meeting* (p. CHED-37). Washington, D.C.: American Chemical Society. For more information, contact the authors at the Department of Math and Science, San Jose City College, 2100 Moorpark Ave., San Jose, CA 95128, rufino.ibarra@sjcc.edu

Peer-led Team Learning (PLTL) was used in a physics course at San Jose City College. Outcomes include increases in students thinking at higher levels both qualitatively and quantitatively.

Kampmeier, J. A. (2001). Peer-Led Team Learning. *Chemical Engineering News, 79*(41), 6

Kampmeier, J. A. (2003). *The scholarship of teaching*. Unpublished manuscript, City University of New York. Retrieved July 1, 2004, from http://www.pltl.org and http://www.sci.ccny.cuny.edu/~chemwksp/PLTL2003Leadership_Conf_Jack-1.doc
This article provides an overview of the Peer-Led Team Learning (PLTL) program developed at the City University of New York. The author describes the impact of the PLTL program upon teacher preparation of the student peer group facilitators.

Kampmeier, J. A. (2004). Using Peer-led Team Learning in organic chemistry. *Abstracts of Conference Papers for the 228th American Chemical Society National Meeting* (p. CHED-90). Washington, D.C.: American Chemical Society. For more information, contact the author at the Department of Chemistry, University of Rochester, Box 270216, University of Rochester, Rochester, NY 14627, kamp@chem.rochester.edu
Peer-led Team Learning (PLTL) was used in a year-long organic chemistry course at the University of Rochester. Program outcomes included higher student performance, higher attitudes towards chemistry, and improved faculty satisfaction.

Kampmeier, J. A., & Roth, V. (2004). Evolution and institutionalization of peer-led workshops: 1993-present. *Abstracts of Conference Papers for the 227th American Chemical Society National Meeting* (p. CHED-43). Washington, D.C.: American Chemical Society. For more information, contact the author at the Department of Chemistry, University of Rochester, Box 270216, University of Rochester, Rochester, NY 14627, kamp@chem.rochester.edu
Peer-led Team Learning (PLTL) was started in 1993 and since then has spread to more than 100 colleges. At the University of Rochester, nine faculty members in five departments supervise 125 trained PLTL student peer facilitators. This paper outlines critical steps for implementing and managing a PLTL program.

Kampmeier, J. A., Tien, L. T., & Roth, V. (2003). Peer leader training: A model for preparing future faculty. *Abstracts of Conference Papers for the 225th American Chemical Society National Meeting* (p. CHED-1246). Washington, D.C.: American Chemical Society. For more information, contact the authors at the Department of Chemistry, University of Rochester, Rochester, NY 14627, kamp@chem.rochester.edu
Peer-led Team Learning (PLTL) has been used at the University of Rochester (NY) to support higher student achievement in introductory chemistry courses. A special training course was created for the PLTL student peer facilitators who are key to the program success.

Kampmeier, J. A., Varma-Nelson, P., & Wedegaertner. (2000). *Peer-Led Team Learning, the workshop project: Organic chemistry*. Upper Saddle River, NJ: Prentice Hall

This book provides strategies for implementing the Peer-Led Team Learning (PLTL) program by other educators in an organic chemistry course.

Kampmeier, J. A., Varma-Nelson. Pratibha, & Wedegaertner, D. K. (1999). The organic workshop project: Peer-led Team Learning. *Abstracts of Conference Papers for the 217th American Chemical Society National Meeting* (p. CHED-767). Washington, D.C.: American Chemical Society. For more information, contact the author at the Science Department, St. Xavier University, 3700 W. 103rd St., Chicago, IL 60655.
Peer-led Team Learning (PLTL) was used with undergraduate chemistry students to improve instruction. Overview of the program and training materials for the student PLTL facilitators was shared. Preliminary evaluation studies suggest improved student learning, higher persistence rates, improved teamwork skills, and heightened communication skills..

Kampmeier, J. A., Varma-Nelson. Pratibha, & Wedegaertner, D. K. (1999). The organic workshop project: Peer-led Team Learning. *Abstracts of Conference Papers for the 218th American Chemical Society National Meeting* (p. CHED-279). Washington, D.C.: American Chemical Society. For more information, contact the author at the Science Department, St. Xavier University, 3700 W. 103rd St., Chicago, IL 60655.
Peer-led Team Learning (PLTL) was used with undergraduate organic chemistry students to improve instruction. Overview of the program and training materials for the student PLTL facilitators was shared. Preliminary evaluation studies suggest improved student learning, higher persistence rates, improved teamwork skills, and heightened communication skills.

Kampmeier, J. A., & Wedegaertner, D. K. (2001). Peer-Led Team Learning in organic chemistry. *Abstracts of Conference Papers for the 221st American Chemical Society National Meeting* (p. CHED-45). Washington, D.C.: American Chemical Society. For more information, contact the author at the Department of Chemistry, University of Rochester, Box 270216, University of Rochester, Rochester, NY 14627, kamp@chem.rochester.edu
Peer-led Team Learning (PLTL) is used at the University of Rochester in chemistry courses.

Lazik, L., Conroy, M., Lee, A., Rocha, S., & Kirby, A. (2004). Peer-led Team Learning: A gateway to teaching opportunities. *Abstracts of Conference Papers for the 227th American Chemical Society National Meeting* (p. CHED-36). Washington, D.C.: American Chemical Society. For more information, contact the author at the Department of Math and Science, San Jose City College, 2100 Moorpark Ave., San Jose, CA 95128, lyun.Larik@sjcc.edu
Peer-led Team Learning (PLTL) was used in a chemistry course at San Jose City College. In addition to the benefits for the participating students, the authors also cited the opportunity for growth by the PLTL student peer facilitators.

Lehr, R. E., & Royt, R. R. (2002). Use of Peer-led Team Learning techniques to enhance undergraduate organic instruction. *Abstracts of Conference Papers for the 224th American Chemical Society National Meeting* (p. CHED-317). Washington, D.C.:

American Chemical Society. For more information, contact the authors at the Department of Chemistry and Biochemistry, University of Oklahoma, 620 Parrington Oval, Norman, OK 73019, relehr@ou.edu
Peer-led Team Learning (PLTL) has been used at the University of Oklahoma to support higher student achievement in an organic chemistry course.. PLTL was instituted in part to deal with the challenge of extremely large lecture sections that discouraged high interaction by the students.

Lewis, S. E., & Lewis, J. E. (2005). Departing from lectures: An evaluation of a peer-led guided inquiry alternative. *Journal of Chemical Education, 82*(1), 135-139.

Lyle, K. S., & Robinson, W. R. (2003). A statistical evaluation: Peer-Led Team Learning in an organic chemistry course. *Journal of Chemical Education, 80*(2), 132-134.
This report documents the impact of Peer-Led Team Learning (PLTL) in an organic chemistry course taken by sophomore students at a small research college in the eastern United States. Participating students outscored their counterparts by a statistically significant level. This was consistent for all student subpopulations regardless of gender or ethnicity.

Malik, D. J. (2004). Creating a culture for PLTL: Selling the faculty and administration. *Abstracts of Conference Papers for the 227th American Chemical Society National Meeting* (p. CHED-42). Washington, D.C.: American Chemical Society. For more information, contact the author at the Department of Chemistry, Indiana University Purdue University Indianapolis, 402 N. Blackford Street, Indianapolis, IN 46202, malik@chem.iupui.edu
Peer-led Team Learning (PLTL) was used in a chemistry course at Indiana University Purdue University Indianapolis. A number of recommendations are presented for marketing of the PLTL to fellow faculty members and administrators that align the program with institutional mission and priorities.

Malik, D. J. (2002). Improving the transition from secondary to higher education in a large urban public university: Recognizing the role of PLTL. *Abstracts of Conference Papers for the 224th American Chemical Society National Meeting* (p. CHED-94). Washington, D.C.: American Chemical Society. For more information, contact the author at the Department of Chemistry, Indiana University Purdue University Indianapolis, Indianapolis, IN 46202, malik@chem.iupui.edu
Peer-led Team Learning (PLTL) has been used at Indiana University Purdue University Indianapolis to support higher student achievement in introductory science courses. PLTL is viewed as a critical program for helping high school students quickly make the adjustment to the academic rigor of challenging college courses.

Marcano, Y., Velez, A., & Fraiman, A. (2003). Implementation of PLTL in sophomore organic chemistry at Northeastern Illinois University. *Abstracts of Conference Papers for the 225th American Chemical Society National Meeting* (p. CHED-81). Washington, D.C.: American Chemical Society. For more information, contact the author at the Department of Chemistry, Northeastern Illinois University, 5500 North St. Louis, Chicago, IL 60625, y-marcano@neiu.edu

The Peer-Led Team Learning (PLTL) program is used with the general chemistry courses at Northeastern Illinois University since Fall 2002. The authors share program outcomes and challenges with implementation of the model.

Mullins, J. J. (2003). The effectiveness of Peer-led Team Learning workshops in organic chemistry instruction at Le Moyne College. *Abstracts of Conference Papers for the 225th American Chemical Society National Meeting* (p. CHED-50). Washington, D.C.: American Chemical Society. For more information, contact the authors at the Department of Chemistry, Le Moyne College, 1419 Salt Springs Road, Syracuse, NY 13214, mullinjj@lemoyne.edu
The Peer-Led Team Learning (PLTL) program is used with the general chemistry courses at Le Moyne College (NY) beginning in 2002. Participating students earn higher grades than nonparticipants. Surveys suggest that students are highly satisfied with PLTL.

Platt, T., Barber, E., Yoshinaka, A., & Roth, V. (2003). An innovative selection and training program for Problem-based Learning (PBL) workshop leaders in biochemistry. *Biochemistryand Molecular Biology Education, 31*(2), 132-136.
A version of Peer-led Team Learning (PLTL) was implemented at the University of Rochester in New York. Traditional recitation sections were replaced in a large upper level biochemistry course with PLTL. A key factor in the program's success was extensive training of the PLTL student facilitators..

Rothstein, V., Goldstein, E., & Mancus, G. (2000). *Peer-Led Team Learning: A handbook for team leaders*. Upper Saddle River, NJ: Prentice Hall.
This book provides strategies for implementing the Peer-Led Team Learning (PLTL) program by other educators. This book offers suggestions for successful implementation including how to write effective group problems and how to train peer leaders.

Sarquis, J. L., Dixon, L. J., Gosser, D. K., Kampmeier, J. A., Roth, V., Strosak, V. S., & Varma-Nelson, P. (2001). The workshop project: Peer-Led Team Learning in chemistry. In J. E. Miller, J. E. Groccia, & M. S. Miller (Eds.), *Student assisted teaching: A guide to faculty-student teamwork* (pp. 150-155). Bolton, MA: Anker Publishing Company. Retrieved March 18, 2005, from http://www.sci.ccny.cuny.edu/~chemwksp/pltl_chap.pdf
This book chapter describes the Peer-Led Team Learning (PLTL) program as it is used with a chemistry course.

Schneider, J., & Handy, C. (2001). Peer-led Team Learning/Comexcel as a model for the general chemistry recitation period. *Abstracts of Conference Papers for the 221st American Chemical Society National Meeting* (p. CHED-45). Washington, D.C.: American Chemical Society. For more information, contact the author at the Department of Chemistry, University of Rochester, River Campus, Rochester, NY 14627, kamp@ chem.rochester.edu.
Peer-led Team Learning (PLTL) has been used at the University of Rochester (NY) to support higher student achievement in chemistry courses.

Staff writer. (2005). *Progressions Newsletter*. New York City, NY: City University of New York. Retrieved March 15, 2005, from http://www.pltl.org
Progressions is the official newsletter of Peer-Led Team Learning. It provides program overview information, data studies, and information about training workshops.

Staff writer. (2005). Peer-led Team Learning, fewer lectures: More learning. *The Teaching Professor, 16*(3), 5.
This short article describes Peer-led Team Learning (PLTL). Results from a general chemistry class indicate that participants earned higher final course grades.

Stewart, B. N., Amar, F. G., & Bruce, M. R. M. (2004). Measuring the effect of PLTL in a large general chemistry course. *Abstracts of Conference Papers for the 227th American Chemical Society National Meeting* (p. CHED-16). Washington, D.C.: American Chemical Society. For more information, contact the authors at the Department of Chemistry, University of Maine, Orono, ME 04469, mbruce@maine.edu
Peer-led Team Learning (PLTL) was used in a general chemistry course at the University of Maine. PLTL was first implemented in 2000. Research studies suggest increased student grades and retention rates. The analysis included variables of previous GPA, high school rank, and SAT scores.

Strozak, V. S. (2001). Bringing Peer-led Team Learning to the community college: Starting a new initiative. *Abstracts of Conference Papers for the 222nd American Chemical Society National Meeting* (p. CHED-28). Washington, D.C.: American Chemical Society. For more information, contact the authors at the Center for Advanced Study in Education, The Graduate Center of the City University of New York, 365 Fifth Avenue, New York, NY 10016, vstrozak@gc.cuny.edu
Peer-led Team Learning (PLTL) has been used at institutions to support higher student achievement in chemistry courses. The model has been adapted for implementation at community and technical colleges. Special issues regarding implementation at two-year institutions are discussed.

Strozak, V. S. (2003). Peer-led Team Learning: A cooperative learning strategy that works. *Abstracts of Conference Papers for the 226th American Chemical Society National Meeting* (p. CHED-5). Washington, D.C.: American Chemical Society. For more information, contact the author at the Center for Advanced Study in Education, The Graduate Center of the City University of New York, 365 Fifth Avenue, New York, NY 10016, vstrozak@gc.buny.edu
Peer-Led Team Learning (PLTL) was used with introductory chemistry courses of the City University of New York. Research studies suggest that PLTL participants earn higher quality grades (A, B, or C), reducing withdrawal rates, and effectiveness with students with low and moderate ability.

Strozak, V. S. (2004). Peer-led Team Learning evaluation and research: Past and present. *Abstracts of Conference Papers for the 227th American Chemical Society National Meeting* (p. CHED-39). Washington, D.C.: American Chemical Society. For more information, contact the author at the Center for Advanced Study in Education, The Graduate Center of the City University of New York, 365 Fifth Avenue, New York,

NY 10016, vstrozak@gc.cuny.edu
Peer-led Team Learning (PLTL) was used in chemistry at the City University of New York. Analysis of a decade of data suggests the following: substantially more quality grades (A, B, C) and student attitudes.

Strozak, V. S. (2003). *Peer-Led Team Learning: Research and evaluation*. Unpublished manuscript, City University of New York. Retrieved July 1, 2004, from http://www.pltl.org and http://www.sci.ccny.cuny.edu/~chemwksp/PLTLresearchandevaluation.doc
This article provides suggestions for evaluation of the Peer-Led Team Learning (PLTL) program. PLTL has established a separate web site that focuses on evaluation and research issues at http://pltlresearch.org

Tenney, A. (2001). Peer-led Team Learning in general chemistry. *Abstracts of Conference Papers for the 221st American Chemical Society National Meeting* (p. CHED-1064). Washington, D.C.: American Chemical Society. For more information, contact the authors at the Department of Chemistry, University of Portland, 5000 N. Willamette Blvd., Portland, OR 97203, tenney@up.edu
Peer-led Team Learning (PLTL) was used in introductory courses in general, organic, and biological chemistry courses at the University of Portland.

Tenney, A., & Houck, B. (2004). Learning about leadership. *Journal of College Science Teaching, 33*(6), 25-29.
This articles describes the use of Peer-Led Team Learning (PLTL) to improve student learning in a chemistry course at the University of Portland, a private, comprehensive, regional university of about 3,000 students in Oregon. The focus of this article was on research concerning the leadership development of the student peer facilitators. The student leaders reported increases in their scientific knowledge, interpersonal communication skills, teaching skills, and leadership skills.

Tenney, A. D. (2002). What works in institutionalizing student centered teaching methods: Peer-led Team Learning. *Abstracts of Conference Papers for the 224th American Chemical Society National Meeting* (p. CHED-91). Washington, D.C.: American Chemical Society. For more information, contact the author at the Department of Chemistry, University of Portland, 5000 N. Willamtie Blvd., Portland, OR 97203, tenney@up.edu
Peer-led Team Learning (PLTL) has been used at the University of Portland (OR) to support higher student achievement in introductory science courses since Fall 1999. PLTL has now been expanded to nine faculty members in three academic disciplines. This paper discusses the critical factors needed to implement and support the PLTL program. Preliminary studies suggest that the academic culture has been positively impacted by PLTL, especially regarding female students.

Tien, L. T., Roth, V., & Kampmeier, J. A. (2004). A course to prepare peer leaders to implement a student-assisted learning method. *Journal of Chemical Education, 81*(9), 1313-1321.
This article describes a training program for peer student facilitators to assist other students in mastering difficult academic content material. An outline of the training

curriculum is provided. Peer-led Team Learning (PLTL) utilizes the skills of trained student paraprofessionals to help a small team of students to work through difficult problems posed by the classroom instructor. The student facilitators are cited as key in the success of PLTL with increasing student academic achievement. Comments from student peer leaders are provided to illustrate the impact of the training program on their professional development and preparation for the program.

Tien, L. T., Roth, V., & Kampmeier, J. A. (2002). Implementation of a Peer-Led Team Learning instructional approach in an undergraduate organic chemistry course. *Journal of Research in Science Teaching, 39*(7), 601-632. Retrieved July 1, 2004, from http://www.chem.rochester.edu/~chem203/PeerLedTeamLearning.doc
This study focused on the use of Peer-Led Team Learning (PLTL) program for all students enrolled in an undergraduate organic chemistry course and an evaluation of student outcomes. Quantitative and qualitative data were collected. PLTL students (treatment) were compared with students who participated in recitation sessions (control). PLTL students earned higher final course grades and had higher persistence rates. Analysis of interviews with PLTL students suggested that the program helped them to learn more course material, were more socially engaged, intellectually stimulated, and found the experience to be a productive use of time.

Varma-Nelson, P., & Gosser, D. K. (2001). National dissemination of Peer-led Team Learning: Its design, implementation, documentation, and evaluation. *Abstracts of Conference Papers for the 222nd American Chemical Society National Meeting* (p. CHED-25). Washington, D.C.: American Chemical Society. For more information, contact the authors at the Science Department, St. Xavier University, 3700 West 103rd Street, Chicago, IL 60655, varmanelson@sxu.edu
Peer-led Team Learning (PLTL) has been used at more than 100 institutions to support higher student achievement in an organic chemistry course. National data studies as well as recommendations for successful implementation are shared.

Varma-Nelson, P., & Gosser, D. K. (2000). National dissemination of the workshop project: Peer-led Team Learning. *Abstracts of Conference Papers for the 219st American Chemical Society National Meeting* (p. CHED-155). Washington, D.C.: American Chemical Society. For more information, contact the authors at the Science Department, St. Xavier University, 3700 West 103rd Street, Chicago, IL 60653, varmanelson@sxu.edu
Peer-led Team Learning (PLTL) is used at the St. Xavier University in chemistry courses. The national PLTL dissemination efforts are reviewed.

Varma-Nelson. Pratibha. (1997). Workshop chemistry: Peer-led Team Learning. *Abstracts of Conference Papers for the 214th American Chemical Society National Meeting* (p. CHED-040). Washington, D.C.: American Chemical Society. For more information, contact the author at the Science Department, St. Xavier University, 3700 W. 103rd St., Chicago, IL 60655.
Peer-led Team Learning (PLTL) was used with undergraduate chemistry students to improve instruction. Preliminary evaluation studies suggest improved student learning, teamwork skills, and communication skills..

Varma-Nelson, P., & Cracolice, M. S. (2000). *Peer-Led Team Learning: General organic and biological chemistry*. Upper Saddle River, NJ: Prentice Hall.
This book provides strategies for implementing the Peer-Led Team Learning (PLTL) program by other educators in a general organic and biological chemistry course.

Varma-Nelson. Pratibha, & Cracolice, M. S. (1998). Workshop chemistry: Peer-led Team Learning. *Abstracts of Conference Papers for the 216th American Chemical Society National Meeting* (p. CHED-105). Washington, D.C.: American Chemical Society. For more information, contact the author at the Science Department, St. Xavier University, 3700 W. 103rd St., Chicago, IL 60655.
Peer-led Team Learning (PLTL) was used with undergraduate chemistry students to improve instruction. Preliminary evaluation studies suggest improved student learning, higher persistence rates, improved teamwork skills, and heightened communication skills..

Wamser, C. C. (2004). PLTL and student success in organic chemistry. *Abstracts of Conference Papers for the 227th American Chemical Society National Meeting* (p. CHED-40). Washington, D.C.: American Chemical Society. For more information, contact the author at the Department of Chemistry, Portland State University, Portland, OR 97207, wamserc@pdx.edu
Peer-led Team Learning (PLTL) was used in chemistry at Portland State University (OR). PLTL is an optional one-credit, two=hour weekly course that attracts about 30% of the students to enroll. Student outcomes for the participants include: slightly higher GPA based on all courses taken, higher persistence rates, and improved attitudes. Positive differences were greater than can be attributed to differences in entry GPA.

Zurer, P. S. (2001). Teaching organic chemistry. *Chemical & Engineering News, 79*(16), 43-45.
This article describes the use of Peer-led Team Learning (PLTL) workshops in an organic chemistry course at the University of Rochester-New York.

Structured Learning Assistance (SLA)

The Structured Learning Assistance (SLA) Program grew out of a need to reach large numbers of students who would not normally seek academic assistance voluntarily. When students enter college, they do not know how different their learning experiences will be from what they knew in high school. They do not know that they should seek out assistance early to help ensure success in college. The SLA program developed discovered there were some courses that students would traditionally have trouble with in their programs. As an effort to help students be successful, they sought to provide a method of direct transference of study skills and learning methods to those content areas. Research literature indicated that students should be taught study skills that will apply directly to the content area. The SLA program devised a way to do that.

Developed at Ferris State University in Michigan, the SLA system was designed and piloted in 1994. It was established to help increase the amount of students passing some historically high-risk for failure courses. Many factors were incorporated in this program such as anticipated student benefit, academic need, faculty commitment, and staff expertise. In March 2000, the SLA program received the Theodore M. Hesburgh Award, Certificate of Excellence from TIAA-CREF. This honored their commitment to the enhancement of undergraduate teaching and leadership in learning innovation. In 2001 the U.S Department of Education Fund for the Improvement of Postsecondary Education (FIPSE) awarded a grant to Ferris State University for “Modeling a Successful Student Retention and Faculty Development Program” to help four partner universities nationwide to develop SLA programs too. These partners include Northern Kentucky University, Kentucky, San Jacinto College North, Texas, Benedictine University, Illinois, and Indiana University—Purdue University Indianapolis (IUPUI), Indiana.

Arendale, D. (2004). Pathways of persistence: A review of postsecondary peer cooperative learning programs. In I. M. Duranczyk, J. L. Higbee, & D. B. Lundell (Eds.), *Best practices for access and retention in higher education* (pp. 27-42). Minneapolis, MN: Center for Research on Developmental Education, General College, University of Minnesota. Retrieved March 15, 2005, from http://www.gen.umn.edu/research/crdeul/monographs.htm

This chapter focused intentionally on a subset of the educational practice that share a common focus with increasing student persistence towards graduation. Rather than a meta-analysis of all published research studies, this chapter is a preliminary review and a description of six models. At the end of the chapter several suggestions are made for differentiating the models from each other and the level of institutional resources and resolve with implementing them. The six student peer learning programs included in this chapter meet the following characteristics: (a) the program must have been implemented at the postsecondary or tertiary level, (b) the program has a clear set of systematic procedures for its implementation at an institution, (c) program evaluation studies have been conducted and are available for review, (d) the program intentionally embeds learning strategy practice along with review of the academic content material, (e) the program outcomes include both increased content knowledge with higher persistence rates, and (f) the program has been replicated at another institution with similar positive student outcomes. From a review of the professional literature six programs emerged: Accelerated Learning Groups (ALGs), Emerging Scholars Program

(ESP), Peer-Led Team Learning (PLTL), Structured Learning Assistance (SLA), Supplemental Instruction (SI), and Video-based Supplemental Instruction (VSI). As will be described in the following narrative, some of the programs share common history and seek to improve upon previous practices. Other programs were developed independently.

Doyle, T. (1999, Winter). Ferris State University's structured learning assistance program. *Michigan Developmental Educational Consortium Newsletter,* 4-5, 8.
This newsletter article describes a learning model at Ferris State University in Michigan. The Structured Learning Assistance Program (SLA) provides both an academic and an affective support system. SLA targets both high-risk for failure gateway and historically difficult upper division courses with four-hour per-week directed practice workshops. The SLA workshops are formally scheduled in the student schedule just like an accompanying science lab. Attendance at the workshop is required of all students the first week of the course or until the first test, quiz or other assessment is given in the class. Following the assessment, attendance is required only for students whose course grade point average falls below a 2.0 Other students may voluntarily continue to attend the SLA sessions. In addition to traditional SI program features, class professors receive regular, ongoing information about student progress, student concerns, and ways of better connecting with students. SLA sessions provide more explicit instruction in learning strategies. Research studies suggest that SLA students earn higher final course grades than nonparticipants in control groups.

Doyle, T., & Hooper, J. (1997). *Structured Learning Assistance Project. Final Report, Fall Semester 1996, Winter Semester 1997*. Unpublished Manuscript, Ferris State University (OH). (ERIC Document Reproduction Service No. ED425772).
Initiated in 1994, Structured Learning Assistance (SLA) is a research project whose purpose is to determine if, for certain courses, grades can be improved by requiring students to attend weekly practice workshops. These SLA workshops assist students in developing the background needed to connect to the course content and to develop and apply the learning strategies most appropriate to the content area. This report details the 3-year findings of the SLA project, as well as findings for all students who participated in it during the 1996-1997 academic year, with a focus on minority students. Results indicated that SLA can significantly improve student pass rates, even for at-risk students. In nearly 85% of the 42 courses offered with SLA support, the SLA students had higher pass rates than those of all other university students taking the same courses. This improvement was especially marked in the mathematics courses, where the average pass rate increased anywhere from 24 to 45 percent. Student evaluations of the SLA project are included. Appended are minority and total student data for fall 1996 and winter 1997, statistics on the project's 3-year averages, and pass rate by subject area.

Doyle, T., & Kowalczyk, J. (1999). The Structured Learning Assistance Program model. In *Selected conference papers of the National Association for Developmental Education, Volume 5* (pp. 4-7). Warrensburg, MO: National Association for Developmental Education. Retrieved July 1, 2004, from http://www.nade.net
Structured Learning Assistance (SLA) was developed at Ferris State University (OH) to

meet the need of challenging 100- through 400-level courses. SLA is an in-course student community that is directly attached to courses. The article provides background to the SLA model. Data suggests the following outcomes for the SLA program: higher rates of earning C- or better in the course, higher persistence rate at the institution, and 73% of students attributed SLA as significant to their academic achievement.

Staff writer. (2005). *Structured Learning Assistance Homepage*. Retrieved March 15, 2005, from http://www.ferris.edu/sla/
This is the web homepage for Structured Learning Assistance based at Ferris State College in Michigan. A variety of descriptive information, evaluation studies, and training materials are available.

Stern, C. (1996). Structured Learning Assistance in the basic writing class. In D. C. Mollise, & C. T. Matthews (Eds.), *Selected conference papers, volume 2, 20th annual conference of the National Association for Developmental Education* (pp. 39-41). Little Rock, AR: National Association for Developmental Education. Retrieved March 15, 2005, from http://www.nade.net
This paper provides an overview of the Structured Learning Assistance (SLA) program and its use in a basic writing class at Ferris State College in Michigan.

Supplemental Instruction (SI)

The Supplemental Instruction (SI) model of academic assistance helps students in historically difficult classes master content while they develop and integrate learning and study strategies. The program was originally developed at the University of Missouri-Kansas City in 1973 and has been adopted by hundreds of institutions in the U.S. and abroad. Goals of SI include: (1) improve student grades in targeted courses; (2) reduce the attrition rate within those courses; and (3) increase the eventual graduation rates of students. All students in a targeted course are urged to attend SI sessions, and students with varying ability levels participate. There is no stigma attached to SI since *historically difficult courses* rather than *high risk students* are targeted. SI is scalable and can be implemented in one or more courses each academic tern.

There are four key persons involved with SI. The first is the *SI supervisor*, a trained professional on the SI staff. The SI supervisor is responsible for identifying the targeted courses, gaining faculty support, selecting and training SI leaders, and monitoring and evaluating the program. Once the historically difficult courses have been identified, the SI supervisor contacts the faculty member concerning SI for their course. The second key person for SI is the *faculty member* who teaches one of the identified courses. SI is only offered in courses in which the faculty member invites and supports SI. Faculty members screen SI leaders for content competency and approve selections. The third key person is the *SI leader*. SI leaders are students or learning center staff members who have been deemed course competent, approved by the course instructor and trained in proactive learning and study strategies. SI leaders attend course lectures, take notes, read all assigned materials, and conduct three to five out-of-class SI sessions a week. The SI leader is the *"model student*," a facilitator who helps students to integrate course content and learning/study strategies. The fourth key member of the SI program are the *participating students*.

Ahrens, R., George, B., Henderson, A., Marhinin, N., Power, D., Rae, M., Watters, J. J., & Ginns, I. S. (1996). *Students helping students: Peer Assisted Study Sessions for students enrolled in a science content subject*. Paper presented at the 2nd State Conference of HERDSA Inc., April 13-14, 1996, University of Southern Queensland, Toowoomba, Queensland, Australia. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.

The Peer Assisted Study Sessions (PASS) program, based upon the Supplemental Instruction (SI) program, was used at the Queensland University of Technology (Brisbane, Australia) in the Center for Mathematics and Science Education. Students enrolled in the Primary and Early Childhood area of a Bachelor of Education degree must take Science Foundations (MDB303) in their first year. The formal science backgrounds of many students enrolled in this class are inadequate. This study examined students enrolled in the class during 1995. The PASS group received higher final course grades (4.88 vs. 4.15, 0 to 7 scale) than the non-PASS participants. Qualitative research through student interviews and analysis of surveys suggested improvement gains for the PASS group as well.

Ainsworth, L., Garnett, D., Phelps, D., Shannon, S., & Ripperger-Suhler, K. (1994). *Mathematics: Needs and approaches using Supplemental Instruction*. Unpublished manuscript, Texas Tech University at Lubbock.
This paper discusses the implementation of Supplemental Instruction (SI) at Texas Tech University (Lubbock, TX) with courses in mathematics. After a review of the literature regarding the challenges with academic achievement for students in mathematics, the authors provide suggestions on how to successfully implement a SI program: focusing on problem-solving activities in the SI sessions that clearly illustrate the protocols to solve the problems rather than focusing just on finding the correct answer; providing more structure to SI sessions in math in comparison with SI sessions in other academic disciplines; and working on developing correct use of math vocabulary.

Ainsworth, L., Garnett, D., Phelps, D., Shannon, S., & Ripperger-Suhler, K. (1994). Steps in starting Supplemental Instruction. In D. C. Martin, & D. Arendale (Eds.), *Supplemental Instruction: Increasing achievement and retention* (pp. 23-30). New Directions for Teaching and Learning No. 60. San Francisco, CA: Jossey-Bass, Inc.
An institution must complete a number of critical steps to effectively implement a new Supplemental Instruction (SI) program: present research-based information that suggests the effectiveness of SI; gaining administrative and faculty support; selecting a SI supervisor with sufficient release time; carefully supervising the SI program throughout the academic term; and using evaluation data for program improvement. The authors based their suggestions from past experience at Texas Tech University.

Akao, S. E. (1996). Book review of Supplemental Instruction: Increasing achievement and retention. *Journal of College Student Personnel, 37*(3), 360.
This is a book review of the monograph Supplemental Instruction: Increasing achievement and retention (Martin and Arendale, Editors, 1994). The book review provides a short summary of each of the monograph's chapters.

Allen, M., Kolpas, S., & Stathis, P. (1992, October). Supplemental Instruction in calculus at a community college. *Collaborative Learning Exchange Newsletter,* 8-9.
At Glendale Community College (Glendale, CA) an experiment was conducted in several calculus courses regarding optional and mandatory attendance. In the traditional SI model attendance in SI is optional and anonymous. In the classes where mandatory attendance was required, students received a 10 percent boost in their grade for participating and submitting additional homework assignments. SI participants earned a mean final course grade that was 20 percentage points higher (70 percentile vs. 50 percentile). In another experiment SI session strategies were integrated into the class sessions. The class instructor developed the work sheets used in the SI sessions. The students in the modified course were compared to classes where SI sessions were not integrated into them. The SI participants earned a mean final course grade nearly a full-letter grade higher than the other students. While initial comments from SI participants were negative, by the end of the term the comments were highly supportive of the SI program.

Andersson, A. (1996). *Supplemental Instruction in Mechanics A*. Unpublished manuscript, The Lund Institute of Technology at Lund, Sweden. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA. Retrieved July 1, 2004, from http://www.si-mentor.lth.se/SI%20ref_webb/pdf/Bruzell-Nilsson_Bryngfors_Student%20Success%20in%201996.pdf
This report describes the use of Supplemental Instruction (SI) in the Mechanics A course during spring of 1996 in the School of Mechanical Engineering at the Lund Institute of Technology (Sweden). The author was the SI leader for the course. The report provides a description of events that occurred during the SI sessions throughout the academic term. Suggestions from the SI leader included: be careful to schedule SI sessions at times of highest interest for the students; keep to time commitments when to start and finish SI sessions since students may have other appointments following the sessions; divide the SI participants into smaller groups so maximize student discussions; and make sure that the SI leader has a plan before the beginning of the session to provide structure.

Anker, E. O. (1991). *Supplemental Instruction: An answer for the at-risk student in a high-risk course?* Unpublished Master's of Arts (M.A.T.) thesis, Calvin College, Grand Rapids, MI. Available: Interlibrary loan from Calvin College and Theological Seminary, Grand Rapids, MI.
This research paper studied the use of Supplemental Instruction (SI) during Spring 1991 at Calvin College in Grand Rapids, MI. Areas for study included: final course grades for "at risk" students; and relationships among the level of SI attendance, academic ability, and final course grades. Special admit "at risk" students were the focus of the study. A study skills class was paired with a content course (e.g., History 101) in Fall 1990 to provide academic assistance for students. The at risk students were required to enroll in the non-credit course. Thirteen special admit students from Fall 1990 were enrolled in the paired class. In Spring 1991 seven special admit students instead participated in SI rather than being enrolled in a paired study skills class. There was no significant difference regarding final course grades. Individual SI attendance for SI ranged from three to 17 for the 18 sessions offered during Spring 1991. The mean average was 8.7 sessions. There was a positive correlation between higher levels of attendance and higher academic achievement. The researcher suggested that SI was more helpful to participating students than a paired study skills course.

Anton, H. F., Dooley, J. L., & Meadows, D. C. (1998). Developmental educators as Supplemental Instruction providers: The next step. In *Selected conference papers: National Association for Developmental Education* (pp. 6-7). Mobile, AL: University of South Alabama.
This conference abstract describes the use of Supplemental Instruction (SI) as a natural outgrowth of a developmental studies process. The Developmental Studies Department at Middle Tennessee State University funded an SI pilot in the 1997 Spring semester in Anatomy and Physiology. Analysis of final course grades revealed the following: the failure rate dropped from 47% to 28.6%; course grade average was 2.4 for SI participants and 1.5 for non-participants; positive correlation between higher levels of SI

attendance and higher final course grades. SI was viewed as a natural compliment of other activities and services offered by the department.

Arendale, D. (Ed.). (1995-2001). *Internet homepage for the National Center for Supplemental Instruction* [On-line]. Retrieved July 1, 2004, from http://www.umkc.edu/cad/si/
This Internet homepage maintained by the National Center for Supplemental Instruction at the University of Missouri-Kansas City provides a central location for information about SI. Some of the menu items include: overview of SI; links to homepages of SI leaders at UMKC; information about upcoming SI Supervisor training workshops; instructions on how to subscribe to the SI listserv discussion group; SI materials for sale; directory of known SI homepages from other colleges around the world; and a directory of SI-related documents. Currently more than 100 documents are available for viewing at this site about SI by authors at UMKC and elsewhere.

Arendale D. (Moderator). (1995-2001). *Supplemental Instruction Internet computer discussion listserv* [On-line]. Kansas City, MO: The University of Missouri-Kansas, Center for Supplemental Instruction. Retrieved July 1, 2004, from http://www.umkc.edu/cad/si/
This moderated computer discussion listserv is provided by the National Center for Supplemental Instruction (SI). Discussion topics include: customizing SI for different content areas; strategies to increase SI attendance; methods to conduct qualitative and quantitative research; and other topics. Subscription to the listserv and is free to anyone, regardless of whether they have an active SI program or not. SI Leaders as well as SI Supervisors are especially invited to join the list. Approximately 350 persons from several countries are members of the listserv. To subscribe to the listserv, send an E-mail message to listserv@listserv.umkc.edu. In body of the message type: subscribe SInet yourfirstname yourlastname. For more information on SInet, send message to: SInet-Request@listserv.umkc.edu.

Arendale, D. (2001). Effect of administrative placement and fidelity of implementation of the model of effectiveness of Supplemental Instruction programs [Dissertation, University of Missouri-Kansas City, 2000]. *Dissertation Abstracts International, 62*, 93. Retrieved July 1, 2004, from http://www.tc.umn.edu/~arend011/disdir.htm
This 456 page research study investigated variables that may influence effectiveness of the Supplemental Instruction learning assistance and enrichment program at the University of Missouri-Kansas City and other U.S. postsecondary institutions. Study number one analyzed variables related to academic performance of University of Missouri-Kansas City students (mean final course grades, rate of course withdrawal, and rate of persistence). Study number two investigated variables at 735 U.S. postsecondary institutions related to academic performance of students and satisfaction level with the campus Supplemental Instruction program. Independent variables included: administrative placement of the SI program unit (academic affairs, student affairs, or other), age of the SI program, fidelity of the program to SI program activity constructs (SI Supervisor involvement, SI Leader involvement, SI Leader training, institutional involvement), and four dependent variables (mean final course grades, mean percent of D and F final course grades and course withdrawals, mean percent of

students who participate in the program, and satisfaction level with the program). Study number one found positive correlation between higher academic achievement and persistence rates with the independent variables of SI attendance and measures of precollegiate academic achievement. The entire known population of 735 SI programs within the United States was selected for study number two. There were statistically significant positive correlations with three of the four program activity constructs (SI Supervisor Involvement, SI Leader Involvement, and SI Leader training) and the effectiveness of the program regarding improved student outcomes and higher satisfaction ratings by the campus administrators who supervised the program. There were no statistically significant differences between the different program administrative placement locations and the dependent variables. Implications from this research include identification of key activities within the program that should be observed to maximize program effectiveness for the institution and participating students. Besides the two quantitative studies, an extensive review of the literature regarding the history of developmental education and learning assistance programs in the United States produced six discernable historical phases. Supplemental Instruction was placed within this social context in American history. The appendix includes an extensive annotated bibliography of 450 publications and other media types published by authors worldwide related to Supplemental Instruction.

Arendale, D. (1993). *Fostering multicultural education with a learning assistance model that works: Supplemental Instruction*. Unpublished manuscript, The University of Missouri-Kansas City. Retrieved June 12, 2005, from http://www.tc.umn.edu/~arend011/SIMULTX.pdf
This paper describes the use of Supplemental Instruction (SI) to serve as a part of a campus multicultural education program. Since the primary focus of SI sessions is on the academic content, the sessions attract students of different ethnicities and cultures who share a common concern for improving their personal academic performance in the course. Cultural differences naturally emerge as students deal with the common academic task and they share their perspectives concerning the academic material from their personal and cultural point of view. The small group allows students to see a multiplicity of realities concerning the academic content. Some researchers argue that collaborative learning environments -- such as provided through SI sessions -- are more conducive for learning of students from diverse cultures. This is because some are field sensitive learners and find the traditional classroom environment of abstract learning unhelpful and find opportunity during SI sessions to make connections between the course material and their personal frame of reference. Included in the article is a research study directed by May Garland and partially funded by the National Association for Developmental Education. The study included 3 institutions across the U.S. regarding academic performance of students separated by ethnicity. Students of color participated at rates equal to or exceeded rates of White students in SI sessions. Students of color who participated in SI received mean higher final course grades than students of color who chose not to participate. The results were the same regardless whether the group was all students, top quartile, and bottom quartile.

Arendale, D. (1996). *Frontloaded academic support: Supplemental Instruction in two-year colleges*. Unpublished manuscript, The University of Missouri-Kansas City.

Retrieved June 12, 2005, from http://www.tc.umn.edu/~arend011/SI2YR.pdf
This paper describes the role of Supplemental Instruction (SI) in providing academic support for new students in two-year colleges. Included are both interviews with campus SI Supervisors at two-year institutions across the U.S. and a data study of SI at 59 two-year public institutions that offered SI in 480 courses with an enrollment of 23,979 students. The data suggests that SI participants earn a final course grade that is half a letter grade higher than non-participants. In addition to examining the data in aggregate, similar findings occur when the data is separated by academic disciplines.

Arendale, D. (2002). History of Supplemental Instruction: Mainstreaming of developmental education. In D. B. Lundell, & J. L. Higbee (Eds), *Histories of developmental education* (pp. 15-27). Minneapolis, MN: Center for Research on Developmental Education and Urban Literacy, General College, University of Minnesota. Retrieved July 1, 2004, from http://www.gen.umn.edu/research/crdeul/monographs.htm
Postsecondary institutions throughout the nation's history have provided developmental education and learning assistance programs to meet the academic standards expected of admitted college students. This history of developmental education provides a context for creation of the Supplemental Instruction (SI) program in 1973 at the University of Missouri-Kansas City to meet immediate needs at the institution due to a high attrition rate among students enrolled in professional schools. The national, and eventual international, dissemination of the SI model was due to it meeting similar needs at other institutions as well. SI has become a widely adopted method of mainstreaming the best practices of developmental education with college-level courses.

Arendale, D. (1998). Increasing the efficiency and effectiveness of learning for first year college students through Supplemental Instruction. P. L. Dwinell, & J. L. Higbee (Eds.), *The role of developmental education in preparing successful college students* (pp. 185-197). Monograph Series No. 19. Columbia, SC: The National Association for Developmental Education and the National Center for the Study of the Freshman Year Experience and Students in Transition. (ERIC Document Reproduction Service No. ED423794). Retrieved June 12, 2005, from http://www.tc.umn.edu/~arend011/DAincreasedefficiencySI97.pdf
Supplemental Instruction (SI) can be a powerful force for increasing the efficiency and effectiveness of learning for students during the first year of college. With the paradigm shift from a focus on teaching to improvement of student learning, institutions are looking for a systematic approach to changing the campus learning culture. This chapter describes how SI addresses these needs and also provides a review of research in the U.S. and other countries regarding the impact of SI with improving student academic performance.

Arendale, D. (2001). Introduction. In *Proceedings of the First National Conference on Supplemental Instruction/VSI* (pp. 6-7). Kansas City, MO: Center for Academic Development, University of Missouri-Kansas City.
The author provides an introduction to the conference proceedings of the First National Conference on Supplemental Instruction/VSI held in Kansas City, MO during May 1999.

Arendale, D. (1996). Lessons that I have learned from students in peer study groups. *National Association for Developmental Education Newsletter, 20*(1), 1-3. Retrieved June 12, 2005, from http://www.tc.umn.edu/~arend011/Lessonsfrompeergroups97.pdf
Based on comments from Supplemental Instruction leaders and participants, this newsletter article describes six lessons learned by the author in his role as a course lecturer: 1) student-led discussions are needed to make lectures and reading assignments more valuable to students; 2) sometimes the lecturer spends too much time telling and not enough time modeling the thinking process for finding the answers and developing critical thinking abilities; 3) the lecturer needs to be careful not to by accident intimidate students; 4) only through student discussions will many be able to construct and retain the knowledge from the class; 5) the lecturer needs to frequently seek student feedback to improve my classroom instruction; and 6) there is more to learn at college than what happens in class.

Arendale, D. (2004). Pathways of persistence: A review of postsecondary peer cooperative learning programs. In I. M. Duranczyk, J. L. Higbee, & D. B. Lundell (Eds.), *Best practices for access and retention in higher education* (pp. 27-42). Minneapolis, MN: Center for Research on Developmental Education, General College, University of Minnesota. Retrieved March 15, 2005, from http://www.gen.umn.edu/research/crdeul/monographs.htm
This chapter focused intentionally on a subset of the educational practice that share a common focus with increasing student persistence towards graduation. Rather than a meta-analysis of all published research studies, this chapter is a preliminary review and a description of six models. At the end of the chapter several suggestions are made for differentiating the models from each other and the level of institutional resources and resolve with implementing them. The six student peer learning programs included in this chapter meet the following characteristics: (a) the program must have been implemented at the postsecondary or tertiary level, (b) the program has a clear set of systematic procedures for its implementation at an institution, (c) program evaluation studies have been conducted and are available for review, (d) the program intentionally embeds learning strategy practice along with review of the academic content material, (e) the program outcomes include both increased content knowledge with higher persistence rates, and (f) the program has been replicated at another institution with similar positive student outcomes. From a review of the professional literature six programs emerged: Accelerated Learning Groups (ALGs), Emerging Scholars Program (ESP), Peer-Led Team Learning (PLTL), Structured Learning Assistance (SLA), Supplemental Instruction (SI), and Video-based Supplemental Instruction (VSI). As will be described in the following narrative, some of the programs share common history and seek to improve upon previous practices. Other programs were developed independently.

Arendale, D. (1995). Self-assessment for adjunct instructional programs. In S. Clark-Thayer (Ed.), *NADE Self-Evaluation Guides: Models for assessing learning assistance/developmental education programs* (pp. 49-87). Clearwater, FL: H&H Publishing Company.
This chapter provides a framework for evaluating a campus Supplemental Instruction (SI) program regarding a variety of issues: mission, goals, and objectives; program

activities; program administration; human resources; facilities; value system; awareness of individual differences; and program evaluation. Adjunct instructional programs (AIPs) are defined as those forms of group collaborative learning assistance that accompany a specific targeted course to serve as a supplement for that course. These AIP activities occur outside of class.

Arendale, D. (1997). *Suggestions for improving attendance in Supplemental Instruction sessions*. Unpublished manuscript, The University of Missouri-Kansas City. Retrieved June 12, 2005, from http://www.tc.umn.edu/~arend011/SIattendance00.pdf
This paper is a collection of suggestions developed at the University of Missouri-Kansas City and others in the field on how to increase attendance by students at Supplemental Instruction (SI) sessions. Because of the voluntary nature of SI attendance outside of course lectures, the issue of SI session attendance will be a continuing issue. A variety of factors can influence attendance. The paper provides 27 suggestions for: activities before the beginning of the term by the SI supervisor; activities by the course professor during the term; activities by the SI leader during the term; activities by the SI supervisor during the term; and activities by the SI supervisor after the academic term. It is critical that students see the relevance and connection between the activities that occur during SI sessions and what occurs during the professor's lectures.

Arendale, D. (1993). Supplemental Instruction: Improving student performance and reducing attrition. In *Educational Programs that Work: The Catalogue of the National Diffusion Network* (19th ed., p. 14.4). Longmont, CO: Sopris West, Inc.
This overview of the Supplemental Instruction (SI) program provides a narrative description of SI, minimum requirements for successful implementation of the program, and services that the National Center for SI at the University of Missouri-Kansas City can provide to institutions that wish to implement SI.

Arendale, D. (1994). Supplemental Instruction: Providing academic assistance at small colleges. *The Freshman Year Experience 7th Annual Conference for Small Campuses Conference Program and Proceedings* (pp. 61-62). Columbia, SC: The National Center for the Study of the Freshman Year Experience and Students in Transition. (ERIC Document Reproduction Service No. ED374765).
This paper describes the use of Supplemental Instruction (SI) in small colleges to provide academic support.

Arendale, D. (1997). Supplemental Instruction: Review of research concerning the effectiveness of SI from The University of Missouri-Kansas City and other institutions across the United States. In *Proceedings of the 17th and 18th Annual Institutes for Learning Assistance Professionals: 1966 and 1997* (pp. 1-25). Tucson, AZ: University Learning Center, University of Arizona. (ERIC Document Reproduction Service ED457797). Retrieved July 1, 2004, from http://www.pvc.maricopa.edu/winderinstitu... roceedings/967_proc/967proc_arendale.html.
This paper provides a narrative overview of the Supplemental Instruction (SI) model and a review of the major research studies concerning SI. The studies are based on data from the University of Missouri-Kansas City and a separate data base of nearly 5,000

research reports describing the use of SI at 270 institutions with a total student enrollment of more than 500,000 in the classes where SI was offered.

Arendale, D. (2003). *Supplemental Instruction study strategies: Using the Information Processing Model*. Retrieved July 1, 2004, from http://www.iup.edu/lec/AcadAssist/SI/IPM-related%20SI%20strategies%5B1%5D.doc
This article about Supplemental Instruction (SI) describes how the Information Processing Model of learning can be applied to SI session strategies employed by the student SI leaders. Session activities are associated with each of the stages of IPM to encourage SI leaders to employ a wide variety of activities to meet the needs of students at each stage of the IPM learning model.

Arendale, D. (1994). Understanding the Supplemental Instruction model. In D. C. Martin, & D. Arendale (Eds.), *Supplemental Instruction: Increasing achievement and retention* (pp. 11-21). New Directions for Teaching and Learning No. 60. San Francisco, CA: Jossey-Bass Publishers. Retrieved June 12, 2005, from http://www.tc.umn.edu/~arend011/SIoverview94.pdf
This chapter provides a basic overview of the Supplemental Instruction model: common factors in student attrition; development of the SI program in 1973; key SI program personnel; administration and funding of SI programs; connection of the SI program with other campus programs.

Arendale, D., & Martin, D. C. (2001). Introduction to special issue on Supplemental Instruction with underprepared students. *Journal of Developmental Education, 24*(3), 2, 40. Retrieved June 12, 2005, from http://www.tc.umn.edu/~arend011/introduction00.pdf
The guest editors provide an overview to the special theme issue of the journal that was devoted to Supplemental Instruction (SI). The introduction provides context for the collection of articles by describing the origins of the SI program.

Arendale, D., & Martin, D. C. (1997). *Review of research concerning the effectiveness of Supplemental Instruction from the University of Missouri-Kansas City and other institutions*. Kansas City, MO: The University of Missouri-Kansas City. (ERIC Document Reproduction Service No. ED370502).
This report provides both a narrative overview of the Supplemental Instruction (SI) model and a review of the major research studies concerning SI. A major portion of the research concerns a meta-analysis of SI research from 270 institutions from across the U.S. The analysis reviewed 4,945 research studies of 505,738 college students between 1982-83 and 1995-96. Regardless of institutional type or academic discipline, SI participants in comparison with non-participants receive mean final course grades that are higher (2.42 vs. 2.09), higher rates of A or B final course grades (46.8% vs. 35.9%) and mean percentages of D, F and withdrawal rates that are lower (23.1% vs. 37.1%). Even when the data is separated by broad academic disciplines or individual departments or classes, the positive differences for SI participants remain. In a national study of 13 institutions and 2,410 students, the question of helpfulness of SI for students of color was examined. The study found that students of color participated in SI at rates equal or exceeding those of White students (White, 33.8%; African American, 42.0%; Latino, 50.9%; Asian/Pacific, 33.3%; and Native American, 42.9%). Students of color

received higher grades than similar students (2.02 final course grade vs. 1.55, rate of 36% for D, F, or W vs. 43% for non-SI participants). Studies from the University of Missouri-Kansas City mirror those from the national studies. A study of UMKC that examines 375 courses with an enrollment of 14,667 students year by year from 1980-81 to 1995-96 found that SI participants earned high mean final course grades, higher rates of A and B final course grades and lower rates of D, F and course withdrawals. In a Winter 1996 study concerning the potential bias of student motivation the results favored the SI participants. SI participants received: final course grade of 2.78, rate of 58.9% for final grades of A or B, rate of 17.2% for D, F or W. The non-SI motivational control group received lower levels of academic achievement: final grade of 2.16, 33.9% A or B, and 26.8% for D, F or W. All other non-SI participants received grades similar to the motivated non-SI group: final grade of 2.38, A or B rate of 42.7%, and 38.6% D, F or W. In a study of UMKC students separated into quartile groups on the basis of standardized entrance test scores, the SI participants outperformed their non-SI counterpart quartile group in nearly all comparisons. Top quartile: SI group 3.29 final course grade vs. 2.83 for non-SI, 92.9% reenrollment vs. 93.1% for non-SI; Middle two quartile groups: SI group 2.67 vs. 2.28, 90.5% reenrollment vs. 77.9% for non-SI; Bottom quartile: SI group 2.10 final course grade vs. 1.77 for non-SI, 85.6% reenrollment vs. 77.9% for non-SI. A study of SI attendance during Winter 1996 suggested a positive correlation between higher academic achievement and higher levels of SI attendance: no SI attendance: 2.37 final course grade, 42.2% A or B, 39.3% D, F or W; attended one to three times: 2.77, 56.3% A or B, 21.4% D, F or W; attended four to seven times: 2.82 final course grade, 63.0% A or B, 17.4% D, F or W. In a study of UMKC students who were first-time freshmen students in 1989, SI participants had graduated at a rate of 46.0% by Fall 1996 as compared with 30.3% of students who had never participated in SI. Other studies include research questions concerning demographic variables and rival hypotheses.

Arendale, D., & McLaren, A. (1999). Supplemental Instruction: Variations on the basic theme. In *Selected Proceedings of the 16th (1997) & 17th (1998) Annual Conferences of the Pennsylvania Association of Developmental Educators* (pp. 40-44). Pittsburgh, PA: The Community College of Allegheny County. (ERIC Document Reproduction Service No. ED 428632). Retrieved July 1, 2004, from http://www.iup.edu/lc/pade/McLaren.htmlx

This paper describes some of the successful variations of Supplemental Instruction (SI). After an initial overview of SI, descriptions about innovations of the model. The first concerns Video-based Supplemental Instruction (VSI). VSI is described as an information delivery system. College students enroll in telecourses that are identical to credit courses delivered live on campus by the same professor. Students enrolled in these VSI course sections attend class eight hours a week rather than three hours since the videotape lectures are frequently stopped to engage in SI session activities. Developmental level students enrolled in VSI course sections earn higher final course grades than the traditional students enrolled in the live course sections. The second variation of the SI model is to use it for faculty development and renewal. Successful models include Salem State College and Anne Arundel Community College. Common activities include: SI leader providing anonymous feedback to the course lecturer; lecturer incorporating SI session activities inside of class sessions; lecturers serving as

assistant SI supervisors and expanding their instructional/learning skills by observing other professors; and other associated activities.

Ashwin, P. (2002). Implementing peer learning across organisations: The development of a model. *Mentoring & Tutoring, 10*(3), 221-231.
This article describes different ways to implement peer learning programs at institutions in the United Kingdom. A deeper understanding of organizational change can help guide administrators as they implement new programs. A version of Supplemental Instruction (SI) has been contextualized for the British postsecondary education system. An adaptation of Lewin's theory of change (1952) is applied with implementing the peer learning programs. This is an important area for further investigation since this is an important variable for the continued success of the SI program due to the need for strong support both from the administrators as well as a supportive culture that has embraced the program.

Ashwin, P. W. H. (2003). Peer Support: Relations between the context, process and outcomes for the students who are supported. *Instructional Science, 31*(3), 159-173.
Contact the author at: Institute for the Advancement of University Learning, University of Oxford, Littlegate House, St Ebbe's Street, Oxford OX1 1PT, UK (E-mail: paul.ashwin@learning.ox.ac.uk)
This paper describes a research study with a version of Supplemental Instruction in the United Kingdom. An investigation of the outcomes of a Peer Support scheme for the students who are supported is reported. It was found that attendance at Peer Support sessions was positively and significantly correlated to academic performance. This relationship was found even when prior levels of academic performance were controlled for. However, it was also found that students who attended Peer Support sessions adopted less meaning orientated approaches to studying over the course of the academic year. It is argued that this is an indication that the quality of the learning of these students fell. Qualitative evidence suggests that this change in approach was in response to an increased awareness of the assessment demands of the course and that these students had become more strategically orientated in their approach to studying as a result of their attendance at Peer Support sessions. It is argued that these results suggest that the outcomes and operation of this Peer Support scheme were influenced by the context in which it operated. Two implications of these findings are discussed.

Ashwin, P. W. H. (1993). *Supplemental Instruction: Does it enhance the student experience of higher education?* Unpublished doctoral dissertation, Kingston University, London, England.
This doctoral dissertation is concerned with the student experience of Higher Education in Britain that is influenced by Supplemental Instruction (SI). The qualitative research study of SI's impact in two classes (Applied Social Science and Computer Science) at Kingston University (UK) included interviews with SI leaders and questionnaires of first year students who were enrolled in the two classes. The purpose of this case study was to examine to what extent the educational theory of SI was matched by the student experience of it. Qualitative research suggests that SI was beneficial to students who took advantage of the service. SI leaders listed the following benefits of the program for

themselves: increased confidence, greater sense of community between different years of the course, greater understanding of the material they were facilitating, and increased interest by potential employers because of the cocurricular nature of the SI leader experience.

Ashwin, P. W. H. (1994). The Supplemental Instruction leader experience: Why SI is not teaching, a student's perspective. In C. Rust, & J. Wallace (Eds.), *Helping students to learn from each other: Supplemental Instruction, SEDA Paper 86* (pp. 87-90). Birmingham, England: Staff and Educational Development Association.
This chapter provides both a perspective as both a leader and supervisor in the Supplemental Instruction program at Kingston University and Newham College of Further Education in the United Kingdom. SI sessions is not about teaching for a number of reasons: new information is not given in addition to that provided by the professor; SI participants create the agenda for the SI sessions; no formal assessment is taken; equal focus is placed on the process of learning of material as well as the material itself; and students do not perceive themselves in the same type of power relationship with the SI leader as they feel with the course professor. SI leaders focus on involving all students at the sessions and having them process the course material.

Associated Press. (1988, October 4). Dayton program 'grade A'. *University of Dayton Newspaper*, Dayton, OH, p. 8.
This newspaper article provides an interview with Jim Melko, director of the University of Dayton (OH) concerning the use of Supplemental Instruction (SI) at the institution in the economics department with the microeconomics course. The course has been historically difficult for students due to the demand for higher order thinking and analytical skills and need to acquire and master the specific vocabulary of the economics discipline.

Barham, W. A. (2001). A supplemental learning assistance model for developmental learners. In V. L. Farmer, & W. A. Barham (Eds.), *Selected models of developmental education programs in higher education* (pp. 167-183). Lanham, NY: University Press of America.
This chapter provides a comprehensive overview of the Supplemental Instruction (SI) program. After providing a short history of developmental education in American higher education, the book chapter reviews the theoretical framework for SI, program organization, procedures for SI sessions, and a selected review of research concerning outcomes of the SI program for SI participants and the institution.

Barlow, J., & Gardiner, P. (1994). Introducing Supplemental Instruction in engineering courses. In C. Rust, & J. Wallace (Eds.), *Helping students to learn from each other: Supplemental Instruction, SEDA Paper 86* (pp. 17-24). Birmingham, England: Staff and Educational Development Association. Retrieved July 1, 2004, from http://www.umkc.edu/cad/si/sidocs/jbengi94.htm
The authors describe the implementation of Supplemental Instruction in civil, mechanical, and electrical engineering courses at Brighton University in the United Kingdom. SI was introduced in response to increasing pressures in higher education with reduced resources, much wider access, and changes in academic organizations.

Evaluation reports suggest improvement by both the SI participants as well as the SI leaders.

Barrett, M., Sutcliffe, P., & Smith, B. (1994). Students as mentors: The case of management education. *Proceedings of the Conference of the Australian and New Zealand Academy of Management* Wellington, Australia: Australian and New Zealand Academy of Management. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper describes the use of Supplemental Instruction (SI) to have advanced-level students (peer mentors) help commencing students (mentees) overcome the teaching and learning problems often associated with large lecture-based introductory courses in management in several courses at Queensland University of Technology (Australia). "Management and Organization" has the primary focus for this study. Students who attended six or more sessions had significantly higher final course grades than those who attended less than six times. It appears that motivation or self-selection was not a major variable since the students who attended six or more times had a similar academic profile to students who did not attend at the same frequency. Surveys of students suggested that the mentoring program helped them to develop new study strategies and approach the material in a more effective manor. Mentors reported that they improved their interpersonal communication skills, ability to mange group dynamics, and enhanced their personal study skills.

Bartlett, G., Terblanche, N., & Eastmond, J. N. (1996). *The politics and process of student involvement in a programme of Supplemental Instruction*. Paper presented at the South African Association for Academic Development Conference, University of Fort Hare, Republic of South Africa. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper recounts the steps (and missteps) taken in beginning an Supplemental Instruction (SI) program in two academic departments at Border Technikon (South Africa): Accounting and Management. It documents the steps taken to draw upon the resources of the Student Representative Council (SRC) in setting policy, selecting tutors, and maintaining the program's funding base. The authors advocate that SI program success is dependent upon a partnership with faculty and students sharing a stake in the outcomes. The SRC representatives advocated that all students should be eligible for consideration as SI leaders. Their view was that even academically weaker students could be helpful since they understood the challenges in the course and could help others. Also, the SRC viewed SI as a service for students and that volunteers should be solicited. In both cases, the compromise was that all students were eligible for the SI leader position however it was felt that the SI leader should be compensated for the large time commitment required. Interviews with SI leaders suggested the following benefits: increased confidence with public speaking; more interaction with course faculty; development of teaching skills; and improved personal study strategies. Interviews with SI participants suggested improved: better understanding of course material; opportunity to practice academic skills; freedom to discuss material in the smaller, relaxed SI session environment; and higher test scores.

Battistelli, L. (2004, August 30). Cal State-Long Beach center assists students in learning. *Forty-Niner CSU-Long Beach Newspaper*, Long Beach, CA,
This school newspaper article describes how the Supplemental Instruction (SI) program is part of the services provided by the California State University-Long Beach learning center.

Beasley, C. J. (1997). Students as teachers: The benefits of peer tutoring. In *Proceedings of the 6th Annual Teaching Learning Forum* (pp. 21-30). Perth, Australia: Murdoch University. Retrieved July 1, 2004, from http://cleo.murdoch.edu/au/asu/pubs/tif97/beasle21.html.
Supplemental Instruction (SI) has been customized for use at several institutions in Australia. Program results for SI participants include: improved understanding and performance in the subject area involved, improved confidence and study skills, as well as on-going friendships. SI leaders also report improvement in content knowledge and personal skills. This paper focuses quantitative and qualitative analysis concerning the use of SI at Murdoch University with business students in 1995. The two courses studied were Principles of Commercial Law and Introduction to Accounting. Many of the participants were international students.

Bech, T., & Donelan, M. (2000). *Supplemental Instruction Leaders' Conference Report*. London, UK: University College London.
This report describes events at the 7th annual Supplemental Instruction (SI) Leaders' Conference. The annual conference draws together SI leaders from across the U.K. This conference was held at St. Martin's College in Ambleside in the Lake District of England from April 17 to 19, 2000.

Beckman, K., & Powell, D. A. (2004). NDSU Supplemental Instruction. *Abstracts of Conference Papers for the 227th American Chemical Society National Meeting* (p. CHED-789). Washington, D.C.: American Chemical Society. For more information, contact the authors at the Department of Chemistry and Molecular Biology, North Dakota State University, 104 Ladd Hall NDSU, Fargo, ND 58105.
Supplemental Instruction (SI) was implemented at North Dakota State University to serve students in science courses such as general chemistry and organic chemistry. Studies suggest that regular attendees of the voluntary SI sessions attain higher final course grades.

Bidgood, P. (1994). The success of Supplemental Instruction: Statistical evidence. In C. Rust, & J. Wallace (Eds.), *Helping students to learn from each other: Supplemental Instruction, SEDA Paper 86* (pp. 71-79). Birmingham, England: Staff and Educational Development Association.
Research studies from Kingston University (United Kingdom) suggest that Supplemental Instruction has been helpful in a wide range of courses. Several studies suggested that higher levels of SI attendance are correlated with higher final course grades: Computer Systems, 1990-91: 68.2 percentile vs. 61.3 percentile for non-SI and 1991-92: 61.9 vs. 61.0; Information Systems, 1990-91: 67.5 vs. 59.2 and 1991-92: 59.4 vs. 54.1; Software Engineering, 1990-91 52.9 vs. 50.4 and 1991-92: 48.6 vs. 42.9; Mathematics, 1990-91: 61.6 vs. 56.7 and 1991-92: 58.5 vs. 53.5; and Average Mark for

All Courses, 1990-91: 62.7 vs. 56.9 and 1991-92: 57.0 vs. 52.8. Additional studies examined final course grades for comparable entry qualifications.

Black-Heiman, D. K. (1999). Effect of a relational type intervention on college students' self regulated learning [Dissertation, The Ohio State University, 1999]. *Dissertation Abstracts International, 60*(08), 2811A
The topics of learning and achievement have been of interest since the early 1900's. In the 20th century, the work of many prominent researchers has led to a better understanding of how factors such as human behavior, personality, cognition, learning styles, and motivation influence individual learning. Current research on academic achievement includes two areas: a relational type study skills intervention, Supplemental Instruction, and self regulated learning. Supplemental Instruction (SI) was an intervention designed by Deanna Martin in the early 1970s. Many studies have shown that students who receive SI for a specific course get better grades than students who do not participate in supplemental instruction for that course. The success of the intervention is due to the fact that difficult courses are targeted rather than at-risk students, study skills are taught within the context of one course, and that the group of students are led by a peer who has recently taken the course and done well. Research on self regulated learning has shown that individuals who achieve academic success share similar characteristics. Self regulated learners are motivated to learn, use cognitive strategies such as rehearsal, elaboration, and organization when they study, and they do particularly well in metacognitively knowing when and how to apply those cognitive strategies when they study. The current study attempted to implement the concepts of self regulated learning into a modified version of SI for a college level history course. The treatment was referred to as a relational type intervention (RTI). Students in the treatment group at Ohio State University discussed their motivation for the course, were taught study skills specific to history, and were taught when and how to implement such strategies. The current treatment differed from original SI in that RTI occurred within a regularly scheduled recitation time rather than outside of class time, students consented to treatment but did not volunteer to participate, a student with a master's degree implemented the treatment rather than a peer who recently did well in the course, and new material was sometimes introduced during recitation so time was not only devoted to study skill implementation. Due to these differences, careful consideration was taken not to compare the current study with SI. Multivariate analysis of variance was used to determine what effect SI had on students' self regulated learning. The results indicated that there were no statistically significant differences between the treatment and control groups on posttest dependent measures: motivation, cognitive strategy use, and metacognitive strategy use. The instrument used to measure self regulated learning components was the Motivated Strategies for Learning Questionnaire.

Blanc, R. A., DeBuhr, L., & Martin, D. C. (1983). Breaking the attrition cycle: The effects of Supplemental Instruction on undergraduate performance and attrition. *Journal of Higher Education, 54*(1), 80-89.
This article concerns an evaluation of the Supplemental Instruction (SI) program at the University of Missouri-Kansas City. The research study looked at the academic performance of 746 students enrolled in seven Arts and Sciences courses during Spring

1980. A variety of research studies were completed using data gathered from this and subsequent academic terms. SI participants in comparison with non-SI participants of similar demographic background earned higher levels of academic achievement. The first study looked at mean final course grades and the rate of D, F and course withdrawals for three groups: SI participants, non-SI participants, and motivational control non-SI participants. Students assigned to the motivational control group were those who, on a Likert scale, indicated higher interest in attending SI sessions, but who were prevented from attending because of scheduling conflicts (e.g., work, class). The final course grades favored the SI participants (2.50, DFW rate of 18.4%, $p < .01$) over the motivational control non-SI group (2.36, DFW rate of 26.5%) and other non-SI group (1.57, DFW rate of 44.0%). SI and non-SI participants were tracked regarding reenrollment rates for two succeeding academic terms. In both cases the results favored the former SI participants (Fall 1980: SI 77.4% vs. non-SI 67.3%; Spring 1981: SI 73.2% vs. non-SI 60.0%). When the students were separated by quartile groups on the basis of standardized entrance exams, SI participants outperformed their counterparts (Top quartile: final grade SI 3.10 vs. non-SI 2.30, reenrollment following term SI 86% vs. non-SI 78%; Bottom quartile: final grade SI 1.72 vs. non-SI 0.88, reenrollment following term SI 74% vs. non-SI 62%). There were long-term reductions in the percentage of D, F and withdrawals in the courses where SI was offered to students (from 34% before introduction of the SI program down to 18% during the SI program's second year). This article was the first one published outside of developmental education publications to gain national attention concerning the SI model.

Blanc, R. A., & Martin, D. C. (1994). Supplemental Instruction: Increasing student performance and persistence in difficult academic courses. *Academic Medicine: Journal of the Association of American Medical Colleges, 69*(6), 452-454.
The authors describe the use of Supplemental Instruction (SI) with medical students to earn higher final course grades in historically difficult courses. The SI process has been used successfully with students who are preparing for the USMLE Step I examination. The authors state that SI can strengthen a prematriculation program for students whose MCAT scores place them in the high-risk category for completing the medical school curriculum. To maximize learning efficiency for students in the prematriculation program, the authors suggest that a small-group preview session precedes each lecture and a small-group review follows. The article concludes with a short overview of Video-based Supplemental Instruction (VSI).

Blat, C., Myers, S., Nunnally, K., & Tolley, P. (2001). Successfully applying the Supplemental Instruction model to sophomore-level engineering courses. *Proceedings of the 2001 American Society for Engineering Education Annual Conference & Exposition* American Society for Engineering Education. Retrieved July 1, 2004, from http://www.succeed.ufl.edu/papers/01/00949.pdf
Supplemental Instruction (SI) has been used at the University of North Carolina at Charlotte for 15 years with mixed success in various academic content areas. In the past four years SI has been used in the College of Engineering in Statics (MEGR 2141), Mechanic of Solids (MEGR 2144), Network Theory II (ECGR 2112), and Applied Calculus for Engineering Technology students (EGET 3171). Research suggests that SI contributes to higher final course grades and lower rates of D, F, or course withdrawals.

SI participants who attend five or more sessions during the academic term are more likely to persist for an additional academic term than students who do not. There were no significant differences regarding SI participation by gender, ethnicity, average Math SAT, average Verbal SAT, or average predicted GPA. The chapter concludes with recommendations for implementation of SI at a campus.

Blat, C. M., & Nunnally, K. (2004). Successfully applying the Supplemental Instruction model to engineering and pre-engineering. In *Proceedings of the 2004 American Society for Engineering Education Annual Conference & Exposition* (pp. 12-17). Savannah, GA: American Society for Engineering Education. Retrieved June 2, 2005, from http//fie.engrng.pitt.edu/fie2004/papers/1067.pdf
Supplemental Instruction (SI) was used at the University of North Carolina-Charlottein engineering and pre-engineering classes to increase student grades in the courses. Final course grades are higher and the rates of D, F, and course withdrawals are lower.

Bocock, J. (1993, February). Supplemental Instruction: Striking a balance in the curriculum. *The Lecturer (The University & College Lecturers' Union),* 7.The Supplemental Instruction (SI) program is cited by Jean Bocock, Assistant Secretary for Higher Education in the United Kingdom, as one way to deal with a number of pressing educational needs: dealing with rising student to teacher ratios [8.5:1 in 1980 to almost 20:1 today]; shifting towards student-centered learning; and capitalizing upon the resources of students to teach other students. One concern expressed by NATFHE, the University & College Lecturers' Union, is that SI not be used as a cheap alternative to hiring trained staff and paying them a proper salary.

Botha, L., Van der Merwe, A., & De Klerk, E. (1996). *Tutor programme vs. Supplemental Instruction at the University of Stellenbosch*. Paper presented at the South African Association for Academic Development Conference, University of Fort Hare, Republic of South Africa. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
The Division of Academic Programmes (DADP) at the University of Stellenbosch (South Africa) runs academic development programs serving the twelve faculties of the University. Both a traditional tutor program and Supplemental Instruction (SI) was provided as support and enrichment for the students. At the time of this paper's publication, quantitative data was not available for summative evaluation and comparison of the two approaches to academic assistance. Interviews with students suggested high satisfaction with the SI program for several reasons: high motivation level of SI leaders; opportunity to work on writing effective summaries during SI sessions; developing understanding of basic concepts and subject specific terminology; development of study strategies; and improved skills for completing essay examination questions.

Bowles, T. J., & Jones, J. (2003). An analysis of the effectiveness of Supplemental Instruction: The problem of selection bias and limited dependent variables. *Journal of College Student Retention, 5*(2), 235-243.

This article extends beyond the usual reliance upon single equation regression models to evaluate Supplemental Instruction (SI) and employs a simultaneous equation, limited dependent variable evaluation model. Results of the research study at Utah State University at Logan suggest that students with below average academic ability are more likely to attend SI and that common measures of student ability included in single equation models fail to adequately control for this characteristic. The authors suggests that the older evaluation models have underestimated the effectiveness of SI.

Bowles, T. J., & Jones, J. (2003). The effect of Supplemental Instruction on retention: A bivariate probit model. *Journal of College Student Retention, 5*(4), 431-437,
This study investigated the effectiveness of Supplemental Instruction (SI) with increasing student academic outcomes. While many previously published studies on SI have been single equation regression models, this study was a bivariate probit model. Two important issues investigated by these researchers included: both SI attendance and retention are categorical variables; both of these variables are jointly determined endogenous variables. This study suggests that single equation models are likely to overestimate the effect of SI participation.

Boylan, H. R. (Ed.). (1996). *An evaluation of the Texas Academic Skills Program (TASP).* Unpublished manuscript, The National Center for Developmental Education, Boone, NC. Retrieved July 1, 2004, from http://www.thecb.state.tx.us/divisions/univ/tasp/boylans/boynof.htm#top
Under contract with the Texas Higher Education Coordinating Board (THECB), the National Center for Developmental Education conducted an extensive review of the Texas Academic Skills Program (TASP) from April through September of 1996. The site team of eight consultants conducted site visits to 20 Texas colleges and reviewed survey data from 96 institutions. The report provided recommendations for improvement of TASP. The team found that institutional procedures generally do not emphasize getting students through remediation as quickly and efficiently as possible. Instead, these procedures are designed to insure that students are engaged in continuous remediation until such time as they pass all sections of the TASP Test in compliance with state law. Recommendation #19 recommends that Texas institutions establish timely completion of remediation as a priority and they document specific efforts undertaken to reduce the amount of time TASP students spend in remediation. A noncourse program that can help achieve the aforementioned objective is discussed in Recommendation #20. That recommendation states that Texas institutions which have not done so already consider adoption of Supplemental Instruction (SI) to help students succeed in historically difficult courses that are often encountered in the first year curriculum. This noncourse academic support program could assist a number of students without the need for enrollment in remedial courses.

Boylan, H. R. (1999). Exploring alternatives to remediation. *Journal of Developmental Education, 22*(3), 2-4, 6, 8, 10.
In this journal article Dr. Hunter Boylan, Director of the National Center for Developmental Education , the author explores five alternative ways to serve students who previously may have been served through traditional developmental education courses: (1) freshman year seminars; (2) Supplemental Instruction; (3) learning

communities and collaborative learning; (4) paired courses; and (5) critical thinking instruction. For students that do not need the extensive time required by full academic-term length developmental courses, the five alternatives explored in the article might be as effective with the benefit of shorter investment of time, personnel, and money. The author cited three studies where SI has been especially effective with developmental students: (1) Blanc, DeBuhr, & Martin, 1983; (2) Commander, Stratton, Callahan, & Smith, 1996; and (3) Ramirez, 1997.

Boylan, H. R., Bonham, B. S., & Bliss, L. B. (1992). *National study of developmental education: Students, programs and institutions of higher education*. Unpublished manuscript, Boone, NC: National Center for Developmental Education.
Through a grant from the EXXON Education Foundation, the National Center for Developmental Education conducted the most extensive study of developmental education. The 1989 to 1992 study included 116 institutions representing a wide diversity of types. More than 6,000 students were subjects of the longitudinal study. The purpose of the study was to determine what is actually done in developmental education, to explore whether or not developmental programs actually contribute to student success, and, if so, to identify what types of programs and services have the greatest impact upon student success. Among the list of instructional factors related to student success, Supplemental Instruction (SI) is one of the items. Other items listed were: mastery level performance, frequent testing, immediate feedback, required remediation, individualized instruction, lab activities, integrated teaching of critical thinking skills, and close proximity of classrooms and support services.

Brazelton, W., Schmidtlein, P., & Baugher, M. (1981, October). *Reducing student attrition in the first-year economics course through skill-based Supplemental Instruction*. Paper presented at the University of Missouri Economics Conference, Columbia, MO. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper discusses the use of Supplemental Instruction (SI) to improve student academic performance in introductory college-level economics courses at the University of Missouri-Kansas City. Data suggests that SI participants receive higher mean final course grades (66.6% A and B final course grades for SI participants vs. 45.6% for non-SI participants) and a lower rate of D, F or course withdrawals (14.8% vs. 21.1%). The total percent of unsuccessful enrollments (D, F or course withdrawal) for the course was reduced from 34 percent before the introduction of SI to 19 percent during the second year that SI was offered to the students in the course.

Bridgham, R. G., & Scarborough, S. (1992). Effects of Supplemental Instruction in selected medical school courses. *Academic Medicine: Journal of the Association of American Medical Colleges, 67*(10), 569-571.
This article describes the use of Supplemental Instruction (SI) in the College of Human Medicine of Michigan State University with courses in biochemistry, physiology, pharmacology, genetics, gross anatomy, and histology. SI attendance was mandatory for all first- and second-year students who are on probation and optional for all others. A study of students enrolled in Biochemistry, Physiology, and Pharmacology courses between 1988 and 1990 suggests that SI attendance was correlated with higher mean

final course grades. The authors suggest about twenty specific activities for SI sessions. In general, SI participants earned higher mean final course grades. The authors mentioned that the success of the SI program has encouraged the College to maintain an admissions policy that encourages a more diverse student population.

Briere, P., Congos, D. H., & Wallace, J. (1995). *Promoting the Supplemental Instruction program.* [Videotape]. Arendale, D. (Producer)Kansas City, MO: Center for Supplemental Instruction, The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This videotape discusses various aspects of promoting the Supplemental Instruction (SI) program. Discussion participants reviewed a variety of topics including recruiting SI leaders, promoting attendance among students, and gaining support from faculty and administrators. The panelists are campus SI supervisors as well as Certified Trainers with the SI program. Wallace is the Certified Trainer from the United Kingdom.

Briere, P., Garland, M., Visor, J. N., & Browning, S. (1995). *The use of Supplemental Instruction with target populations.* [Videotape]. Arendale, D. (Producer) Kansas City, MO: Center for Supplemental Instruction, The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This videotape records a panel discussion concerning the use of Supplemental Instruction (SI) with targeted subpopulations of students. Generally the SI program is provided for all students on campus. Due to specific needs and restricted funds, the SI program may be targeted with success for any of the following groups: students on academic probation; academically underprepared students; student-athletes; Upward Bound high school students; international students; and programs that limit grant funds to eligible populations (e.g., Carl Perkins Vocational, TRIO programs). The panelists discuss how to market to these student groups and conduct appropriate evaluation systems. The panelists are campus SI supervisors as well as Certified Trainers with the SI program.

Brock, L. (2003). *Effect of Supplemental Instruction on academic performance of community college students*. Unpublished MA thesis, California State University, Stanislaus, CA.
This study examined the potential impact of Supplemental Instruction (SI) with public community college students enrolled at Modesto Junior College (CA). The analysis included both the level of involvement in SI as measured through sessions attended as well as the preentry attributes of the students: prior academic achievement, prerequisite course grades, interest, and self-efficacy.. Nine sections of the following courses which offered SI were selected for the study: College Algebra, Elementary Statistics, Elementary Algebra, English Basic Composition and Reading. Voluntary participation in SI ranged from one-third to two-thirds of the classes in the nine course sections. In nearly all the courses both the decision of participate in SI and the number of times that SI sessions attended were found to be statistically significant with higher final course grades. In several sections there were no statistically significant differences between SI and non-SI participants. The preentry attributes of the students did not significantly

contribute to higher grades. The researcher made several recommendations for further research including a study of the impact of early participation in SI rather than waiting until later in the academic term. There are no reported studies of SI that have evaluated this variable for its possible impact on student grades in the course.

Browning, S., Minkoff, D., Wallace, J., & Zerger, S. (1995). *The use of Supplemental Instruction for faculty and SI leader development.* [Videotape]. Arendale, D. (Producer) Kansas City, MO: Center for Supplemental Instruction, The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This videotape records a panel discussion on the uses of Supplemental Instruction (SI) for both faculty and SI leader professional development. Topics covered included: faculty development in the United Kingdom and the U.S.; SI leaders serving as partners with faculty members to improve classroom learning; using SI as an anonymous feedback mechanism for faculty members; and developing a faculty focus on increased student learning. The panelists are campus SI supervisors with the SI program. Wallace is Certified Trainer for the United Kingdom with Minkoff and Zerger trainers for the U.S.

Bruzell-Nilsson, M., & Bryngfors, L. (1996). Use of Supplemental Instruction to improve student learning in Sweden. *A passport to enhanced student learning, success, satisfaction, and retention. Proceedings of the International Conference on the First-Year Experience, St. Andrews, Scotland* (pp. 67-68). Columbia, SC: The National Resource Center for the Freshman Year Experience and Students in Transition. (ERIC Document Reproduction Service No. ED398792) Retrieved July 1, 2004, from http://www.si-mentor.lth.se/SI%20ref_webb/pdf/Bruzell-Nilsson_Bryngfors_Student%20Success%20in%201996.pdf.
This chapter in the conference proceedings describes the use of Supplemental Instruction (SI) at postsecondary institutions in Sweden. Both a basic overview of the SI model and adaptions to the SI model for use in Sweden are shared.

Bryngfors, L., & Barmen, G. (2000). *The LTH Program: A structured introductory process to improve first year students' performance and learning*. Unpublished manuscript, The Lund Institute of Technology, Sweden. Available from the authors: Lund Institute of Technology, PO Box 118, SE-221 OO LUND, Sweden, Leif.Bryngfors@kansli.lth.se
Higher education in Sweden faces many of the same challenge as the rest of Western Europe and the United States. The LTH Program combines an orientation process with a support system to help new students in their transition from secondary school to university studies. Essential components of the program stimulate the learning process of students while encouraging them to find a balance between academic and social activities. Three years experience with the LTH program shows an increase in first-year performance and retention by as much as 50 percent. Supplemental Instruction is a critical component of the LTH program.

Bryngfors, L., & Barmen, G. (2003). The LTH Program -- A Structured introductory process to improve first-year students' performance and learning. *National Association for Student Personnel Administrators Journal, 40*(4), Article 3. Retrieved July 1, 2004,

from http://publications.naspa.org/naspajournal/vol40/iss4/art3
This article focuses on a comprehensive approach to student persistence at the Lund Institute of Technology in Sweden in a manner consistent with Swedish ethos. The explorations led to the development of the LTH (*Swedish abbreviation for Lund Institute of Technology*) program, which combines an orientation process with a support system to help new students in their transition from secondary school to university studies. Essential components of the program seek to stimulate the learning process of students, while encouraging them to find a balance between academic and social activities. Three years experience with the LTH program shows an increase in first-year performance and retention by 50%. Supplemental Instruction (SI) is an important component of the LTH program.

Bryngfors, L., & Bruzell-Nilsson, M. (1997). *Supplemental Instruction: An experimental project with the method of Supplemental Instruction*. Lund, Sweden: The Lund Institute of Technology and The Faculty of Science. Available: Lund University, Center for Supplemental Instruction, Kansli LTH, Box 118, 221 00 Lund, Sweden. Retrieved July 1, 2004, from http://www.si-mentor.lth.se/SI%20ref_webb/pdf/Bryngfors,%20Bruzell-Nilsson_An%20Experimental%20Project%201997.pdf
This report provides an overview of the expansion of the Supplemental Instruction (SI) program into Sweden. Research studies in 1996 from Lund University (Lund, Sweden) suggest that SI participation contributes to higher percent of students passing the final examination for the course (46 percent vs. 39 percent), and a higher rate of reenrollment (15 percentage points higher). The mean average of students participating in SI was 46 percent. Interviews with SI participants, SI leaders and the course professors who had SI attached to their class reported positive comments concerning the impact of the SI program. SI leader comments could be placed into three categories: contact with and the opportunity to assist in the learning process of the new students; deeper knowledge of the subject; and deeper knowledge of the learning process and leadership experiences. Faculty members mentioned the following reasons for supporting the SI program: received feedback from students concerning problems that students encountered but did not disclose to the course instructor; SI sessions provided another forum for students to engage in deeper understanding and problem solving; students appeared more ready to participate in class oral examinations due to practice of similar activities in SI sessions; students were more skilled in participating in collaborative learning activities required by the course professor; and students appeared to have higher morale since they established working relationships with other students who could support their academic work. The authors for this report also serve as the Certified Trainers for SI in Sweden and surrounding countries.

Bryngfors, L., & Bruzell-Nilsson, M. (1997). Supplemental Instruction: An experimental project with the method of Supplemental Instruction. In R. B. Ludeman, & S. Hubler (Eds.), *Quality student services around the world: Bridging student needs and student success* (pp. 221-246). Washington, D.C.: National Association of Student Personnel Administrators.
This report provides an overview of the expansion of the Supplemental Instruction (SI) program into Sweden. Research studies in 1996 from Lund University (Lund, Sweden) suggest that SI participation contributes to higher percent of students passing the final

examination for the course (46 percent vs. 39 percent), and a higher rate of reenrollment (15 percentage points higher). The mean average of students participating in SI was 46 percent. Interviews with SI participants, SI leaders and the course professors who had SI attached to their class reported positive comments concerning the impact of the SI program. SI leader comments could be placed into three categories: contact with and the opportunity to assist in the learning process of the new students; deeper knowledge of the subject; and deeper knowledge of the learning process and leadership experiences. Faculty members mentioned the following reasons for supporting the SI program: received feedback from students concerning problems that students encountered but did not disclose to the course instructor; SI sessions provided another forum for students to engage in deeper understanding and problem solving; students appeared more ready to participate in class oral examinations due to practice of similar activities in SI sessions; students were more skilled in participating in collaborative learning activities required by the course professor; and students appeared to have higher morale since they established working relationships with other students who could support their academic work. The authors for this report also serve as the Certified Trainers for SI in Sweden and surrounding countries.

Bryson, D. (1987, March 8). Study sessions help medical students get over the hump of board tests. *Daily American Republic Newspaper*, Popular Bluff, MO, p. 5.
This newspaper article describes an adaptation of the Supplemental Instruction (SI) model with medical students who are studying to pass their licensure examination so that they may continue with their clinical studies. The article includes interviews with Dr. Robert Blanc, Coordinator of Curriculum Development at the UMKC medical school and Dr. Deanna Martin, Director of the Center for Academic Development. Some of the activities of the semester-length board preparation program mentioned by students interviewed in the article are: students learn how to work in groups to learn new material, students must be able to explain concepts to one another to assure understanding, students focus on the thinking process as much as the content, and students develop confidence in their ability to do well with challenging examinations.

Burmeister, S. L. (1994). The challenge of Supplemental Instruction: Improving student grades and retention in high risk courses. In M. Maxwell (Ed.), *From access to success: A book of readings on college developmental education and learning assistance programs* (pp. 209-214). Clearwater, FL: H&H Publishing Company.
This chapter provides a general overview of the Supplemental Instruction (SI) program, its history and components. Review of significant research studies of the SI model is included (e.g., course grade and reenrollment by entry-test score, graduation rates). A new study suggests that SI attendance was correlated with higher final course grades in three types of mathematics courses: College Algebra (2.21 vs. 1.98), Calculus (2.28 vs. 1.83), and Statistics (2.49 vs. 2.32). The study included data from 45 institutions with a total of 11,252 students enrolled in 177 classes. SI participants earned mean final course grades that were higher than non-participants in all three categories of mathematics courses. Suggestions are provided for improving the effectiveness of campus SI programs.

Burmeister, S. L. (1996). Supplemental Instruction: An interview with Deanna Martin. *Journal of Developmental Education, 20*(1), 22-24, 26.
This is the transcript of an interview with Dr. Deanna Martin, creator of the Supplemental Instruction (SI) model. Issues discussed in the interview include: new innovations in the SI model; cost effectiveness of the model; use of SI in other countries; current educational climate in higher education; disagreement with mandatory testing and placement of students into tracked developmental education programs; challenges with lecture-based educational delivery systems with increasing student learning mastery; and future opportunities for use of SI and Video-based Supplemental Instruction.

Burmeister, S. L., Carter, J. M., Hockenberger, L. R., Kenney, P. A., McLaren, A., & Nice, D. L. (1994). Supplemental Instruction sessions in College Algebra and Calculus. In D. C. Martin, & D. Arendale (Eds.), *Supplemental Instruction: Increasing achievement and retention* (pp. 53-62). New Directions for Teaching and Learning No. 60. San Francisco, CA: Jossey-Bass
Based on their observations of math Supplemental Instruction sessions, the authors review several active learning strategies that have been effective for students of the discipline. Critical activities for SI participants include: active involvement by all SI session participants; test their approaches to problems; precise use of math vocabulary; attention to precision; practice solving problems under time constraints; vocalize their thinking process regarding problem solving to each other; and set part of the agenda of SI sessions. SI leaders need strong support from the SI supervisor for such activities to characterize SI sessions.

Burmeister, S. L., Kenney, P. A., & Nice, D. L. (1996). Analysis of effectiveness of Supplemental Instruction sessions for college algebra, calculus, and statistics. In J. J. Kaput, A. H. Schoenfeld, & E. Dubinsky (Eds.), *Research in Collegiate Mathematics Education II* (pp. 145-154). Providence, RI: American Mathematical Association and Mathematical Association of America.
After an overview of the Supplemental Instruction (SI) model, this article focuses on a research study concerning the effectiveness of SI for 11,252 students enrolled in 177 courses in college algebra, calculus and statistics from 45 different institutions. In comparison with non-SI participants, SI participants earned higher mean final course grades and experienced lower rates of withdrawals: algebra (2.21 vs. 1.98); calculus (2.28 vs. 1.83); and statistics (2.49 vs. 2.32).

Burmeister, S. L., McLaren, A., & Zerger, S. (1995). *Supplemental Instruction in the content areas: English, Humanities, and Mathematics.* [Videotape]. Arendale, D. (Producer)Kansas City, MO: Center for Supplemental Instruction, The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This videotape records a panel discussion on the subtle differences and needs for Supplemental Instruction in different content areas. Topics included: differences in problem-based and vocabulary-based curriculums; use of SI in laboratory situations; strategies for mastering vocabulary; relationships between lectures and textbooks in different content areas; and the degree to which strategies for curriculums overlap with

each other. The panelists are all campus SI supervisors as well as Certified Trainers with the SI program.

Bushway, S. D., & Flower, S. M. (2002). Helping criminal justice students learn statistics: A quasi-experimental evaluation of learning assistance. *Journal of Criminal Justice Education, 13*(1), 35-57.
This article describes a quasi-experimental study of the use of Supplemental Instruction (SI) in a statistics course taken by students enrolled in criminal justice and criminology at a large public university. Three other modifications were made in the class: (1) participation in SI was mandatory for at-risk students and voluntary for all others in the class; (2) offering web-based quizzes; and (3) mandatory lecture class attendance for at-risk students. SI and the quizzes contributed to increased success of students while the mandatory attendance did not have an apparent effect. The intent of the online quizzes was to increase reading of the textbook.

Campbell, M. L. (1994). *The cognitive effect of Supplemental Instruction on student achievement in general biology*. Unpublished Master's of Education thesis (M.Ed.), Slippery Rock University, PA: Available: Interlibrary loan from Slippery Rock University of Pennsylvania.
Supplemental Instruction (SI) was studied at Slippery Rock University (PA) with a college-level general biology class. SI participants attended SI sessions twice each week and were compared to a similar group of students who did not participate but had equivalent academic preparation level. The SI group outperformed the control group by half a letter grade, $p<.0285$. Qualitative interview procedures were employed to confirm the effectiveness of SI session attendance with higher final course grades.

Campbell, M. L. (2002). Supplemental Instruction academic assistance within Pennsylvania's ACT 101 Program for disadvantaged students [Dissertation, University of Pittsburgh, 2001]. *Dissertation Abstracts International, 62*(12), 4083.
Supplemental Instruction (SI) is a specialized form of group academic support developed to increase student performance and retention by proactively integrating study skills acquisition strategies into voluntary out-of-class sessions targeting content from high-risk courses (Martin & Arendale, 1993). SI features faculty partnerships, sessions focused upon peer collaborative learning, SI leaders who attend class lectures, and on-going assessment (Martin & Arendale, 1994). To determine how to foster SI academic assistance within programming like Pennsylvania's Act 101 initiative for disadvantaged students, this study determined the differences in perceptions of SI between Act 101 tutorial coordinators with established SI programs and those who may potentially start new SI programs. A self-administered questionnaire was developed by the researcher using current SI literature and mailed to each of the state's Act 101 program tutorial coordinators. Of the 79 subjects, 56 (71%) returned completed questionnaires. Though 27% of the Act 101 tutorial coordinators were unaware of SI, 46% reported familiarity with and usage of the model. Act 101 SI efforts were characterized as small in scale, nascent in development, and lacking many recommended elements of the SI model (e.g., faculty partnership). Act 101 tutorial coordinators lacking SI programs, yet aware of the potential, tended to underestimate the benefits of such programming like the emphasis on high-risk courses, integration of

study skills, and lack of remedial stigma. Moreover, they tended to overestimate the difficulty associated with overcoming challenges to program administration like program costs and recruiting students to SI sessions. However, most Act 101 tutorial coordinators valued similar program characteristics such as promoting student persistence and meeting academic needs as influencing the use of SI. Finally, perceived limitations in program funding, professional supervision, and campus support emerged as the most prevalent issues impeding the expansion of SI within Act 101.

Capstick, S., Aisthorpe, A., Fleming, H., Haynes, S., & Spiers, M. (2003). *Peer assisted learning in Business Education: Innovative student support with wide-ranging benefits*. Unpublished manuscript, Bournemouth University, United Kingdom. Retrieved July 1, 2004, from http://www.business.ltsn.ac.uk/events/BEST%202003/full%20papers/Working%20Papers/capstick.pdf
Peer Assisted Learning (PAL), an adaptation of the Supplemental Instruction (SI), was used at Bournemouth University (United Kingdom) in the Business School. The manuscript describes the PAL program, short history of the introduction of SI to the United Kingdom, theories of group and individual learning, and operational issues associated with implementing the PAL program. PAL is offered by 80 PAL leaders in 13 courses: computing, conservation sciences, hospitality, business information technology, business information systems management, communication, and law.

Capstick, S., & Fleming, H. (2002). Peer assisted learning in an undergraduate hospitality course: Second year students supporting first year students in group learning. *Journal of Hospitality, Leisure, Sport, and Tourism Education, 1*(1), 69-75. Retrieved July 1, 2004, from http://www.hlst.ltsn.ac.uk/johlste/vol1no1/practice/0001.pdf
This article describes the use of Peer Assisted Learning (PAL) in the Management Foundation Course within the School of Services Industries at Bournemouth University (United Kingdom). The PAL program is an adaptation of the Supplemental Instruction (SI) program. The article first provides an overview of the PAL program and how it has been adapted from the SI model for use within the UK education system.

Carbon, D. (1995, August 1). Universities give peer program top marks. *Courier Mail Newspaper*, Brisbane, Queensland, Australia, p. 25.
This newspaper article reports on the implementation of Supplemental Instruction (SI) at three postsecondary institutions in Australia (Queensland University of Technology, University of Queensland, and the University of Southern Queensland). Henry Loh, QUT anatomy professor, reported reducing students' failure rate from 20 to 5 percent after the introduction of the SI program. However, he implemented the program more to increase academic performance than to just reduce student failure rates. Barbara Kelly of UQ reports that SI leaders regularly provide feedback to the course professors regarding the comprehension level of the students. At UQ the SI program is being used in biochemistry, microbiology, engineering, chemistry, and law. Kelly requires SI leaders to maintain diaries to record SI session activities, student behaviors, and suggestions to improve the program. SI leaders report improvement of their confidence levels, developed better communication skills, and believed that their employment prospects were improved.

Carr, A. R. (2002). *A study to determine the effect of a university's Supplemental Instruction program on retention*. Unpublished manuscript, Master's Thesis, Northern State University, 2002. Available: Interlibrary loan from Northern State University.
The topic to be investigated in this study was whether regular use of Supplemental Instruction (SI) by at risk freshmen students during the fall semester of 2001 at Northern State University (SD) would result in an increase in persistence from the fall semester of 2001 to the fall semester of 2002 when compared to freshmen students who were also at risk but did not regularly use SI. Courses supported by the SI program included Principles of Sociology, History of Western Civilization II, General Chemistry, General Psychology, American Government, and Biology Survey. All students in the study met the income guidelines of federal TRIO programs for designation as at-risk by being economically-disadvantaged and/or first-generation college. To be considered a SI participant, a threshold was established of attending four or more sessions during the academic term. The results favored the SI participants as they persisted at a rate of 59% as compared with a peer group who persisted at a rate of 52%.

Carroll, D. (1994, September 13). UMKC to work with South African school. *The Kansas City Star Newspaper*, Kansas City, MO, p. B3.
This newspaper article describes an agreement between the University of Missouri-Kansas City and the University of Port Elizabeth in South Africa concerning the Supplemental Instruction (SI) program. UPE has been successfully using the SI program already for one year.

Carson, D., & Plaskitt, N. (1994). *A descriptive study of the attitudes of first year students at the University of Port Elizabeth toward Supplemental Instruction and evaluation thereof*. Unpublished doctoral dissertation, University of Port Elizabeth, Port Elizabeth, Republic of South Africa.
This dissertation study of Supplemental Instruction (SI) was conducted at the University of Port Elizabeth in the Republic of South Africa. The study examined students' perceptions of the effectiveness of SI in helping them to acquire skills such as critical thinking, essay writing, and reading of textbooks. The study surveyed Sociology and Economics students' perceptions of the values of SI and found that students perceived four main reasons why SI is effective: improvement of learning ability; increased interest in the subject; a forum to meet new friends; and SI leader support. A need for greater structure within SI sessions was offered as the most common response for improvement of SI.

Cezar, T., & Gordy, K. (1985). Supplemental Instruction: A model of academic support. *Published Conference Proceedings of the Midwest Regional Association of Developmental Educators* St. Louis. MO: Midwest Regional Association of Developmental Educators.
This paper describes the use of Supplemental Instruction (SI) with improving academic achievement of students in historically difficult courses.

Chandler, J. (1994, December 24). Peer guidance tutors: Group study sessions led by 'A' students help some struggling with 'killer' math and science courses at community colleges. *Los Angeles Times Newspaper*, Los Angeles, CA, pp. B1, B6.

This newspaper article describes the use of Supplemental Instruction (SI) program in several colleges in the Los Angeles, CA area (Pierce College, Glendale Community College, Cal State Northridge, Pasadena City College, Valley College in Van Nuys). At Pierce College in a biology course 76 percent of the SI participants earned a grade of A, B, or C while the non-SI participants earned a similar grade only 50 percent of the time. Glendale Community College has a large program with 50 SI leaders. A challenge mentioned by administrative leaders some of the SI programs was finding stable funding to continue the program each year. Several interviewees mentioned that the SI program was important for all students, not just the ones in severe academic trouble.

Christie, R., & Cheah, S. (1995). *Support structures for students in information technology at Queensland University of Technology*. Unpublished manuscript, Queensland University of Technology at Brisbane, Queensland, Australia. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper describes the use of Supplemental Instruction (SI) at the Queensland University of Technology (Australia) in information technology courses. Based on qualitative research studies, the following results occurred: 1) SI participants: were appreciative of opportunity to share their academic problems and doubts with someone who had successfully completed the course; 2) SI leaders: improved their skills in leadership, interpersonal communication, problem solving, study and time management; and 3) course instructors: improved their teaching by receiving timely feedback from the students. There was a positive correlation between higher levels of SI attendance and receiving high marks (6 or 7) in the course.

Clark, C. (1997). *Report by the National Centre for Supplemental Instruction Southern Africa at the University of Port Elizabeth fro the Department of Academic Development at the University of Missouri-Kansas City*. Unpublished Manuscript, University of Port Elizabeth, Port Elizabeth, Republic of South Africa. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper describes results from the 1997 Supplemental Instruction (SI) national South Africa survey. Currently 53 tertiary institutions comprising more than 140 faculty and staff members have been trained in use of SI by the Southern African Center for SI based at the University of Port Elizabeth (UPE) in the Republic of South Africa. Continuing technical assistance and professional development workshops are offered by the National Center at UPE for institutions with SI programs.

Clark, C., & Brophy, B. (1995). *Student perceptions of the Supplemental Instruction (SI) programme at the University of Port Elizabeth*. Paper presented at the South African Association for Academic Development Conference, Technikon Free State, Republic of South Africa. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper describes the use of Supplemental Instruction (SI) at the University of Port Elizabeth (South Africa). A questionnaire investigated the attitudes of: attenders and non-attenders, regular and irregular attenders, prepared and underprepared students, humanities and science students, and finally, pass and failures. This paper focuses on

prepared and underprepared students. The underprepared students often only attended SI when they had problems in the course. As a group that studied by themselves. The more prepared students found the SI sessions useful due to the use of collaborative learning techniques.

Clark, C., & Koch, E. (1997). Supplemental Instruction for the South African context: A case study at the University of Port Elizabeth. In R. B. Ludeman, & S. Hubler (Eds.), *Quality student services around the world: Bridging student needs and student success* (pp. 124-146). Washington, D.C.: National Association of Student Personnel Administrators. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper describes how the Supplemental Instruction (SI) program was adapted for use at the University of Port Elizabeth (UPE) in the Republic of South Africa. Issues discussed in the paper include: perceptions and academic performance of first year students; diversity in student composition in terms of language, culture and educational background; departments and curriculum developments; and the personal growth of SI leaders. SI is offered to students in 19 departments offering 25 courses in the Faculties of Science, Arts, Law, Economics, Social Science, and Health Science. The SI program is supervised by the Centre for Organisational and Academic Development (COAD). In a qualitative and quantitative study of students from Fall 1995 SI participants earned higher grades than nonattendees in nearly all courses. Follow up in the other courses suggested that SI was less than effective due to heavy time tabling of the students that precluded their regular attendance in SI sessions. Feedback provided through the SI program led to curricular reform in several courses where many students experienced academic challenges. SI was found to be equally effective for students from racially diverse and academically disadvantaged backgrounds. Faculty development activities occurred when lecturers attended SI leader training workshops and embedded SI session activities inside their traditional classroom presentations. The researchers suggested that participating lecturers changed their lecture style, made changes to the curriculum, and became more sensitive to diversity issues. SI leaders reported changes due to their involvement: reinforced knowledge of the academic discipline; improved personal academic performance; increased their facilitation and interpersonal skills; increased personal self esteem and confidence levels; and increased career opportunities due to skills in group facilitation.

Clark, C., & Mallon, P. (1998). *Supplemental Instruction as a tool to improve student success at South African tertiary institutions*. Unpublished manuscript, University of Port Elizabeth, Port Elizabeth, Republic of South Africa. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This unpublished manuscript describes the use of Supplemental Instruction (SI) with students at the University of Port Elizabeth (UPE) and other institutions in the Republic of South Africa. UPE was selected by UMKC to serve as the training and technical assistance center for Africa. To date national workshops have been conducted 14 times with 140 faculty and staff members from 53 tertiary institutions in South Africa. This paper describes the historical development of SI with Historic Black Universities, Historic White Universities, and Technikons/Colleges. Often the SI program is located

within the academic development unit. It is common that SI programs have been introduced to redress inequalities in academic preparation by the newly admitted students from widely diverse ethnic backgrounds and academic preparation levels.

Clark, L. R. (1997). *Outcomes of Supplemental Instruction for History 1310 and 1320 at Southwest Texas State University*. Unpublished Masters of Arts Thesis, Southwest Texas State University, San Marcos, TX. Available: Interlibrary loan from Albert B. Alkek Library, Southwest Texas State University, San Marcos, TX.
This study sheds light on the effectiveness of Supplemental Instruction (SI) in achieving student academic goals, enhancing student performance in difficult entry level college classes and impacting the success of students with varying abilities between Fall 1995 and Spring 1997 at Southwest Texas State University in History 1310 and History 1320. SI participants out-performed non-SI participants on the three academic outcomes examined: final course grades (mean grade difference: 2.91 vs. 2.17 and rate of A, B, or C: 95.5% vs. 73.3%), D or F course rates (18.9% vs. 37.0%), and institutional persistence (81.1% vs. 63.0%). SI attendance was defined as attending five or more times during the academic term. SI was equally effective with general (2.91 vs. 2.17), non-traditional (2.89 vs. 2.44) and part-time (2.78 vs. 1.90) populations. This research also indicated minority students participated in SI in greater proportions than non-minority students. A significant cross-over or repeat SI population was found. This research concluded that participation in SI result in higher final course grades and successful course completion; the resulting grade improvement is reflected in improved retention (84.2% vs. 72.6%). The researcher noted that the impact of SI may be understated due to analysis of entry level characteristics of the students that suggest that the SI participants tend to be less academically prepared than the non-SI participants (lower high school rank and SAT scores).

Clulow, V. G. (1998). *Supporting student learning in high risk university subjects and the interrelationship to effective subject teaching: An analysis of a peer tutoring experience*. Unpublished doctoral dissertation, University of Melbourne, Parkville, Victoria.
This dissertation is concerned with the detailed accounts of 21 students who participated with Supplemental Instruction (SI) in a Statistics for Marketers course. The focus of the qualitative research design was how can students' critical awareness of their learning experience while participating in an SU group, inform the teaching practice in universities, at a time when the institution is facing difficult challenges. The critical findings from the study were that: students were highly sensitive to factors that influenced the effectiveness of their learning, and these included: class size, workload, learning effectiveness in class time and opportunity for participation in classes. SI was found to be significant for improving student involvement in the course that resulted in higher academic outcomes for the students. Students found that SI enabled guide learning from a subject 'champion'. symmetry in the teaching/learning communication, an effective use of learning time and the opportunity to work in small groups.

Cobb, R. (1997). Learning is the lesson: Center illuminates path to understanding. *Illinois State Scholar, 7*(1), 16-17.
This article describes the University Center for Learning Assistance at Illinois State University (Normal, IL). In an interview with Julia Visor, acting director of the center, an

overview of the Supplemental Instruction (SI) program at the university is provided. During the Spring 1997 semester, SI was offered to students enrolled in Chemistry and Society, General Psychology, Principles of Microeconomics, Principles of Macroeconomics, Introduction to Non-Western Politics, American Government and Politics, History of the United States to 1865, and Human Biology. Some of the SI participants include students in Student Support Services, one of the federally-funded TRIO programs. A short summary of several research studies concerning SI's impact on affective variables conducted by Visor and others is shared.

Coe, E. M., McDougall, A. O., & McKeown, N. B. (1999). Is peer assisted learning of benefit to undergraduate chemists? *University Chemistry Education, 3*(2), 72-75. Retrieved July 1, 2004, from http://www.ucl.ac.uk/epd/pal/ManUMISTpapers.html and http://www.rsc.org/pdf/uchemed/papers/1999/32_coe.pdf.
Peer Assisted Study Sessions (PASS), based on Supplemental Instruction (SI), was implemented at the University of Manchester (UK) Chemistry Department in 1995 for first-year courses. About half of students enrolled in the classes where PASS is offered participate in the program. The drop out rate was reduced by half after the introduction of PASS (from 20% to 10%). PASS Leaders also reported advantages for their participation including their communication skills.

Collins, N., & Ronaldson, A. (1995). *Supplemental Instruction: Its effectiveness within the ambit of the Social Work Department of the University of Port Elizabeth*. Unpublished doctoral dissertation, University of Port Elizabeth, Port Elizabeth, Republic of South Africa.
This dissertation examines the effectiveness of Supplemental Instruction (SI) at the University of Port Elizabeth in the Republic of South Africa. This study replicates findings from a dissertation by Carson and Plaskitt (1994) from the same institution. Two additional reasons were identified by Collins and Ronaldson concerning reasons for the effectiveness of SI: easy participation in SI sessions and adjustment to university life. They concluded that the focus of SI correlates with the needs of students and that SI has helped students to develop important skills, for example, understanding key concepts, lecture note taking, understanding the textbooks and exam preparation. Depending upon the structure of the course, SI participants reported wanting varying levels of structure during the SI sessions. Some students wanted open agendas for the group to select the areas covered and processes used. Other students reported wanting more structure in the SI sessions from the SI leader.

Collins, W. (1982). Some correlates of achievement among students in a Supplemental Instruction program. *Journal of Learning Skills, 2*(1), 19-28.
This article examined the effectiveness of Supplemental Instruction (SI) at Cornell University by comparing the course-grade earned in four subjects (chemistry, mathematics, biology, and physics) and the GPA of 301 students enrolled in these courses with College Board Scholastic Aptitude Scores (Verbal and Math), assistance requested by the student, and high school rank. Even when SAT-scores and high school rank are held constant as in the standard multiple regression procedure used with this study, the results suggest that SI attendance made a significant contribution to the academic achievement of SI participants both with the individual course (Biology,

Chemistry Mathematics) and the overall cumulative GPA. The research suggested when comparing students of equivalent SAT scores and high school rank, the following predictions would be warranted, SI participants would receive the following higher grades when compared with the non-SI counterparts: one full letter grade higher in Biology; three-fourths of a letter grade higher in Mathematics; and one-half letter grade higher in Chemistry. There were no predictive variables regarding final course grades in physics. The authors suggest that the strategies learned in SI are transferred to other courses and help improve academic achievement in those courses as well. The SI program is aimed at students admitted to Cornell through the Committee on Special Education Projects (COSEP). Most of these students are members of ethnic groups or from disadvantaged backgrounds.

Commander, N. E., Callahan, C. A., Shatton, C. B., & Smith, B. D. (1997). Adjunct courses and Supplemental Instruction: A ten step workshop. In *Selected conference papers of the National Association for Developmental Education, Volume 3* (pp. 14-16). Mobile, AL: University of South Alabama. Retrieved July 1, 2004, from http://www.umkc.edu/cad/nade/nadedocs/97conpap/nccpap97.htm.
At Georgia State University there has been a transition from focusing on developmental courses for some to offering learning support for all students. The authors provide ten questions that can guide an institution as they consider offering Supplemental Instruction (SI) and adjunct courses. In 1996 the institution was offering SI in 28 course sections will a combined enrollment of 3,900 students. About one-third of the students participated in SI sessions. SI participants earned between one half to a full letter grade higher in comparison with similar non-SI attendees. The ten questions that the authors suggest when designing a new learning support program are: 1. What makes your campus unique? 2. What population do you wish to serve? 3. What courses will you target? 4. How will you build faculty support? 5. How will you market your program? 6. How will you design your curriculum? 7. What results will you share with colleagues in your institution? 8. What results will you share with colleagues outside your institution? 9. How will you secure campus resources? 10. What problems are unique to your situation and what are possible solutions?

Commander, N. E., & Smith, B. D. (1995). Developing adjunct reading and learning courses that work. *Journal of Reading, 38*(5), 352-360.
This article explores a variation of the Supplemental Instruction (SI) program to provide more time for students to develop reading and learning strategies. Rather than using the voluntary peer facilitated study review sessions based on the SI model, the learning assistance center at Georgia State University (Atlanta, GA) chose to create an adjunct course model. Like the SI model, a historically-difficult content course (History 113) was paired with an adjunct course (Learning Strategies for History or LSH). Students enrolled in both courses. Unlike SI, most students enrolled in the strategies courses were developmental. The LSH required students to apply the learning strategies to the companion History 113 course. Considering that the LSH students were less prepared academically than the general student population in the History 113 course, data suggests that the adjunct course was helpful since three quarters of the students passed the History 113 course with a final course grade of C or higher and their mean final course grade (2.3) with nearly the same as the other students (2.5). One of the

recommendations for potential adopters of this model is that all students in the LSH course be enrolled in the same section of the content course (e.g., History 113). Failure to do so creates confusion in the LSH course if there are multiple sections of the content course with professors who may be teaching at with different rates, textbooks or content material.

Commander, N. E., Stratton, C. B., Callahan, C. A., & Smith, B. D. (1996). A learning assistance model for expanding academic support. *Journal of Developmental Education, 20*(2), 8-10, 12, 14 , 16.
This article provides a model for expanding the role of academic support in higher education. A learning program that formerly offered primarily developmental classes and a tutorial center later expanded to include course-related services of Supplemental Instruction (SI) and adjunct courses at Georgia State University (Atlanta, GA). During Fall 1993 a study in Political Science 101 suggested that SI was correlated with higher mean final course grades (2.7 for regular SI attenders, 2.4 for occasional attenders, and 1.9 for non-SI attenders). The authors suggest ten steps for expanding academic support: 1) consider campus uniqueness; 2) identify population; 3) identify courses; 4) build faculty support; 5) staff adjunct courses with seasoned faculty and SI learning sessions with thoroughly trained leaders; 6) market programs at several levels; 7) provide feedback to the professor of the content course throughout the quarter or semester; 8) involve the administration; 9) keep records; and 10) disseminate information.

Congos, D. H. (2003). Health checklist for Supplemental Instruction (SI) programs. *The Learning Assistance Review, 8*(2), 29-45.
This article provides a checklist of recommended policies and practices for Supplemental Instruction (SI) programs. The document provides a means for conducting a program review with 90 recommended practices. The categories covered by the evaluation tool include: SI leader pre-semester training, SI faculty training, SI leader training during the academic term, SI session observation and feedback, in-class introduction of SI, end-of-term evaluation.

Congos, D. H. (2001-2002). How Supplemental Instruction (SI) generates revenue for colleges and universities. *Journal of College Student Retention: Research, Theory, & Practice, 3*(3), 301-309.
The writer discusses how supplemental instruction (SI) can generate revenue for higher education institutions. He shows how SI can create retained tuition revenue far beyond the costs of an SI program in both state-supported and private colleges and universities and notes that SI reduces recruiting costs and retains incoming tuition dollars for longer time periods, supplements the quality of the educational experience, and has the potential to affect an institution's fund-raising efforts. He presents formulas that can be used to determine the amount of retained revenue that can be generated by SI for individual colleges.

Congos, D. H. (2002). How Supplemental Instruction stacks up against Chickering's 7 principles for good practice in undergraduate education. *Research and Teaching in Developmental Education, 19*(1), 75-83.

This article discusses the Supplemental Instruction (SI) model and compares it with Chickering's 7 Principles for Good Practice in Undergraduate Education. SI shares many of the same outcomes cited by Chickering such as: increased student persistence towards graduation, higher final course grades, improved thinking and study skills, and higher satisfaction with the college experience.

Congos, D. H. (2003). Is Supplemental Instruction (SI) help helpful? *Research & Teaching in Developmental Education, 19*(2), 79-90.
This article explores the issue of the "helpfulness" of Supplemental Instruction (SI) sessions for students. Does participation in SI programs lead to independent learning by students, or are they dependent upon the help of the group for academic achievement? Key factors in the theoretical framework cited by the author for developing independent learners are: reciprocal trust, cooperative learning, mutual growth, reciprocal openness, shared problem solving, non-directive modeling, autonomy, and experimentation.

Congos, D. H. (1993, Fall). A model for Supplemental Instruction in Introductory Chemistry. *Supplemental Instruction Update,* 1, 3.
This article describes the use of Supplemental Instruction (SI) at The University of North Carolina at Charlotte in Introductory Chemistry courses. Four suggestions are made for problem solving activities: 1) SI leader models problem solving steps; 2) SI participants verbalize and write down the steps to solve the problem and how they arrived at their answers; 3) students ask each other questions during the problem solving process; 4) rules for solving the problem are written on the black board; 5) students work by themselves to solve similar problems; 6) students work on recognizing problem types; 7) SI leaders facilitate the discussion process of the students; 8) each step in the problem solving process is identified and numbered; and 9) students continue to practice on problems till they master the process.

Congos, D. H. (1997). *Supplemental Instruction models for introductory chemistry and physics*. Manuscript submitted for publication, Central Piedmont Community College at Charlotte, NC.
This paper provides several models for Supplemental Instruction (SI) leaders to use when facilitating sessions in introductory chemistry and physics courses. Problem-solving activities are essential for students enrolled in these courses since many of them are unable to recognize problem patterns and the needed procedures to solve them. In chemistry the following seven steps often are needed: 1) read the problem; 2) rewrite the problem in students' own words; 3) write down what the student is trying to find; 4) list the tools that are given for solving the problem; 5) do factor labeling; 6) check the answer in the book for correctness; 7) if the students' answer is incorrect, return to step #3.

Congos, D. H., & Bain, D. W. (2001, December). A boardwork and note formatting model for learning mathematics coursework using writing. *The Learning Center Newsletter,* Retrieved July 1, 2004, from http://www.learningassistance.com/2001/Jul01/index.htm
This article presents a model for teaching math that illustrates the value of using writing within a step-by-step approach to help students understand and learn math solutions.

This process was adapted for use with Supplemental Instruction (SI) sessions in mathematics and other problem-solving courses.

Congos, D. H., Langsam, D. M., & Schoeps, N. (1997). Supplemental Instruction: A successful approach to learning how to learn College Introductory Biology. *The Journal of Teaching and Learning, 2*(1), 2-17.
This article reviews the use of Supplemental Instruction (SI) at the University of North Carolina at Charlotte with students enrolled in Introductory Biology (Biology 1110), the first course of a two semester introductory biology sequence for non-majors. The data from Fall 1990 and Spring 1991 suggests that participation in SI has a positive impact on student academic performance. The final score for the SI participants was higher (Fall 1990: 2.72 vs. 1.94; Spring 1991: 2.83 vs. 1.95); the rate of A, B and C final course grades was higher (Fall 1990: 86.3% vs. 65.4%; Spring 1991: 78.6% vs. 62.5%); and the rate of D, F and course withdrawals was lower (Fall 1990: 13.7% vs. 34.6%; Spring 1991: 21.4% vs. 37.5%). A variety of additional statistical tests were conducted to test for the intervening nature of other variables (e.g., SAT verbal, SAT quantitative, SAT sum of SATV and SATQ, high school rank, predicted grade point average before matriculation based on SAT verbal and quantitative). After these additional tests, participation in SI was still found to be statistically significant.

Congos, D. H., & Mack, A. (2005). Supplemental Instruction's impact in two freshman chemistry classes: Research, models of operation, and anecdotes. *Research & Teaching in Developmental Education, 21*(2), 43-64.
Supplemental Instruction (SI) was used at the University of Central Florida to improve student academic performance in several chemistry classes. In addition to the evaluations study, the article provides an overview of the five modes of operation that occur during SI sessions: build complete and accurate lecture and text notes; formulating potential exam questions and answers; build complete and accurate steps in solutions to problems; practice with sample exam; and finally conduct a post-test review to evaluate performance and make behavior modifications for the next exam. Extensive data records were collected to compare student performance in the course both before and during the time of the academic intervention. Significant shifts of student grades in a positive direction occurred after introduction of SI to the introductory chemistry courses. Data was run twice, once comparing SI participants and nonparticipants. A second time it was run with SI participation defined as attending five or more sessions during the term. In both cases, SI attendance was a significant factor in higher grades. When analyzing students who attended five or more times, there was a dramatic drop in the DFW rate and an increase by nearly a full letter grade in final course grade achievement for these SI participants.

Congos, D. H., McLaren, A., & Visor, J. N. (1995). *Clinical supervision of Supplemental Instruction sessions.* [Videotape]. Arendale, D (Producer) Kansas City, MO: Center for Supplemental Instruction, The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This videotape records a discussion by a panel regarding various issues related to supervision of the Supplemental Instruction program: role of the Assistant SI

Supervisor; components of a clinical supervision protocol; the limit of capacity for supervision; mentoring and evaluation in clinical supervisory debriefing sessions; and protocol for debriefing SI sessions. The panelists are campus SI supervisors as well as Certified Trainers with the SI program.

Congos, D. H., & Schoeps, N. (1993). Does Supplemental Instruction really work and what is it anyway? *Studies in Higher Education, 18*(2), 165-176.
The authors describe the Supplemental Instruction (SI) program as it operates at the University of North Carolina at Charlotte from 1987 to 1990. The initial portion of the article provides a general overview of the SI program. The Fall 1988 research study suggested that SI participation was positively correlated with higher mean final course grades (2.391 vs. 1.894) and lower withdrawals (17.7% vs. 37.9%). These favorable results are so in spite of the fact that SI attendees enter college with lower predicted academic potential.

Congos, D. H., & Schoeps, N. (1994). Does Supplemental Instruction really work and what is it anyway? *Educational Administration Abstracts, 29*(1), 52-53.
This is a short summary of the authors article -- Does Supplemental Instruction really work and what is it anyway? -- that originally appeared in Studies in Higher Education (1993), vol. 18, no. 2, pp. 165-176. The authors describe the Supplemental Instruction (SI) program as it operates at the University of North Carolina at Charlotte from 1987 to 1990. The Fall 1988 research study suggested that SI participation was positively correlated with higher mean final course grades (2.391 vs. 1.894) and lower withdrawals (17.7% vs. 37.9%).

Congos, D. H., & Schoeps, N. (1998). Inside Supplemental Instruction sessions: One model of what happens that improves grades and retention. *Research and Teaching in Developmental Education, 15*(1), 47-61.
After providing an overview of the Supplemental Instruction (SI) model, the authors describe three basic modes of operation in SI sessions: 1) building complete and accurate lecture notes; 2) formulating possible examination questions and answers; 3) conduct post examination survey. The cost effectiveness of the SI program was calculated on the basis of increased retention rates of SI participants. A study was conducted at the University of North Carolina at Charlotte with students enrolled in Introductory Biology (Biology 1110), the first course of a two semester introductory biology sequence for non-majors. The data from Fall 1990 suggests that participation in SI has a positive impact on student academic performance. The final score for the SI participants was higher (2.59 vs. 1.94); the rate of A, B and C final course grades was higher (86.3% vs. 65.5%); and the rate of D, F and course withdrawals was lower (13.7% vs. 34.5%). A variety of additional statistical tests were conducted to test for the intervening nature of other variables (e.g., SAT verbal, SAT quantitative, SAT sum of SATV and SATQ, high school rank, predicted grade point average before matriculation based on SAT verbal and quantitative). After these additional tests, participation in SI was still found to be statistically significant.

Congos, D. H., & Schoeps, N. (2003). Inside Supplemental Instruction sessions: One model of what happens that improves grades and retention revisited. *Journal of Student*

Centered Learning, 1 (3), 161-172.
This article is a revision of one earlier published earlier by the authors: *Research and Teaching in Developmental Education, 15* (1), 47-61. The first section of the article is devoted to an overview of the Supplemental Instruction (SI) model. The next part provides a financial cost-benefit analysis of the economic return of the SI program due to it contributing to higher student persistence. The authors describe five types of activities that occur inside of SI sessions: note building, question/answer, problems and solutions, sample test, and post-test survey. A study was conducted at the University of North Carolina at Charlotte with students enrolled in Introductory Biology (Biology 1110), the first course of a two semester introductory biology sequence for non-majors. The data suggests that participation in SI has a positive impact on student academic performance. The final score for the SI participants was higher (2.59 vs. 1.94); the rate of A, B and C final course grades was higher (86.3% vs. 65.5%); and the rate of D, F and course withdrawals was lower (13.7% vs. 34.5%). A variety of additional statistical tests were conducted to test for the intervening nature of other variables (e.g., SAT verbal, SAT quantitative, SAT sum of SATV and SATQ, high school rank, predicted grade point average before matriculation based on SAT verbal and quantitative). After these additional tests, participation in SI was still found to be statistically significant.

Congos, D. H., & Schoeps, N. (1999-2000). Methods to determine the impact of SI programs on colleges and universities. *Journal of College Student Retention: Theory, Research, & Practice, 1*(1), 59-82.
This article presents three categories of approaches to assess the impact of Supplemental Instruction (SI) on an institution: anecdotal information, descriptive statistics, and inferential statistics. For SI programs required to justify their existence, the methods in this article presents assessment devices from simple testimony to rigorous inferential statistical data.

Congos, D. H., & Schoeps, N. (1997). A model for evaluating retention programs: Data from a Supplemental Instruction program. *Journal of Developmental Education, 21*(2), 2-4, 6, 8, 24.
This article presents a step-by-step model for analyzing the impact of retention programs on students. Data from a Supplemental Instruction (SI) program is used to demonstrate how this research is done. The seven steps include: identify the relevant variables; for each student in the class, gather the data on the independent variables chosen in Step 1; maintain on-going data on the information needed for the dependent variables; enter the data into a computer in an organized format that eases analysis; define the criteria that determines who is an attendee or participant; analyze the data using an appropriate data analysis software package; and set up the results in a readable manner, including relevant narratives necessary to explain and clarify the data. To illustrate the seven-step method, the researchers analyze the SI data from their campus regarding improved final course grades, reduction of D/F/W, and projected cost savings.

Congos, D. H., & Stout B. (forthcoming). The benefits of Supplemental Instruction (SI) leadership experience after graduation. *Research & Teaching in Developmental Education*.

The benefits of Supplemental Instruction (SI) for the students who facilitate the sessions is described in this article. The authors used an open ended survey instrument to gather data from former SI leaders for this study. Participating institutions in the study included the University of Pittsburgh, Central Florida University, and Palm Beach Community College. Responses gathered through the survey were categorized into the following categories: interpersonal relations skills, learning skills, leadership skills, work related skills, content knowledge, and other. The most frequently cited benefit of serving as a SI leader was the improvement of personal interpersonal communication skills.

Congos, D. H., & Stout, B. M. (2001). Twenty FAQ's from faculty about Supplemental Instruction programs. *Research & Teaching in Developmental Education, 18*(1), 41-49.
As experienced Supplemental Instruction coordinators, we regularly field a variety of questions from faculty about the SI program. This is anticipated since SI is attached to their courses and they have a natural vested interest in the SI program and the impact that it has on student achievement and satisfaction with the course which potentially can affect student evaluations for the course professor. Many of these questions are expected and not difficult to address. The paper lists twenty of the most frequently asked questions.

Conroy, G. J. (1996, May 28). Supplemental Instruction program shows results first year. *The Observer Newspaper*, Edwardsville, IL, pp. 3-4.
This newspaper article describes the use of Supplemental Instruction (SI) at Southern Illinois University at Edwardsville. SI sessions were offered in an introductory biological sciences course (Biology 120). The article indicated one of the SI program benefits was that SI leaders who were biology education majors learned pedagogical methods. The SI supervisor reported a preference for hiring education majors. According to data from Fall 1995 in Biology 120, SI participants to attended four or more sessions earned a mean grade of a low B, whereas those who attended one to three sessions averaged a C. Those who did not attend any SI sessions averaged a D.

Couchamn, J. A. (1997). Supplemental Instruction: Peer mentoring and student productivity. *Researching education in new times* Brisbane, Toowoomba, Australia: Australian Association for Research in Education. Retrieved July 1, 2004, from http://www.aare.edu/au/97pap/coucj521.htm.
The Supplemental Instruction (SI) program was implemented in a first year accounting subject (51002: Introduction to Accounting) in the Faculty of Commerce at the University of Southern Queensland (Australia). The results, in both quantitative and qualitative terms supported the utility of SI regarding student achievement and higher institutional revenue. While the failure rate did not change between the control and treatment groups, the rate of final course grades of high distinction tripled. SI Leaders reported increases in both their communication and leadership skills.

Couchman, J. A. (1999). Distance PALS in real and virtual classes. In *Proceedings of the First National Conference on Supplemental Instruction and Video-based Supplemental Instruction* (pp. 32-46). Kansas City, MO: Center for Supplemental Instruction, University of Missouri-Kansas City. Available: Center for Supplemental

Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, Kansas City, MO 64110.
As a major provider of distance education programs in Australia, the University of Southern Queensland has a unique interest in the development of flexibly delivered and supported distance education study programs. In 1996, to enhance the success and retention of its distance education students, the Distance PALS (Peer Assisted Learning Sessions) program was developed on the basis of the Supplemental Instruction program. During semester one, 1997 and 1998, it was implemented and evaluated in a first year foundation economics course in selected off-campus study centers. The quantitative and qualitative data collected confirm the success of the PALS program and indicate modification to further enhance its success. Attendees received a difference of 0.96 on a seven point scale higher score and were twice as likely to pass the course.

Couchman, J. A. (2001). Peer-assisted teaching and learning in distance education. In J. E. Miller, J. E. Groccia, & M. S. Miller (Eds.), *Student-assisted teaching: A guide to faculty-student teamwork* (pp. 110-115). Bolton, MA: Anker Publishing Company. (ERIC Document Reproduction Service No. ED449713).
As a major provider of distance education programs in Australia, the University of Southern Queensland has a unique interest in the development of flexibly delivered and supported distance education study programs. In 1996, to enhance the success and retention of its distance education students, the Distance PALS (Peer Assisted Leaning Sessions) program was developed on the basis of the Supplemental Instruction program. During semester one, 1997 and 1998, it was implemented and evaluated in a first year foundation economics course in selected off-campus study centers. The qualitative data collected confirm the success of the PALS program and indicate modification to further enhance its success. Attendees received a difference of 0.96 on a seven point scale higher score and were twice as likely to pass the course. The program was cost effective based on the higher persistence rate of students.

Couchman, J. A. (1997). *Report on the pilot study of the Supplemental Instruction program: 51002 Introduction to Accounting*. Unpublished manuscript, University of Southern Queensland, Toowoomba, Queensland, Australia. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
A 1997 research study at the University of Southern Queensland (Toowoomba, Queensland, Australia) involved all enrolled students in Introduction to Accounting (51002). By use of the external student cohort as a control group, it was claimed by the researchers that Supplemental Instruction resulted in a positive impact on the overall pass rate for the unit, raising it from 39% in 1996 to 55% in 1997. SI participants averaged 1.15 of a grade point higher on a 7 GPA scale than non-participants. SI participants were: only one-third as likely to fail; nearly four times more likely to gain an HD, approximately equally likely to gain an A grade; over twice as likely to gain a B grade; and three-quarters as likely to gain a C grade than non-participants. When examining a subpopulation of international students, they had a 78% pass rate compared with 48% for those international students who did not participate.

Couchman, J. A., & Pigozzo, R. (1997). *Report on the Supplemental Instruction program: 51008 Economics*. Toowoomba, Queensland, Australia: Unpublished manuscript, University of Southern Queensland. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This 1997 Supplemental Instruction (SI) study was conducted at the University of Southern Queensland (Toowoomba, Queensland, Australia) in the 51008 Economics course. SI participants averaged 0.83 of a grade point higher on a 7 GPA scale than non-participants. The results suggested that only one-fifth of SI participants were likely to fail; one-third more likely to gain an HD, two and a half times more likely to gain an A grade; twice as likely to gain a B grade; and over one and a half times as likely to gain a C grade than non-participants. International students who attended SI sessions regularly had a 93% pass rate compared with 63% for those international students who chose not to attend regularly.

Craig-Claar, D. (1994, Summer). Starting Supplemental Instruction at Maple Woods Community College. *Supplemental Instruction Update,* 1-2.
The author is the Associate Dean of Instruction at Maple Woods Community College (MO). She describes the development of the Supplemental Instruction program at her campus. The article describes the administrative steps that were taken to initiate the program. A creative solution to compensate the SI leaders was that they were paid with fee waivers rather than the more common monthly paycheck.

Cross, I. G. (1997). Peer support through Supplemental Instruction for civil engineering students. *Proceedings from the 2nd Working Conference on Engineering Education: Professional Standards and Quality in Engineering Education* (pp. 97-102). Sheffield, England: Sheffield Hallam University.
This article describes the use of Supplemental Instruction for civil engineering students in the United Kingdom.

Davies, E., & Vorster, J. (1994). *The SI leader as a teaching resource*. Paper presented at the South African Association for Academic Development Conference, University of Natal, Republic of South Africa.
In 1994 a Supplemental Instruction (SI) program was introduced in the Law Faculty at Rhodes University (South Africa). Two courses were initially selected for a pilot program: Legal Theory I and Commercial Law I with joint funding from the Academic Development Program and the Law School. Interviews with students suggested that the SI leader empowered the students to be more active in their own learning process and take additional responsibility for mastery of content mastery rather than being passive in the classroom. The SI activities were more student controlled while the formal tutorial program was viewed as more rigid and prescriptive.

Davies, J., & Johnston, S. (1994). The institutional implementation of Supplemental Instruction. In C. Rust, & J. Wallace (Eds.), *Helping students to learn from each other: Supplemental Instruction, SEDA Paper 86* (pp. 55-63). Birmingham, England: Staff and Educational Development Association. Retrieved July 1, 2004, from http://www.umkc.edu/cad/si/sidocs/jdinst94.htm

This chapter describes the implementation of Supplemental Instruction at the University of Plymouth in the United Kingdom. Proponents of the SI program were careful to generate wide support rather than having the program implemented solely by the top institutional leaders. The "SI Working Group" was formed to carefully explore key questions before a final decision was made regarding SI implementation. Liaison relationships were established with the faculty staff, students, and the Dean. While there were challenges during the pilot implementation of SI, the program continues to develop.

Davis, E. E. (1999). *Student mentors: Experiences of being a Supplemental Instruction leader*. Unpublished Master of Science Thesis, Indiana University. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
The purpose of this Master Thesis was to examine the experience of serving as a Supplemental Instruction (SI) Leader upon the individual at Indiana University Purdue University Indianapolis (IUPUI). A qualitative research study was conducted of SI leaders during Fall 1997. Some common benefits cited were improved: communication skills, problem solving skills, subject matter knowledge, people skills, friendships, knowledge of campus layout and resources, time management skills, involvement and knowledge of campus activities, leadership skills, and feelings of connection to the campus. Some mentioned that SI opened doors to new experiences that drew them closer to their desired career goal.

Detchen, J. C., Hershberger, S. A. S., & Sarquis, J. L. (2004). PLTL research Explorations at Miami University. *Abstracts of Conference Papers for the 227th American Chemical Society National Meeting* (p. CHED-17). Washington, D.C.: American Chemical Society. For more information, contact the authors at the Department of Chemistry and Biochemistry, Miami University, 501 E. High Street, Oxford, OH 45056, detchenc@muohio.edu.
Peer-led Team Learning (PLTL) was used in a general chemistry course at Miami University (OH). PLTL was first used in 1998. A research study compared the impact of PLTL and Supplemental Instruction on different sections of the same course. All students in the different sections took the same ACS Examinations Institute exam as a final exam and each section was administered the Group Assessment of Logical Thinking instrument (GALT), and were surveyed using the Student Assessment of Learning Gains (SALG) instrument.

Donelan, M. (1995). An enterprising start: Innovative teaching and learning at the University College London. *Universe: Innovation and Excellence at the University of Central Lancashire, 7*(1), 14-15.
This article describes a number of innovative learning practices being implemented at the University College London (the largest and oldest college in the federal University of London). Supplemental Instruction (SI) is one of the featured learning strategies at UCL. Paul Kohler, Sub-Dean in the Faculty of Laws cites benefits of the SI program that include: facilitates students' learning and understanding; prepares them for employment since they will have better skills for learning and applying new concepts.

Donelan, M. (1997). *Introducing Supplemental Instruction at University College London*. London: University College London. Retrieved July 1, 2004, from: http://www.ucl.ac.uk/epd/pal/SEDApaper2.html
This paper describes the introduction of Supplemental Instruction (SI) at University College London into the Department of Mathematics and subsequently into five other departments during 1993/4 at both undergraduate and postgraduate level. SI was seen to fit closely with the Enterprise in Higher Education program which aims to develop students' personal skills alongside their academic abilities.

Donelan, M. (1994). Introducing Supplemental Instruction in mathematics, law, architecture, geography, and statistics. In C. Rust, & J. Wallace (Eds.), *Helping students to learn from each other: Supplemental Instruction, SEDA Paper 86* (pp. 41-50). Birmingham, England: Staff and Educational Development Association.
This chapter describes the introduction of Supplemental Instruction (SI) at University College London (UCL) in the United Kingdom. Goals for the SI program was to improve both students' personal skills alongside their academic abilities. With would provide a vehicle for improving their personal transferable, as well as cognitive, skills while gaining an experiential understanding of groupwork. SI leaders are generally not paid as SI mirrors a variety of other unpaid student facilitation programs elsewhere at UCL. SI was implemented in mathematics, law, architecture, geography, and statistics. Positive improvements were reported for both SI participants and the SI leaders.

Donelan, M. (1999). SI leaders: The real winners. In *Proceedings of the First National Conference on Supplemental Instruction and Video-based Supplemental Instruction* (pp. 87-110). Kansas City, MO: Center for Supplemental Instruction, University of Missouri-Kansas City. Retrieved July 1, 2004, from http://www.ucl.ac.uk/epd/pal/JDEpapers.html
While much has been written about the benefits of Supplemental Instruction (SI) to first-year students, significantly less has been written about the impact of this more holistic approach to learning and skills development as experienced by the SI leaders. Within the context of the major changes in higher education within the United Kingdom and the research into effective teaching and learning, this papers takes a qualitative view of the thoughts, perceptions, and feelings of undergraduate law students at University College London in 1997-98 as they developed from university entry to the end of their first year when they applied to become SI leaders for the following year. Common themes for SI participants included the following benefits of SI: valuable learning experience, consolidates knowledge through participation, cooperative and fun learning environment, social integration, and clarified difficult issues and improved understanding. Common themes for SI leaders: facilitate personal learning through discussions, received reciprocal support, improved communication skills, and improved understanding of the course material.

Donelan, M. (1997). *Supplemental Instruction: Students helping students' learning at University College London and University of Central Lancaster*. London: University College London. Retrieved July 1, 2004, from: http://www.ucl.ac.uk/epd/pal/IALSpaper.html.
The Supplemental Instruction program aims to provide an untapped learning resource for academics interested in developing first year students' cognitive capabilities

alongside their personal skills. This study examines whether the pilot SI program meets the needs of first year students within the Law faculties of UCL and UCLAN. Whereas the US model places prime emphasis on increasing grades, the UK model develops more holistically to include both cognitive and affective aspects of learning, in which the benefits to the 2nd year SI Leaders becomes an important outcome as the outcomes for 1st year students.

Donelan, M., & Kay, P. (1998). Supplemental Instruction: Students helping students' learning at University College London (UCL) and University of Central Lancashire (UCLAN). *The International Journal of Legal Education, 32*(3), 287-299. Retrieved July 1, 2004, from http://www.ucl.ac.uk/epd/pal/IALSpaper.html
The Supplemental Instruction (SI) program is used to meet the needs of first year students in their academic and personal development within the Law faculties of the University College London (UCL) and the University of Central Lancashire (UCLAN). The United Kingdom expansion of the SI model develops more holistically in cognitive and affective aspects of learning for both SI participants and SI leaders. The three law courses that had SI attached to them were English Legal System, Obligations 1, and Lawyers' Skills. There are several variations of SI within the UK use of the model: SI leaders are instructed to focus on facilitating the group discussion and not presenting course content material; SI leaders academic credit for their service through evaluation of a portfolio. Higher grades were recorded for SI participants and SI leaders when compared with non-participants. Interviews with SI participants revealed the following SI program benefits: enhanced academic understanding; enjoyed active learning; opportunity to clarify concepts; enjoyed the social aspects of meeting students of other classes; and developed personal confidence and reassurance. Benefits cited by the SI leaders included: opportunity to help others; developed communication, presentation, and leadership skills; increased knowledge of the academic content of the course.

Donelan, M., & Wallace, J. (1997). *Peer assisted learning: A truly co-operative initiative*. London: University College London. Retrieved July 1, 2004, from http://www.ucl.ac.uk/epd/pal/SEDApaper1.html.
This paper sets out to examine the place of peer assisted learning within the contest of higher education I the United Kingdom and to see how one model of co-operative peer learning, Supplemental Instruction, supports academic teaching, enhances the students' learning experience, reduces attrition, and most important of all in this context enables the students to develop confidence with the subject and practical development of those generic personal qualities and attributes most keenly sought by graduate employers: communication, teamwork, problem solving, negotiation, decision making, and management of self and others.

Doty, C. (2003). *Supplemental Instruction: National data summary, 1998-2003*. Unpublished manuscript, The University of Missouri-Kansas City, The International Center for Supplemental Instruction. Retrieved July 1, 2004, from http://www.umkc.edu/cad/si/sidocs/National Supplemental Instruction Report 98-03.pdf
This report provides data supplied by 53 U.S. institutions between 1998 and 2003 concerning academic achievement for Supplemental Instruction (SI) participants and nonparticipants. The data is drawn from SI reports covering 745 courses with a total

enrollment of 61,868 students. SI participants were defined as those who attended one or more sessions during the academic term. Outcomes displayed in the report included: SI participants received a D, F, or withdrew from the course at a rate between one-third and one-fourth that of non-participants, regardless of institutional type and mean final course grades were approximately half a letter grade higher for SI participants. These differences were statistically significant and were consistent across different types of institutions and academic content areas. The most prevalent use of SI is in the Natural Sciences (46%), followed by Social Sciences (20%), Mathematics (15%), and Humanities (7%).

Douma, S. R. (1988). *Supplemental Instruction: An alternate approach*. Unpublished master's thesis (M.S.), Mankato State University, Mankato, MN. Available: Interlibrary loan from Mankato State University, Mankato, MN.
This Master of Science thesis study from 1986 had two purposes. The first was to provide a descriptive review of the Supplemental Instruction (SI) program (e.g., program overview, SI leader training program). The second purpose of the study was to evaluate the effects of SI at Southwest State University (MN) during Fall 1986, Winter 1987 and Spring 1987. Between 36 to 42 percent of students participated in the SI program. Findings include the following: 1) SI participants earned a higher final course grade. F86, 2.34 vs. 2.01, W87, 2.31 vs. 2.01, S87, 2.55 vs. 2.04. 2) SI participants earned a higher rate of A and B final course grades. F86, 42% vs. 31%, W87, 41% vs. 35%, S87, 54% vs. 36%. 3) SI participants earned a lower rate of D and F final course grades or withdrawals: F86, 21% vs. 33%, W87, 21% vs. 35%, S87, 19% vs. 35%. Several data tables from an article by Blanc, DeBuhr, and Martin (1983) are reproduced in this report. Individual course reports from Southwest State University that were used to generate the previous summary research studies are included: Natural Science, Biology I, Food for Thought, Everyday Chemicals, Accounting I, Introductory Algebra, Business Statistics I, General Psychology I, A.C. Circuits, Critical Thinking, and General Biology II.

Duckett, J. (1996, April 28). Tutors offers more than last-minute fix. *The Morning Call Newspaper*, Allentown, PA, p. E1.
This newspaper article describes tutoring programs at colleges in the Allentown, PA area. Supplemental Instruction (SI) is used at Kutztown University.

Eastmond, J. N. (1997). Five academic development programs in the Eastern Cape Province: Reactions of an American academic in South Africa. *Educational Technology Research & Development, 45*(3), 129-134.
This article describes the academic development programs at four tertiary institutions in South Africa (University of Port Elizabeth, Port Elizabeth Technikon, Rhodes University, and the University of Ft. Hare) as well as the development of a fifth new program at Border Technikon. Topics include cross-cultural differences; interviews; Supplemental Instruction (SI) that combined staff development and student academic development; integration of media support; and stages of program development. The author describes how a former SI student leader at the University of Port Elizabeth had been hired as an instructor at Border Technikon. Based on interviews, the previous experience as SI leader had a direct impact upon the new instructor's style of instructional delivery which

utilized a high degree of academic inquiry and guided classroom discussion. The author commented about how the SI program was able to combine both staff development and student academic development. While this was a common pattern with South African institutions, the author commented that this was largely unknown in the U.S. The author subscribed to a four-stage model for faculty development previously articulated by DeBloois and Alder, 1974: 1). Awareness: through guest speakers, newsletters, and similar low impact activities; 2). Faculty support: small grants to faculty, seminars or workshops on aspects of tertiary teaching; 3). Faculty skills: larger investment in course development, more extensive involvement of individual faculty; and 4). Departmental curriculum: extensive development of a series of courses in the curriculum, organizational development efforts to change the prevailing reward structure.

Eastmond, J. N., Bartlett, G., & Terblanche, N. (1997). Planning for student involvement in a program of Supplemental Instruction. *Educational Technology Research and Development, 45*(3), 134-140.
Supplemental Instruction (SI) is used at Border Technikon (South Africa) to increase student achievement in the Accounting and Management academic departments. The article describes the ways student involvement has been maintained through enlisting support from the Student Representative Council (SRC). Article topics include: training, funding considerations, effectiveness, student response, and student achievement results. A grant provided through the United States Agency for International Development (USAID) Tertiary Education Linkages Project (TELP) was used to start the SI program. The grant's major goals are to enhance staff and student development, both of which were enhanced through the SI program. SI leaders reported the following benefits to them from participation in the SI program: gained confidence in public speaking; developed new teaching strategies; and enjoyed more interaction with the course lecturers. Surveys of SI participants identified the following suggestions to improve the SI program: assign the same place each week for SI sessions; SI leaders should prepare before SI sessions to provide structure in case the attending students do not have a full agenda of items; SI leaders should receive additional interpersonal discussion group skill training; and that times should be set aside in class scheduling to allow for SI sessions to be scheduled. Analysis of final course examinations revealed that the number and percent of students who passed the final examination had doubled after the introduction of the SI program. The author found stated that this was remarkable considering that the class size had increased significantly, straining the ability of the course instructor to deal with the additional workload of students.

Eberling, D. J. (1998). A comparison of the effectiveness of study strategies instruction with community college students [Dissertation, University of Houston, 1998]. *Dissertation Abstracts International, 59*(03), 705A.
College students who use study strategies effectively are more successful in school than are those who are unaware of study strategies, or who use such strategies infrequently. There is a relationship between poor performance in school and inadequate study strategies. Fortunately, study strategies can be taught. The purpose of this dissertation study was to investigate the relation between grade point average and study habits and attitudes. Also, to examine the effectiveness of a study strategies course and the Supplemental Instruction (SI) program with community college students '

study habits and attitudes. Volunteers for the study completed a pre and post test of the Survey of Study Habits and Attitudes (SSHA). Small sample size (n=10) may have played a role in clouding results of the research. Most students refused to participate in the study by permitting access to course grades and other vital information variables. With this SI program, attendance in SI sessions was not tracked and therefore the quantity of SI attendance was not available as an independent variable which has been used with many other published studies. With the small remaining group of voluntary study participants, a comparison of the students' grade point average and scores on the SSHA did not reveal significance. The scores on the SSHA and the comparison between the study strategies course and the SI program revealed no significant difference between the treatment groups.

Eckard, S. J., & Hegeman. (2002). Breaking the rules: Mandatory SI for developmental readers. In *Selected conference papers of the National Association for Developmental Education, Volume 8* (pp. 12-16). Memphis, TN: The University of Memphis. This article describes the use of Supplemental Instruction (SI) for developmental readers at Frostburg State University (MD). The students enrolled for a block of three courses: Reading, a choice from several general education course that are reading-intensive (history, psychology, or sociology), and a section of Freshmen Orientation that emphasized the development of study strategies. These students participated in a mandatory SI laboratory session each week to develop successful reading and study skills. Final course grades favored the SI participants in the history and sociology courses, but not in psychology.

Edelnant, V. (1999). Supplemental Instruction program helps students succeed. *Recruitment and Retention in Higher Education, 13*(5), 3.
This short article describes the use of Supplemental Instruction (SI) at Wartburg College in Waverly, IA. The SI program is four years old at the 1,500 student undergraduate Wartburg College. Benefits for the SI leaders reported by the author include developing empathy for the faculty members, experimenting with a possible career as a teacher, and development of their leadership skills.

Edelson, M. (1996). *A student's experience of the Supplemental Instruction programme and the first year of university: A case study*. Unpublished doctoral dissertation, University of Port Elizabeth, Port Elizabeth, Republic of South Africa.

Ehly, S. W., & Topping, K. (1998). Summary and conclusions. In K. Topping, & S. Ehly (Eds.), *Peer-assisted learning* (pp. 313-327). London: Lawrence Erlbaum Associates.
This book chapter discusses the potential future impact of peer-assisted learning (PAL) programs in the United Kingdom higher education system. PAL is based upon Supplemental Instruction.

Eig, J. (1997, Spring). Supplemental Instruction programs: An effective way to increase student academic success? *Journal of The Indiana University Student Personnel Association,* 11-15.
Supplemental Instruction (SI) is used at Indiana University (Bloomington) to increase academic achievement and retention. This article provides a basic overview of the SI

program and data concerning its effectiveness at the institution. Challenges for implementing SI include: administratively SI programs require considerable coordination; SI leaders must be carefully selected for their academic and interpersonal skills; SI leaders must be trained prior to the academic term and receive supervision throughout the term; students must make a time commitment to attend SI sessions; and the institution must have sufficient professional staff to supervise the SI program.

Emal, C., Johnson, T., & Kelter, P. B. (1997). *Supplemental Instruction: A model program that goes against the grain.* Unpublished manuscript, University of Nebraska at Lincoln. Retrieved July 1, 2004, from http://yaduh.unl.edu/si.htm
This report examines the use of Supplemental Instruction (SI) at the University of Nebraska (Lincoln, NE). After an initial overview of the SI model, the paper reports on a study of the use of SI in multiple sections of Chemistry 109 (1,100 to 1,300 students total) over a period of five academic terms (Fall 1994 through Fall 1996). The SI participants earned a mean final course grade of 2.70 vs. 2.12 for the nonparticipants. The SI participants received a much lower rate of D, F and withdrawal grades (17.2 percent) when compared with the nonparticipants (42.9 percent). There was a positive correlation between increased attendance at SI sessions with higher mean final course grades. A further analysis of students was accomplished by dividing them into quartile groups on the basis of their standardized college entrance scores (ACT). Whether it was the top (3.18 vs. 2.53), bottom (1.97 vs. 1.68) or middle quartile groups (2.60 vs. 2.04) the SI participants received approximately a mean final course grade that was half a letter grade higher It appears that SI was equally attractive to all students since approximately the same percent of students attended SI from each of the quartile groups (18 to 20 percent).

English, B. J. (1999). *Effects of social integration on the academic performance of international students.* Unpublished manuscript, The University of Southern California, Los Angeles, CA. Retrieved July 1, 2004, from http://www-rcf.usc.edu/~brianeng/508.htm
This manuscript describes the use of Supplemental Instruction (SI) with postsecondary international students. A comparison is made between SI and the English Language Fellows Program at the University of Rhode Island which has similar purposes. The focus of the sessions is placed more on the use of language as the means for communicating and understanding the course material. The pairing of the native and nonnative speakers of English provides a rich atmosphere for language acquisition and fostering higher comprehension of the course content. The author then explores adapted use of Video-based Supplemental Instruction (VSI) for nonnative speakers as a supplement to challenging courses to aid in language development and mastery.

Etter, E. R., Burmeister, S. L., & Elder, R. J. (2000). Improving student performance and retention via Supplemental Instruction. *Journal of Accounting Education, 18*, 355-368.
This study reports on student performance, and failure and withdrawal rates for 9,053 students enrolled in 132 Principles of Accounting classes from 21 four-year colleges and universities that have adopted the Supplemental Instruction (SI) program. The overall SI participation rate was 26.8 percent. After providing an overview of the SI model, the data study concerning accounting occupies the rest of the paper. SI participants were found to have statistically significant higher average course grades

(2.44 vs. 2.12), lower failure rates (5.9% vs. 15.3%) and lower withdrawal rates (10.6% vs. 19.8%) than non-participants enrolled in the target courses.

Evenbeck, S., & Williams, G. (1998). Learning communities: An instructional team approach. *Metropolitan Universities: An International Forum, 9*(1), 35-46.
At the Indiana University-Purdue University Indianapolis (IUPUI) a commitment was made to widely implement learning communities throughout the curriculum. This chapter provides a narrative overview of the implementation of this approach throughout the campus. The freshmen seminar is taught by a team that includes faculty, an academic advisor, librarian, and a Supplemental Instruction (SI) leader. This team approach provided for a rich learning environment for first-year students. Freshmen students were enrolled in a similar cohort of classes which provided high interaction among them and the team that taught the freshmen seminar. The SI leaders facilitated study review sessions for one of the common courses that all students in the cohort had enrolled for that academic term.

Farmer, B. (1991, Autumn). Helping learners to help themselves. *Teaching and Learning Bulletin,* (7), 2-3.
This article describes the use of Supplemental Instruction (SI) at several institutions in England. The author, a member of the Learning Methods Unit at Birmingham Polytechnic, describes research that was shared at a SI workshop coordinated by Kingston Polytechnic and the World Wild Life Fund for Nature.

Feinn, R. (2004). Effectiveness of Supplemental Instruction for developmental math in a university setting. *Dissertation Abstracts International, 65*(02), 410.
This dissertation explored the utility of Supplemental Instruction (SI) at a public university in New England with an elementary algebra course during Fall 2001. Students who participated in SI sessions facilitated by instructors had higher final course grades than groups that were led by peer student leaders. However, we course withdrawal rates were analyzed, there were no differences between the instructor and student facilitated groups.

Fest, B., Beauchamp, L., Holladay, J., & Sparks, S. (1999). *The use of graduate students/experienced Supplemental Instruction (SI) leaders as SI supervisors*. Unpublished manuscript, The University of Texas at Austin.
This manuscript describes the use of graduate students and experienced Supplemental Instruction (SI) leaders to serve as SI supervisors with the SI program at the University of Texas at Austin. An established SI program has a natural set of experienced SI leaders who can assume additional responsibilities within the program, thereby allowing the program to expand with the appropriate level of supervision. Extensive information is presented on how the SI program is supervised by both the professional as well as student paraprofessional staff.

Fest, B. J. R. (2000). The effects of Supplemental Instruction (SI) on student performance in a college-level biology course [Dissertation, The University of Texas at Austin, 1999]. *Dissertation Abstracts International, 80*(09), 3311. Available through interlibrary loan from the University of Texas at Austin.

This experimental study examined the effects of participation in a Supplemental Instruction (SI) program on student performance in a college level biology course. SI is an academic support program which incorporates study techniques into the framework of an academic course through discussion sessions. According to Blanc, DeBuhr, and Martin (1983) and Kenney (1988), students who experienced Supplemental Instruction had higher course grades, semester grade point averages, and rates of re-enrollment than did non-participants. The present study was conducted within the scheduled discussion sections of a large lecture class of biology for science majors (n = 135). The researcher and another graduate student conducted these discussion sessions in which half of the sections served as the SI treatment group and half of the sections served as the non-SI (traditional) control group. This design eliminated both time on task and motivation as potential contaminating variables. This posttest only, quasi-experimental design study uses a modified nonequivalent control group design. The academic performance of students who participated in SI discussion sessions was compared to the academic performance of students who participated in traditional review-type discussion sessions. Other research questions examined the interactive effect of SI on student performance with respect to SI leader experience, student ability level as measured by total SAT scores, previous academic success as measured by previous college GPA, and different cognitive level of examination questions. t-test and ANOVA statistical methods were used to analyze the data. The results of the t-tests to compare the means of the SI group to the non-SI group (p < .458) do not indicate any significant difference in the semester course scores between the two groups. Thus, the data did not show an overall effect of SI on student performance. The most important results obtained from this study are those with respect to the interactive effect of SI and student ability groups as measured by SAT total scores and prior college GPA. In this study the students in middle ability groups seemed to benefit more from SI than did the lower and higher ability students.

Fisher, J. E. (1997). Effects of Supplemental Instruction on undergraduate academic achievement, motivational orientation, and learning strategies [Dissertation, Auburn University, 1997]. *Dissertation Abstracts International, 58*(10), 3831A.
Examined in this dissertation study were the effects of participation in a Supplemental Instruction (SI) program on student academic achievement, motivational orientation, and learning strategies in a core psychology course at Auburn University. Participants in this study were 381 undergraduate students divided into one treatment and two comparison groups. Students in the treatment group participated in SI outside of regular class time once a week for 9 weeks. Both the treatment and comparison groups were administered four items: a course content knowledge pretest, the Halpin and Halpin Demographic Survey (1996), the Motivated Strategies for Learning Questionnaire (1994), and a course content knowledge posttest. Both the pretest and posttest were teacher-made tests assessing knowledge of course content. An initial cross-tabulation frequency distribution followed by a chi-square supported the assumption that the two groups were equal on course entry demographic variables. An analysis of variance (ANOVA) conducted with pretest scores revealed that there were no significant differences across groups in pre-entry content knowledge prior to the treatment. Once the study was completed, a multivariate analysis of variance (MANOVA) was conducted revealing that there were differences between the groups. On two variables, peer

learning and help seeking, significant differences were found in favor of the SI treatment group. The groups did not differ on the other motivation and learning strategies subscales or on the posttest measuring academic achievement. Several research design features were unusual with this study. Most SI studies limit possible variables that might influence student achievement. Therefore, most research designs limit analysis to a single course, one course instructor, one SI leader, analysis of actual course grades, and provide no additional academic enrichment activities in the class. Numerous limitations were listed by the researcher in the dissertation. 1) The actual final course grades of the students were not used, but rather a teacher-made posttest that was one part of the final course grade. 2) To increase sample size, additional sections of the same course were added to the study even through SI was not available to them and the course sections were taught by other professors who may employ different approaches to the curriculum, grading, and instructional delivery. 3) Ten SI leaders were employed in one course section. 4) All students in the course also participated in mandatory discussion sessions conducted each week. Fifteen graduate teaching assistants conducted these sessions in the three course sections. 5) All students who scored high on the course pretest were given an "A" final course grade and were dismissed from the course. This excluded their potential involvement in SI sessions and providing additional successful student modeling other than the SI leader. 6) Students were not allowed to attend SI sessions more than once a week. Students who needed additional help were denied the assistance. 7) Since the pre/post test was teacher-made, there is no way to judge its validity as an instrument. 8) The final exam was optional for students. If students already had an "A" average, they could skip the exam, therefore they were then excluded from the study. Students who needed a few points to earn a "B" only needed to correctly answer enough questions on the posttest exam to earn a "B" final grade, even though they might have earned a "D" or "F" on the final exam.

Fisher, M. (1988, September 23). UD "ringers" succeeding academically. *Dayton Daily News*, Dayton, OH, p. 3.
This newspaper article describes the use of Supplemental Instruction (SI) at the University of Dayton (OH).

Fitzgerald, N. (1997). The dropout dilemma. *Careers and Colleges Magazine, 18*(2), 14-17, 26.
This article reviews the causes and cures for the high rate of college drop outs. The author interviewed a number of people for the article. One of those interviewed and quoted in the article is David Arendale, National Project Director for Supplemental Instruction (SI). Arendale describes how SI and its newest variation, Video-based Supplemental Instruction help students to integrate "what to learn" with "how to learn it".

Fjortoft, N., Bentley, R., Crawford, D., & Russell, J. C. (1993). Evaluation of a Supplemental Instruction program at a college of pharmacy. *American Journal of Pharmaceutical Education, 57*(3), 247-251.
The purpose of this study was to evaluate, in terms of improved final grades, the effectiveness of the Supplemental Instruction program with students enrolled in a required first year pharmacy course at the University of Illinois at Chicago College of

Pharmacy. Regular SI attendance was found to be significantly and positively related to final course grades for minority students. The authors postulate that the SI program might have been more effective if the SI program had been started the first week of class rather than being delayed until the third week. An additional factor that may have diminished the statistical impact of the SI program was that funds were not available to hire additional SI leaders since the average SI attendance at every session through the academic term was 52. The authors speculate that smaller groups might have been more helpful than these large groups since students could have been more active and be able to vocally participate with others.

Forester, J. P., Thomas, P. P., & McWhorter, D. L. (2004). Effects of four Supplemental programs on students' learning of gross anatomy. *Clinical Anatomy, 17*(4), 322-327.
This article evaluated the effectiveness of Supplemental Instruction (SI) when adapted for use through four interventions: second-year medical student teaching assistant program, directed study program, weekly instructor laboratory reviews, and a web-based anatomy program. In each case participants in the adapted SI programs earned higher grades and self-reported higher levels of satisfaction when compared with nonparticipants.

Forson, L. (2000). *Supplemental Instruction: Can it work in outcomes-based education?* Unpublished manuscript, Vista University, Republic of South Africa. Available from the author at Vista University, Welkom Campus, PO Box 1881, Welkom 9460, FRSON-LF@weasel.vista.ac.za.
The paper compares the basic tenets of Supplemental Instruction and Outcomes-based Education. Using the SI program at the Welkom campus of Vista University in the Republic of South Africa has been used for both raising student academic achievement as well as fulfilling outcomes-based institutional objectives. SI sessions can be intentionally designed to carefully augment and support instruction in the traditional classroom. The SI leader can ensure that students engage in meaningful work during SI sessions that relate to institutional mission.

Frans, P. (1997). *The development of Supplemental Instruction facilitators as skilled and confident leaders*. Paper presented at the South African Association for Academic Development Conference, Broederstroom, Republic of South Africa. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper describes the use of Supplemental Instruction (SI) at Vista University-Mamelodi Campus (South Africa). In addition to fulfilling traditional SI program objectives, additional ones were a focus of this contextualization: providing feedback to the lecturer concerning student comprehension, thereby providing an opportunity to revise content delivery; give opportunity for students to use their first language rather than having all conversation occur in English; providing another venue for faculty development; and ensuring that all stakeholders -- students, course lecturer, SI Supervisor, and SI leaders -- work together to evaluate the SI program.

Frans, P. (1998). *Evaluation of the Supplemental Instruction (SI) programme implemented at a historically disadvantaged university*. Paper presented at the South

African Association for Academic Development Conference, Bloemfontein, Republic of South Africa.

Gaddis, B. A. (1994). The science learning center. *Education, 115*(2), 195-201.
This article describes the services provided by the Science Learning Center at the University of Colorado in Colorado Springs. The Center had three primary objectives: (1) to identify the mathematical, computational, and conceptual skills needed by science students; (2) to assist students to master basic conceptual, mathematical, and computational skills that are common to most science disciplines; and (3) to develop skills in the use of basic and specific laboratory instrumentation required in most science disciplines. To help meet the second goal, Supplemental Instruction (SI) was offered in connection with historically-difficult science courses (e.g., physics or organic chemistry). Research studies suggested that SI participants received higher mean final course grades. Since the Center's creation in 1992: the number of students enrolled in basic science classes increased by 12 percent; the number of declared science majors increased by 37 percent; 72.1 percent of students who used services from the Center received a grade of B- or better; cum GPA of students who used the Center's services had an average of 3.03 vs. 2.49 for those who did not; the rate of attrition of science classes dramatically dropped (e.g., Chemistry I, the rate decreased from 39.7 percent to 5.7 percent; Physics III, 16.5 percent decreased to 4.8 percent; Biology I, 16.7 percent decreased to 3.2 percent. SI was one component of a comprehensive Center that contributed to these positive outcomes.

Gardiner, P., Corbett, B., & Palmer, P. (1994). Increasing student participation in the education of civil engineers. In J. Wallace (Ed.), *Kingston University HEFCE Supplemental Instruction Project: 1993-94* (pp. 237-241). London, England: Kingston University.
Through use of Supplemental Instruction in the civil engineering courses at the University of Brighton (East Sussex, United Kingdom), improvement occurred in: student learning, self-motivation, and team work skills.

Gardiner, R. (1997). *Comparison of costs and financial benefits of a Supplemental Instruction program*. Unpublished manuscript, Queensland University of Technology, Brisbane, Queensland, Australia. Available from the author: Emeritus Professor R B Gardiner, Ph.D., SI/PASS Program Coordinator, Queensland University of Technology, GPO Box 2434 , Brisbane 4001, Australia, Tel: +61 (0)7 3864 2927, E-mail: rb.gardiner @qut.edu.au.
This paper describes the benefits of the Supplemental Instruction (SI) program in terms of educational outcomes and financial benefits. The costs and benefits are based on implementation at higher educational institutions in Australia. Based on higher reenrollment rates of SI participants, the SI program increases revenue through savings from lost student fees and tuition. Preliminary data from Queensland University of Technology in Civil Engineering suggest an increase in 15 percentage points for reenrollment of SI participants. However, the financial equation model described in this paper is very conservative and only estimates a difference of 5 percentage points.

Gardiner, R. (1996). Supplemental Instruction: A cost-effective, student-centered collaborative learning program. *Proceedings of the Second International Open Learning*

Conference (pp. 214-219). Brisbane, Queensland, Australia: International Open Learning Conference. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper presented by Emeritus Professor Ron Gardiner of Queensland University of Technology describes the use of Supplemental Instruction (SI) in Australia. After an extensive description of the SI model, program benefits for the SI Leaders and the course instructors are described. Benefits to the SI Leaders include: deeper understanding of the course content; development of leadership and group facilitation skills; increased self-confidence; improved job marketability and admission to advanced graduate work due to service as SI Leader; development of professional relationship with course professor; membership in an effective peer support network; and modest financial reward. Benefits for the course professors that have SI attached to their lectures: timely feedback concerning the comprehension level of the students regarding course material; opportunity to repeat previous lecture material in a modified fashion to increase comprehension; an option to modify future teaching strategies based on feedback from students; a basis for accessing additional funds through grants (e.g., teaching and learning development grants); increased rapport with students and SI Leaders; membership in local, national and international SI network; increased recognition from their colleagues; and increased satisfaction with their teaching role. The institution benefits in several ways: deployment of a cost-effective, student-centered learning enhancement program; membership in national and international SI networks; and effective means of managing the collective learning power of its students.

Garland, M., & Anderson, J. (1985). *Supplemental Instruction: The review session.* [Videotape]. Garland, M. (Producer)Kansas City, MO: Center for Supplemental Instruction, The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This videotape provides a simulation of an Supplemental Instruction (SI) session in an economics class. A narrator guides the viewer regarding the activities of the SI leader and provides a debriefing of the SI session.

Garland, M., & Gordy, K. (1989, May 11). *National teleconference on Supplemental Instruction.* [Videotape]. Connett, J., & Confer B. J. (Producers) Kansas City, MO: United States Department of Education, National Diffusion Network. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This live national teleconference featured an overview of the Supplemental Instruction (SI) model. Also included were interviews with SI leaders and faculty members who had SI attached to their classes. A live call-in portion of the teleconference permitted members of a national audience to call in with questions.

Garland, M., & Gordy, K. (1987). *Supplemental Instruction in the context of critical thinking*. Unpublished manuscript, The University of Missouri-Kansas City.
This manuscript describes how the Supplemental Instruction program can be used to promote critical thinking skills of students. This goal is supported through SI session activities. Independent thought is fostered through session strategies that require

students to work privately before group discussions are facilitated. Creating a learning environment in SI sessions where students feel comfortable to talk promotes active learning and vocalizing of ideas. A third component needed by critical thinking proponents is "reflection" when students begin to understand their own thinking processes. SI sessions focus not only on the course content, but also on the process of learning and thinking about it. The SI leader vocalizes when they are thinking about as they consider the material and solving the problems. SI participants are also encouraged to vocalize their thinking process and their uncertainties as well.

Garland, M., & Jamerson, L. (1988). *Supplemental Instruction: A validated model of student academic support* [Audio cassette]. Glendale, CA: Mobiltape Co.
Taped at the 1988 National Conference on Higher Education in Washington, D.C., two experts from the Supplemental Instruction (SI) program at the University of Missouri-Kansas City discuss their experience with SI, a nonremedial model of student academic assistance that targets historically-difficult courses rather than high-risk students. They provide an overview of the model and its use with a variety of student subpopulations.

Garland, M., Minkoff, D., & Zerger, S. (1995). *The use of Supplemental Instruction in small classes and small colleges.* [Videotape]. Arendale, D. (Producer)Kansas City, MO: Center for Supplemental Instruction, The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This videotape records a panel discussion regarding the advantages and challenges of Supplemental Instruction (SI) in small classes and colleges. Some of the issues included: locating SI leaders; cost effectiveness in small classes; networking with faculty members; and the use of SI in quarter and semester terms. The panelists are campus SI supervisors as well as Certified Trainers with the SI program.

Garvin, A., & Snyder, D. (2001). MASH (Math and Science Help): Supplemental Instruction at a technical university. In J. E. Miller, J. E. Groccia, & M. S. Miller (Eds.), *Student-assisted teaching: A guide to faculty-student teamwork* (pp. 82-86). Bolton, MA: Anker Publishing Company. (ERIC Document Reproduction Service No. ED449713).
This chapter describes the use of Supplemental Instruction (SI) at Worcester Polytechnic Institute (WPI) located in Worcester, Pennsylvania. WPI is the nation's third oldest private engineering college. The name given to the Supplemental Instruction (SI) program is MASH (Math and Science Help) for purposes of marketing to students and faculty members. The focus of MASH was with students enrolled in Calculus I and II, Physics I and II, and Chemistry I and II. Data from a Fall 1999 study suggested higher final grades for the MASH attendees in comparison to nonattendees. Based on student utilization, the program appears to be cost effective since the unit cost of offering MASH to a student is approximately $24 annually.

Gattis, K. W. (2000). Long-term knowledge gains due to Supplemental Instruction in college chemistry courses. *Journal of Research and Development in Education, 33*(2), 118-126.
This article examined the effectiveness of a Supplemental Instruction (SI) program for undergraduate chemistry courses at North Carolina State University (Raleigh, NC). The

SI program was evaluated through the effects of academic preparation, fall SI attendance, and spring SI attendance on spring chemistry grades. In Experiment #1, 437 undergraduate students were enrolled in Chemistry I in the fall semester and Chemistry II in the spring; results show that SI exerted a significant positive effect on spring course grade. Following changes made to the Chemistry I course, 148 students in Experiment #2 proceeded from fall Chemistry I to Chemistry II or Organic Chemistry I in the spring. Results show that those attending SI in both fall and spring semesters obtained the highest grade scores in the spring term. Findings suggest both short-term and long-term benefits of SI attendance. SI sessions can enhance long-term retention of concepts, improve problem-solving skills, and build conceptual frameworks for future learning.

Gattis, K. W. (2002). Responding to self-selection bias in assessments of academic support programs: A motivational control study of Supplemental Instruction. *The Learning Assistance Review, 7*(2), 26-36.
A motivational control study of students participating in Supplemental Instruction (SI) sessions in college chemistry at North Carolina State University showed that participants benefit from SI sessions to an extent that cannot be explained by their higher levels of motivation. Motivation is shown to be an important factor in grade performance whether students use SI or not. Actual SI attendance is shown to provide additional grade benefits. Students who had initially indicated high motivation to attend SI and attended SI four or more times during the academic term earned statistically significantly higher final course grades than similar students who attended SI between one and three times or students who were highly motivated but did not attend SI. The highly motivated students who attended SI four or more times earned dramatically higher grades than students who were not highly motivated and did not attend SI. The effectiveness of SI is thought to be due to enhanced interactivity. SI provides students with a productive hour of learning, featuring a psychologically safe environment for asking questions and opportunities for guided practice.

Gentner, N. (1997, April 22). Queensland University of Technology to push Supplemental Instruction in local units. *Inside QUT (Queensland University of Technology Newspaper)*, Brisbane, Queensland, Australia, p. 11.
This newspaper article contains an interview with Kathy Phillips, Supplemental Instruction campus coordinator from The University of Missouri-Kansas City who was spending an academic term at the Queensland University of Technology (Australia). The SI program was started at QUT by Professor Ron Gardiner, then Associate Pro-Vice-Chancellor (Academic) in 1992. At present SI is offered to 1,000 students in 12 course units in four faculties.

Gibbon, M., & Saunders, D. (1998). Peer tutoring and Peer-Assisted Student Support: Five models with a new university. *Mentoring & Tutoring, 4*(3), 165-176.
Peer-Assisted Student Support (PASS) is based upon Supplemental Instruction (SI) and is the predominate name used in the United Kingdom. This article provides an overview of PASS.

Gilinsky, R. (1985, October 20). Extra effort. *New York Times Newspaper*, New York City, NY, p. 10.
This newspaper article provides an overview of the Supplemental Instruction (SI) program.

Ginns, I. S., & Watters, J. J. (1995). *Final Report of Peer Assisted Study Sessions in Science Foundations MDB303*. Unpublished manuscript, Queensland University of Technology, Brisbane, Queensland, Australia. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This report describes the use of Peer Assisted Study Sessions (PASS) with students at Queensland University of Technology (Brisbane, Queensland, Australia). PASS is the term used at the institution for Supplemental Instruction (SI). Students enrolled in the Primary and Early Childhood strands of the preservice Bachelor of Education program are required to undertake basic studies of science in their first year. This core unit (Science Foundations - MDB303) was the course proposed for PASS. The performance of the students were examined on a 1 to 7 scale (1 to 3=fail, 4=pass, 5=credit, 6=distinction, 7=high distinction). The PASS group earned a statistically significant ($p < .01$) higher mean final course grade of 4.88 as compared with 4.15 for the non-participants. No PASS participants earned a failing grade while 8 of the non-participants did so. The PASS group earned grades of distinction or high distinction 66 percent of the time compared with 28 percent for the non-participants. Interviews with PASS participants identified the following changes: more thorough understanding of scientific concepts; identified ways of engaging the course content; study methods improved; established more consistent study times; attitudes towards science improved; and overall confidence increased. PASS leaders mentioned the following changes for themselves: increased confidence in teaching skills; enjoyed working in groups.

Glesner Fines, B. (2003). *Structured Study Groups at the University of Missouri-Kansas City School of Law*. Unpublished manuscript, University of Missouri-Kansas City. Retrieved July 1, 2004, from.http://www.law.umkc.edu/faculty/profiles/glesnerfines/SSG.html
This short abstract describes the adaptation of the Supplemental Instruction (SI) program for use at the School of Law at the University of Missouri-Kansas City. The SI program is called the Structured Study Groups.

Gordy, K. (1987). Supplemental Instruction in the context of critical thinking. *Proceedings of the Intellectual Skills Development Association Conference* San Diego, CA: Intellectual Skills Development Association.
This paper describes the use of Supplemental Instruction (SI) to increase the level of critical thinking by students enrolled in historically difficult college courses.

Gordy, Z. K., & Garland, M. (1987). *Improving college-level thinking through Supplemental Instruction*. Unpublished manuscript, The University of Missouri-Kansas City.
The authors describe the use of Supplemental Instruction (SI) to increase the level of thinking by college students. Since SI sessions incorporate a reflective approach to learning, the SI leader creates an environment for students to increase their level of

critical thinking. Not only do the SI sessions focus on review of course content, but also through active discussions, students become more aware of their own thinking process.

Gravina, M. (1990). Supplemental Instruction: A collaborative experience. *Conference Proceedings of the Southeastern Conference on At-Risk Students* Savannah, GA: At-Risk Students Association.
This article provides an overview of the Supplemental Instruction (SI) program.

Gravina, M. (1990). Supplemental Instruction: A continuation of the goals of the Freshman Year Experience. *Proceedings of the Freshman Year Experience Conference in Austin, TX* Columbia, SC: The National Center for the Study of the Freshman Year Experience and Students in Transition.
This article provides an overview of the Supplemental Instruction program.

Gravina, M. (1990). Supplemental Instruction: A continuation of the goals of the Freshman Year Experience. *Proceedings of the Freshman Year Experience Conference in Tampa, FL* Columbia, SC: The National Center for the Study of the Freshman Year Experience and Students in Transition.
This article provides an overview of the Supplemental Instruction program.

Gravina, M. (1991). Supplemental Instruction: A continuation of the goals of the Freshman Year Experience. *Proceedings of the Freshman Year Experience Conference in Kansas City, MO* Columbia, SC: The National Center for the Study of the Freshman Year Experience and Students in Transition.
This article provides an overview of the Supplemental Instruction program.

Gravina, M. (1991). Supplemental Instruction: A continuation of the goals of the Freshman Year Experience. *Proceedings of the Freshman Year Experience Conference in Long Beach, CA* Columbia, SC: The National Center for the Study of the Freshman Year Experience and Students in Transition.
This article provides an overview of the Supplemental Instruction program.

Gravina, M. (1990). Supplemental Instruction and enhanced performance in social science classes. *Conference Proceedings of the National Social Science Association* Louisville, KY: National Social Science Association.
This article provides an overview of the Supplemental Instruction (SI) program.

Gravina, M. (1991). Supplemental Instruction: SI for "at-risk" courses. *Freshman Year Experience Newsletter, 3*(4), 8.
This newsletter article provides an overview of the Supplemental Instruction (SI) program.

Gravina, M. (1990). Supplemental Instruction: Success with diverse student populations. *Conference Proceedings of the Minority Student Today Conference* San Antonio, TX: Minority Student Today Conference.
This article provides an overview of the Supplemental Instruction (SI) program. Data

suggests that the SI program is helpful for all students, regardless of their ethnic background or previous levels of academic preparation.

Gravina, M., & Adams, B. (1991). Supplemental Instruction: Integration of approaches to help high-risk students. In *Youth at-risk: A resource guide* (pp. 67-74). Lancaster, PA: Technonic Publishing Company, Inc.
The book chapter describes the use of Supplemental Instruction (SI) to assist students who have been predicted to be of academic risk at the institution.

Green, D. (1990). Student mentors fight departmental attrition. *Academic Leader: The Newsletter for Academic Deans and Department Chairs, 6*(3), 2.
This newsletter article provides an overview of the Supplemental Instruction (SI) program. In addition to comments from SI's creator, Deanna Martin, it also provides a quotation from Professor Lowell Orr at Kent State University who is using SI in his two biology courses. Orr supports the SI program since the SI leaders help participants to develop their own problem-solving skills.

Grise, D. J., & Kenney, A. M. (2003). *Journal of College Science Teaching, 33*(2), 18-21.
This article examines the use of Supplemental Instruction (SI) at Southwest Texas State University in a three-credit nonmajors biology course without a lab during 2000 BS 2001. Data were analyzed by ANCOVA with their grade point average used as the covariate. The researchers noticed differences in student performance based on the size of the class lecture with less participation in the larger class. It was noted that SI attendance was quite low for the participants with a common attendance pattern of only once during the academic term. The class instructor chooses to make SI attendance voluntary, but shares data studies on the effectiveness of SI with the students with the hope of motivating their participation.

Guinane, J. M. (1991). *The impact of Supplemental Instruction on the academic performance of "at-risk" students*. Unpublished Master's of Arts in Education (M.A.Ed.) thesis, Gratz College, Melrose Park, PA. Available: Interlibrary loan from Gratz College, Melrose Park, PA.

Gunning, F. (1993, February). Supplemental Instruction is not teaching. *The Lecturer (The University & College Lecturers' Union),* 2.
This article describes how Supplemental Instruction (SI) is not used as a replacement for teaching by course instructors. The author is a professional tutor at Kingston University in England and is a member of the teacher's union. The author describes the unique benefits that SI provides for students: peer support; modeling of study strategies; focuses on learning, not teaching. Faculty and tutors that have SI attached to their courses are supportive of the SI program since it provides different services to students than their provide. They see no conflict in roles for them.

Habley, W. R., & McClanahan, R. (2004). What works in student retention? Iowa City, American College Testing, Inc. Retrieved April 23, 2005, from http://www.act.org/path/postsec/droptables/pdf/AllColleges.pdf

This followup to the classic 1980 and 1987 reports is a comprehensive national study of college student retention practices. Eighty-two academic intervention strategies were analyzed for their potential impact on student persistence. The top five strategies were: freshman seminar, tutoring programs, advising interventions, mandated course placement testing program, and comprehensive learning assistance center. Among learning support activities, Supplemental Instruction was a significant factor.

Hafer, G. R. (2001). Supplemental Instruction in freshman composition. *Journal of Developmental Education, 24*(3), 30-32, 34, 36-37.
In the past, Supplemental Instruction (SI) has been underutilized in freshman composition courses particularly because of misperceptions regarding the nature of composition and the notion that the writing laboratory provides the only needed assistance programs. This article examines those assumptions and explores how success is measured in the composition classroom. It argues that the goals and method of freshman composition and SI are complementary. The conclusion outlines a pilot SI program, modified for a freshman composition classroom, that supports writing strategies and appropriate behaviors for students.

Hall, P. T. (1993). Use of Supplemental Instruction at the University of Missouri-Kansas City School of Law. In D. C. Martin, & D. Arendale (Eds.), *Supplemental Instruction: Improving first-year student success in high-risk courses* 2nd ed., (pp. 38-39). Monograph Series No. 7. Columbia, SC: National Resource Center for The Freshman Year Experience and Students in Transition. (ERIC Document Reproduction Service No. ED 354839).
The author describes the use of Supplemental Instruction with first-year "special-admit" law students at the University of Missouri-Kansas City. SI sessions were offered in Introduction to Law, Contracts I, Property I, and Criminal Law. While special admit students were directed to participate in the SI sessions, the program was open to all students enrolled in the four courses. Research suggests that the SI program assisted students to earn higher grades. Reenrollment rates for the special admit students was higher than before the introduction of the SI program.

Hamilton, S., Blakeley, R., Critchley, C., Playford, J., Kelly, B. A., McNamara, E., & Robertson, R. (1994). *Supplemental Instruction at the University of Queensland: A pilot program*. Brisbane, Queensland, Australia: University of Queensland.
The project at the University of Queensland (Australia) investigated the effectiveness of incorporating Supplemental Instruction (SI) with two large first-level biological science subjects (Introductory Biochemistry and Plant Biology). Research studies suggest that the SI program contributed to higher final course grades for SI participants (63.2 percentile vs. 52.7 percentile). The following factors were cited as important for program success: financial commitment by the academic department; availability of an experienced SI coordinator; selection and training of appropriate SI leaders; and full support of the program and the leaders by academic staff associated with the subject.

Hand, J. (2003). *Framework fidelity in an entry level biology Supplemental Instruction program*. Unpublished manuscript, Southwest Texas State University, San Marcos, TX.
The research question "do the experiences of students participating in the first year

Supplemental Instruction (SI) program in the entry-level biology program at Southwest Texas State University resonate with the frameworks in which the SI model is grounded?" was investigated using qualitative inquiry within a phenomenological epistemology. The purpose of the study was to determine if the experiences of five students, participating full time in a SI program for an entry-level biology curriculum, resonated with the frameworks underlying the SI model. Analysis of transcriptions of open-ended interviews with the study participants revealed that students participating in the entry-level SI sessions were experiencing phenomena reflective of the frameworks under girding the SI model. This tentative, theoretical construct of "framework fidelity" emerged as grounded theory from the qualitative study. These findings suggest that if the SI model is implemented with fidelity, the educational and developmental theories that underpin the model will resonate in a way that produce predictive, desired and expected results in student cognitive and affective domains.

Harrington, J., & Moore, D. (1986). *Say "Si" to supplementals*. Paper presented at the 7th Annual Meeting of the Rocky Mountain Regional Conference of the International Reading Association, Colorado Spring, CO. (ERIC Document Reproduction Service No. ED270739).
This paper provides an overview of the Supplemental Instruction (SI) program. The authors describe a pilot test of the SI program with a Spanish class at the University of Nebraska-Omaha. Lessons learned from the pilot test of SI included: tie SI sessions to one course taught by one instructor; hire staff leaders for sessions; provide adequate feedback and constructive criticism for session leaders; and inform students that SI session attendance is not a substitute for independent studying.

Haunwitz, R. K. M., & Heinauer, L. (2005, February 6). Colleges left behind. *American-Stateman Staff Newspaper*, Austin, TX, p. A1.
This newspaper article describes the use of Supplemental Instruction (SI) at the University of Texas-San Antonio.

Hawthorne, J., & Hawthorne, J. W. (1987). *Separating the wheat from the chaff: Finding the unique effect of Supplemental Course Instruction*. (ERIC Document Reproduction Service No. ED328201).
Supplemental Instruction (SI) at Olivet Nazarene University (CA) was examined through a study utilizing path analysis. Confounding factors such as the voluntary nature of the study sessions and the open admission policy of the college were controlled through path analysis/structural equation modeling. The analysis studied: 1) the effect of factors affecting SI participation, such as high school rank, marital status, semester load, and expected grade; and 2) the effects of SI participation on course grade, semester grade point average, and re-enrollment. Overall, path analysis explained 12.5 percent of the total variance of SI participation. Three of the exogenous variables have a direct, statistically significant, impact on SI participation: 1) The study found that the more a student is "at-risk" the more likely he or she is to use SI. 2) There is a direct positive effect between reported high school grades and SI participation. 3) The longer the student has been out of high school, the less likely he is to use SI. Two endogenous variables also have direct impacts on SI participation: 1) The more a student works, the less likely he is to attend SI sessions. 2) Students who expect to do well in the course

are significantly more likely to attend SI sessions. SI participation had significant direct effects on course grade, semester GPA, and reenrollment. Since there was direct effects of SI on grade point average and semester grade point average, the authors suggest the transfer of study skills learned to other courses.

Healy, C. E. (1994). Introducing Supplemental Instruction in engineering. In C. Rust, & J. Wallace (Eds.), *Helping students to learn from each other: Supplemental Instruction, SEDA Paper 86* (pp. 25-30). Birmingham, England: Staff and Educational Development Association.
This article describes the implementation of Supplemental Instruction in engineering courses at Glasgow Caledonia University in Scotland. The University is seeking to initiate cultural change through partnership events involving students, staff and employees. Research studies suggested improvements by both the SI participants (64.8 percentile vs. 54.4 percentile for non-SI participants) and the SI leaders. Some SI leaders reported that they had now considered pursuing a teaching career based on the positive experience with the SI program.

Healy, C. E. (1994). Supplemental Instruction: A model for supporting student learning. In J. Wallace (Eds.), *Kingston University HEFCE Supplemental Instruction Project: 1993-94* (pp. 231-236). London, England: Kingston University.
The study investigates the effectiveness of Supplemental Instruction at the Glasgow Caledonian University. Preliminary results indicate: a) improved performance in the students' annual examinations (e.g., Electrical Engineering Principles: 61 percentile vs. 46 percentile for non-SI participants); b) reduction in students' drop-out rates; c) enhanced communication and other transferable skills and d) deeper understanding of engineering principles.

Healy, C. E. (1994). Supplemental Instruction: A model for supporting student learning. In H. C. Foot, C. J. Howe, A. Anderson, A. K. Tolmie, & D. A. Warden (Eds.), *Group and interactive learning* . Southampton, England: Computational Mechanics Publications.
The author reported improved performance in annual examination results of Supplemental Instruction (SI) students as well as reductions in dropout rates, coupled with enhanced communication and other transferable skills and a deeper understanding of the principles of engineering at the British higher education institution.

Healy, C. E. (1994). Supplemental Instruction: A model for supporting student learning. *Proceedings of the International Conference on Group and Interactive Learning* (pp. 171-176). Southampton, England: Computational Mechanics Publications.
This article describes the implementation of Supplemental Instruction in engineering courses at Glasgow Caledonia University in Scotland. The University is seeking to initiate cultural change through partnership events involving students, staff and employees. Research studies suggested improvements by both the SI participants (64.8 percentile vs. 54.4 percentile for non-SI participants) and the SI leaders. Some SI leaders reported that they had now considered pursuing a teaching career based on the positive experience with the SI program.

Heerspink, J. B. (1997). *The use of spatial representation in history courses and in courses with historical content*. Unpublished manuscript, Calvin College at Grand Rapids, MI.
Students who learn to represent historical information spatially will find their learning to be both more complete and more efficient. The Supplemental Instruction (SI) leader has a significant role to play in bringing experience in learning history and in the use of learning strategies in the SI sessions. Five typical spatial representation patterns of learning in history courses include: sequence, parts/types/lists, compare/contrast, cause and effect, PERSIA (political, economic, religious, social, intellectual, and/or artistic factors). The author is the tutor coordinator at Calvin College (Grand Rapids, MI).

Henry, M. (1998, February 27). Faculty senate applauds recommendations. *Lubbock Avalanche-Journal*, Lubbock, TX, p. 7c.
This newspaper article discusses the steps that Texas Tech Chancellor John Montford outlined to enhance academic performance of student-athletes. Supplemental Instruction (SI) was among the suggested activities. Four classes with high concentrations of student-athletes have SI provided as a service with an expansion to 10 to 12 classes for the following fall 1998 academic term.

Hensen, K. A., & Shelley, M. C. (2003). The impact of Supplemental Instruction: Results from a large, public, Midwestern university. *Journal of College Student Development, 44*(2), 250-259.
This article describes the use of Supplemental Instruction (SI) at Iowa State University. The SI program was established in 1992 and serves 60 sections of biology, chemistry, math, and physics courses with a combined enrollment of approximately 7,500. About 22% of students in these courses attend SI sessions one or more times during the academic term. There was statistically significant differences favoring the SI participants regarding higher rates of A & B final course grades (9% higher), lower rates of D, F, and withdrawals (8% lower), and higher mean final course grades (one-third of a letter grade higher). Regarding preentry attributes (e.g., ACT scores), the SI participants in biology, chemistry, and math had statistically lower scores and were less academically prepared than their non-SI participants. In physics, there was no statistical difference. This suggests that preentry attributes do not explain the reasons for higher academic performance by SI participants, especially since most SI participants were less academically prepared.

Hensley, D. (1997, February 27). Montford vows to set new pace for Texas Tech University athletes. *Lubbock Avalanche-Journal*, Lubbock, TX, p. 7c.
The Chancellor of Texas Tech University (Lubbock, TX) announces that the Supplemental Instruction (SI) program will be expanded at the institution as part of a comprehensive increase in academic support services for student-athletes. Due to several highly-publicized cases of poor academic performance by several athletes, the institution will provide: closely monitored study table; SI provided in more classes; tutors to students when they are out-of-town for athletic contests; and more closely monitored class attendance.

Hibbert, T. D. (1996). *Taking study skills to the classroom: Supplemental Instruction as an integral part of college courses*. Unpublished Master's of Arts (M.A.) thesis, University of Texas at El Paso. Available: Interlibrary loan from the University of Texas at El Paso.
This paper studied the impact of Supplemental Instruction (SI) at the University of Texas at El Paso during Fall 1994 and 1995 in three Sociology Statistics classes and three Sociology Methods of Research classes with a total student enrollment of 269 students. These sections were chosen since the same instructor taught the three sections in each subject -- controlling for the possibility of different teaching styles. The three dependent variables studied were final course grade, semester grade point average, and re-enrollment at the university the following academic term. The classes included in this study had D, F or withdrawal rates of 32 to 38 percent before providing the SI program. During Fall 1994 the researcher conducted a mandatory study session connected with each section of the sociology classes. These mandatory sessions occurred during one class period each week. In one course section the researcher conducted a traditional SI session. In the other section of the same course the researcher allowed the enrolled students to guide the session. The researcher served as a discussion facilitator. The results were mixed regarding the improvement of semester grade point averages. In the statistics course the SI group had a higher subsequent semester GPA (2.86 vs. 2.57). In the methods course the results slightly favored the non-SI group (1.98 vs. 1.90). The same pattern emerged regarding final course grades. In the statistics course the SI group had higher academic performance (percent A & B, 41.3% vs. 32.6%; D, F & W, 32.0% vs. 30.4%; mean final grade, 73.66 vs. 72.2). In the methods class the non-SI group had higher achievement (percent A & B, 55.0% vs. 48.9%; D, F, & W, 20.0% vs. 26.5%; mean final grade, 76.4 vs. 73.8). An abbreviated version of the Whimbey Analytical Skills Inventory (8 items rather than 38) and a math assessment test was administered to all students at the beginning and the end of the academic term. No significant differences were found. Analysis of student journals suggested increased confidence and enjoyment of the course content due to the experience of the supplemental study review sessions provided through both the traditional SI and the informal student-led sessions. The researcher postulated several possible reasons for no significant difference between the SI group and the informal student study groups: (1) since the same person facilitated the SI sessions and the informal student study group (non-SI) some SI activities may have been utilized during the non-SI group sessions; (2) the SI facilitator also provided additional tutorial help to the non-SI group throughout the academic term.

Hill, D. (1992, October). Supplemental Instruction in the social sciences at Weber State University in Ogden, UT. *Collaborative Learning Exchange Newsletter,* 10-11.
The author reports on the implementation of Supplemental Instruction at Weber State University in Ogden, Utah. In the 1991-92 year SI was offered in US History 170, American National Government 110, Introduction to Criminal Justice 106, Introduction to Philosophy 101, and Introduction to Economics 101. In the Introduction to Criminal Justice 106 course the SI participants earned a higher percent of A and B final course grades (80% vs. 53%). The article described some of the SI session activities for the social science courses: cause and effect; comparison and contrast; short writing activities; review of elements of research reports; review lecture note taking strategies;

integration of outside reading assignments with lecture notes; and interpretations of reading assignments.

Hill, S., Gay, B., & Topping, K. J. (1998). Peer-assisted learning beyond school. In K. Topping, & S. Ehly (Eds.), *Peer-assisted learning* (pp. 291-311). London: Lawrence Erlbaum Associates, Publishers.
This book chapter provides a wide overview of peer-assisted learning (PAL) programs. The first part deals with cross-age tutoring programs. This most often involve college students working with young people. It is common for student tutors to report growth in improved communication skills, self-confidence, cognitive gains. The studies have had mixed results concerning cognitive gains by the tutees. More common improvements are reported with the social and affective domains. The authors report substantial and persuasive evidence of impact on dropout rates, course grades, and graduation outcomes.

Hillman, J. C. (1996). The value of Supplemental Instruction in conceptual learning. In *Proceedings of the 1996 4th AFRICON Conference* (pp. 288-292). New York, NY: Institute of Electrical and Electronics Engineers.
Undergraduates have difficulty with courses that are conceptual in nature. The internalization of concepts and the development of problem solving skills is achieved by individuals in a variety of ways, relatively few of which are known by lecturers or actively sought. Supplemental Instruction (SI) can overcome these problems by encouraging students to learn from the experiences of others by participating in structured group discussions which are facilitated by senior students. This paper describes the development of an SI program with a first year electrical engineering course and concludes that it is both an efficient and cost effective methods of improving student learning, particularly for those from an educationally disadvantaged background.

Hinckley, A. (1991, April). Students get paid to help others pass. *The National College Newspaper*, p. 23
This newspaper article describes the use of Supplemental Instruction (SI) program at Utah State University. Currently SI is offered in connection with two courses: economics and nutrition/food science. The SI program is administered through the Learning Assistance Center.

Hodges, R., Dochen, C. W., & Joy, D. (2001). Increasing students' success: When Supplemental Instruction becomes mandatory. *Journal of College Reading and Learning, 31*(2), 143-156.
The study found that students in both mandated and voluntary Supplemental Instruction groups in a high-risk, required, freshmen-level, writing-intensive United States history course earned significantly higher course grades and semester grade point averages than students in the non-SI group. The study found no significant differences between voluntary and mandatory SI participants.

Hodges, R., & White, W. G. (2001). Encouraging high-risk student participation in tutoring and Supplemental Instruction. *Journal of Developmental Education, 24*(3), 2-4, 6, 8, 10, 43.

The study investigated the effect of high-risk students' use of self-monitoring strategies and instructors' use of verbal prompts on high-risk students' participation in tutoring and Supplemental Instruction (SI) and one their academic achievement. Subjects consisted of 103 conditionally admitted contract students at a large state university in the southern United States enrolling approximately 21,000 students during Fall 1996. The study employed an experimental posttest-only control-group design. Results indicated no significant group differences in mean semester GPA between attendees and nonattendees in tutoring but did find a statistically significant difference between mean semester GPA of attendees and nonattendees in SI. One of the challenges with high risk students is that they may not accurately perceive their own need for academic assistance. Possible solutions to this challenge is to make SI attendance mandatory.

Hodges, R. B. (1997). The effect of self-monitoring strategies and verbal prompts on high-risk students' attendance in tutoring and Supplemental Instruction and their academic achievement]Dissertation, Grambling State University, 1997]. *Dissertation Abstracts International, 59*(02), 0429A.
The study investigated the effect of high-risk students' self-monitoring (SM) strategies and instructors' use of verbal prompts on high-risk students' attendance in tutoring and Supplemental Instruction (SI) and on their academic achievement. Subjects consisted of 103 conditionally admitted contract students at Southwest Texas State University during fall 1996. Using an experimental posttest-only control-group design, instructors in four freshman seminar classes implemented different combinations of treatment. In Treatment 1, subjects were required to self-monitor their attendance in tutoring and SI, and they received verbal prompts from their instructors to attend free tutoring and SI. In Treatment 2, subjects were required to self-monitor their attendance in tutoring and SI but were not given verbal prompts. In Treatment 3, subjects received verbal prompts to attend tutoring and SI but were not required to self-monitor their attendance. In the control group, subjects were not required to self-monitor their attendance in tutoring and SI and were not exposed to verbal prompts. A validation analysis of the effectiveness of tutoring and SI compared subjects attending one or more tutoring sessions and one or more SI sessions to those not attending. Using independent t-tests, the results indicated no significant group differences occurred in semester GPA between attendees and nonattendees in tutoring but did find statistically significant group difference in semester GPA for attendees in SI. Three hypotheses examined the relationship between subjects' use of SM strategies and instructors' use of verbal prompts on subjects' attendance in tutoring and SI. Two ANOVAs failed to reject the three null hypotheses which indicated that there was no increased in subjects' attendance in tutoring and SI between groups. SI attendance for this subpopulation of students was low (mean=2.27 with S.D.=3.37) when compared with national SI data studies. The researcher suggested the following reasons for low SI attendance based on student surveys and interviews: SI sessions scheduled at time in conflict with other student commitments; high-risk students have unrealistic positive perceptions regarding their own academic skills and may not seek help; and high-risk students need stronger external influences to change their behavior including the requirement of mandatory SI attendance. The researcher suggests increased attention to the affective domain and its possible impact upon student learning and the use of mandatory attendance in academic enrichment programs such as SI and tutoring.

Hodges, R. B., Sellers. Diana E, & White, W. G. (1994). Peer teaching: The use of facilitators in college classes. *Journal of College Reading and Learning, 26*(2), 23-29.
This article discusses the use of peer students as facilitators in the learning process. Supplemental Instruction (SI) is cited as another example of these student-led peer groups. The authors cite Maxwell (1992) when stating that SI is the best known and has the widest acceptance of any course-related learning program. A facilitator is defined as a facilitator as an undergraduate teaching assistant engaged in collaboratively teaching a college course alongside the instructor. While facilitators may perform some clerical duties, the focus of their work is to foster student learning. Common activities for facilitators include: through hosting smaller outside-of-class sessions make large classes more personable; turn lecture material by asking questions; share from a student's perspective another way to think about the lecture material; provide individual feedback to students; supervise small student work groups; provide role models of active learning; give encouragement; and change the classroom climate. Critical elements for a successful facilitator: be carefully selected by the instructor and perhaps a team of other student facilitators; training both before and during the academic term; evaluation by student and self-administered surveys.

Hollenkamp, J. (1992, April 1). Supplemental Instructors help fellow students understand lectures, homework. *Louisville Cardinal Newspaper*, Louisville, KY, p. 10.
This newspaper describes the use of Supplemental Instruction (SI) with students at the University of Louisville (KY) since 1984. Each academic term SI is offered in a dozen courses for the following academic departments: accounting, biology, chemistry, EMCS, geography, HED, history, ISDP, math, physics, political science, and sociology.

Horsley, L. (1991, September 19). UMKC pioneers a 'survival course': Study skills program gives students the help they need to succeed. *The Kansas City Star Newspaper*, Kansas City, MO, pp. 1, 6.
This newspaper article provides an overview of the Supplemental Instruction (SI) program at the University of Missouri-Kansas City. The article provides an interview with Deanna Martin -- SI's creator -- as well as several other SI supervisors and SI leaders. Dr. Gary Widmar, UMKC Vice Chancellor for Student Affairs, estimates that for every dollar invested in the SI program for staff salaries, the university receives back six dollars due to higher reenrollment and graduation rates of SI participants. Martin shares that the SI program is expanding to the United Kingdom and the Arctic Circle.

Hostetter, S. (1994, Summer). Improving college student retention: Interview with David Arendale. *National Tutoring Association Newsletter,* (3), 2-3.
The interview of David Arendale provided an overview of the Supplemental Instruction (SI) program. Tinto's Model of Student Retention was discussed and its relationship to explaining the effectiveness of the SI model was discussed. Data from a study of students at the University of Missouri-Kansas City suggested that SI participation with positively correlated with increased levels of reenrollment at the institution when compared with non-SI participants. It is estimated that through increased reenrollment rates, the SI program generates over $200,000 in annual savings.

Hrabovsky, P. (1999). Math Supplemental Instruction at Indiana University of Pennsylvania: A short and sweet first report. In *Selected Proceedings of the 16th (1997) & 17th (1998) Annual Conferences of the Pennsylvania Association of Developmental Educators* (p. 45). Pittsburgh, PA: The Community College of Allegheny County. (ERIC Document Reproduction Service No. ED 428 632). Retrieved July 1, 2004, from http://www.iup.edu/lc/pade/Hrabovsky.htmlx.
Math Supplemental Instruction (SI) was initiated at Indiana University of Pennsylvania (IUP) during the summer session of 1996 through the developmental math course, LC 095: Introduction to College Math II. Improved grades and scores were noted and SI was integrated into all LC 095 sections beginning with the summer session of 1996. With the cooperation of the Mathematics Department and support from administrators, SI was piloted in select sections of developmental math courses. The pilot program was continued and expanded in the spring semester of 1998.

Hurley, K. F., McKay, D. W., Scot, T. M., & James, B. M. (2003). The Supplemental Instruction Project: Peer-devised and delivered tutorials. *Medical Teacher, 25*(4), 404-407.
The study examined the effectiveness of Supplemental Instruction Program (SIP) with undergraduate first-year medical students at Memorial University of Newfoundland in the Integrated Study of Disease I course during 1888 and 2000. The SIP program is based on the Medical Scholars Program developed at the University of Southern California which is an adaptation of Supplemental Instruction. Both qualitative and quantitative data collection methods were employed to evaluate the program. Benefits were stated for both the student participants as well as the student group facilitators who were second year medical students.

Ilsley, G. (1994). Introducing college-wide Supplemental Instruction. In C. Rust, & J. Wallace (Eds.), *Helping students to learn from each other: Supplemental Instruction, SEDA Paper 86* (pp. 65-70). Birmingham, England: Staff and Educational Development Association.
Supplemental Instruction is being used at Nene College (Northampton, United Kingdom). SI was used in five courses drawn from engineering, building studies, human biological studies and information systems. Research studies suggest improvement with SI participants.

Indiana Commission for Higher Education. (1997). *Campus retention programs at Indiana public institutions: Working paper*. Indianapolis, IN: Indiana Commission for Higher Education. (ERIC Document Reproduction Service No. ED431480).
This paper examines what Indiana public colleges are doing to improve the retention of students, and provides a synopsis of 12 examples of "best practices" in the state and three from other states. The commission also presents 11 observations, each accompanied by one or more possible strategies that might improve student retention. Half a dozen of the institutions provide achievement and persistence data about the impact of Supplemental Instruction with higher student outcomes.

Irwin, D., & Risser, B. (1988). *Supplemental Instruction-Plus: Levels of academic support at the community college*. Unpublished manuscript, Onondaga Community College at Syracuse, NY.

Traditional support programs at community colleges focus a great deal of attention on meeting the needs of developmental students. Supplemental Instruction PLUS (SI+) builds on that model to provide several levels of academic support all students as they are challenged. SI+ was developed at Onondaga Community College in Syracuse, NY and is a variation of the traditional SI program. However, SI+ groups have a slightly different focus since SI+ is meant to help students adjust to the demands of college courses after they have completed a sequence of developmental courses. The courses targeted by SI+ are not historically difficult and requiring the intensity of a full SI program. While the study sessions appear similar to traditional SI, SI+ leaders do not attend the course professors lectures. The SI+ leader still models effective study behavior. To keep pace with the course, the SI+ leader meets weekly with the course professor. It is anticipated that students will participate in traditional SI program when they encounter historically difficult courses in succeeding academic terms. The final stage for the SI+ program is for students to create independent study groups in other courses where SI+ and traditional SI sessions are not offered.

Jarvi, S. W. (1998). A quantitative and qualitative examination of Supplemental Instruction and its relationship to student performance (collaborative learning, academic support) [Dissertation, The University of Connecticut, 1998]. *Dissertation Abstracts International, 59*(05), 1484A.

Academic support programs are well entrenched on virtually every college campus. These programs have not always been warmly received, however, and their place on many campuses is a source of constant debate. They have to be evaluated effectively and often to determine if they are achieving their intended goals and contributing to the overall mission of the institution. Supplemental Instruction (SI) is one example of a support program because it utilizes peers to foster a collaborative learning environment and targets high risk classes as opposed to high risk students. Quantitative and qualitative methodologies were employed in this study. The sample for the quantitative component included 2,295 cases of a student completing 1 of 12 introductory level Biology or Chemistry courses in which SI was offered at a large New England Research University. From the total sample, 860 students attended at least one SI session. Qualitative techniques were employed to collect data from both participants and non-participants of SI during one semester. Direct regression where the independent variables of Scholastic Aptitude Test scores, cumulative grade point average, semester standing, and level of SI participation. The dependent variable was student performance in the class as measured by average exam scores. Analyses of data found that in 7 of 12 classes involved, level of participation in SI explained a significant additional amount of variation in exam scores with accompanying large effect sizes. Qualitative findings revealed core categories related to why students attend SI: belief that SI attendance helps to raise test scores; SI sessions were fun and made participants feel more comfortable; students liked SI since it gave an opportunity to work in teams with other students; enabled attendees to stay academically competitive; and sometimes SI sessions compensated for poor lectures. The two major reasons for students not participating in SI were that time constraints precluded attendance and the other reason was a belief that SI attendance was unnecessary.

Jenkins, A. (1994). Thirteen ways of doing fieldwork with large classes/more students. *Journal of Geography in Higher Education, 18*(2), 143-155.
This article describes thirteen strategies for geography instructors to consider to increase instructional effectiveness with large classes. The article is addressed to geography teachers and other field-based subjects in the United Kingdom. Suggestion number suggests finding ways to add new members to the academic staff. Supplemental Instruction (SI) is suggested as a way to involve students in helping to teach each other in large classes.

Johnston, C. (1995). Peer tutoring in Economics at the University of Melbourne. In *Australian Economic Education Symposium Proceedings* (pp. 48-71). Adelaide, Australia: University of Adelaide.
This paper describes an adaptation of the Supplemental Instruction (SI) model used at the University of Melbourne (Australia) in 1993. The model integrates Diploma of Education students in an undergraduate economics group learning program (Macroeconomic theory and Macroeconomic Policy). Several adaptations of the SI program: the group facilitator was a volunteer postgraduate Diploma of Education student; two wine and cheese evenings were scheduled to provide the facilitator and students to interact socially and exchange experiences with one another. It found that small groups operate more effectively in terms of group cohesion, longevity and perception of improved performance when supported by postgraduate students. Postgraduates developed an enhanced range of skills in relation to group management, cooperative learning and communication.

Jones, J. P., & Fields, K. T. (2001). The role of Supplemental Instruction in the first accounting course. *Issus in Accounting Education, 16*(4), 531-547.
This study investigates empirically the role of Supplemental Instruction (SI) as a means of enhancing student performance in the first accounting course. ANCOVA-based results from 1,359 students in nine sessions of Principles of Accounting indicates that SI was effective at increasing academic performance; after controlling for self-selection bias, participation in both voluntary and mandatory SI sessions was found to be positively associated with the total points earned in the course. Additionally, a step pattern is observed in the increased performance for both the voluntary and mandatory attendance phases of the study, indicating that the level of SI attendance may play a role in the benefits obtained. The implications of this analysis for the accounting curriculum are addressed.

Josephsen, K. (2001, October 1). Illinois State University to discuss student retention. *The Pantagraph* , Bloomington, IL, p. A3.
This newspaper story describes the use of Supplemental Instruction (SI) at Illinois State University-Bloomington and its impact on increasing student retention.

Kastelic, J. (1997). *Adjunct study skills: An integrated, student-centered approach to learning in community college*. Unpublished Master's of Arts (M.A.) thesis, University of San Francisco.
This research report describes one academic study skills program offered at a community college in northern California. It presents a variety of data to show how this

integrated, student-centered, collaborative-based adjunct program affected the immediate and long term academic performance and study behaviors of its multicultural, multilingual participants. Students who enrolled in the target course in political science and concurrently completed its corresponding adjunct course over a three quarter period participated in this study. The adjunct course (Skills 130A/PS) was a variation of the Supplemental Instruction (SI) model. Students must attend at least seven weekly sessions and complete four independent study skills labs. SI leaders facilitate the adjunct course which carries academic credit and can generate extra credit points for the linked political science course (Political Science 1). A qualitative and quantitative study was conducted. The students enrolled in linked adjunct course earned higher rates of A & B final course grades, lower rates of D, F & W grades, and increased levels of study skills abilities as compared with students who did not enroll in the adjunct course.

Kastor, E. (1984, April 2). Education: Reading, 'riting and reasoning. *Washington Post Newspaper*, Washington, D.C., p. B5.
This newspaper article provides an overview of the Supplemental Instruction (SI) program and its use to develop reasoning skills. Research suggests that half of all students entering college lack the basic reasoning skills to completely understand the content of their courses. It contains an interview of Deanna Martin, creator of the SI program.

Kauffman, D., & Wolfe, R. F. (1990). Supplemental Instruction with mentoring support: A vehicle for faculty development. *The Journal of Staff, Program, and Organization Development, 8*(2), 101-104.
The Supplemental Instruction (SI) program at Anne Arundel Community College (Arnold, MD) was modified to use faculty members as SI supervisors. While this was the initial focus for the faculty members, the mentor role evolved into an opportunity for them to observe colleagues and to grow as teachers. Faculty mentors were placed in classes outside their own discipline. The classroom instructor and faculty mentor would meet periodically to provide feedback to each other and discuss strategies to improve instructional effectiveness.

Kaye, P. (1994). Introducing Supplemental Instruction in law. In C. Rust, & J. Wallace (Eds.), *Helping students to learn from each other: Supplemental Instruction, SEDA Paper 86* (pp. 51-54). Birmingham, England: Staff and Educational Development Association.
Supplemental Instruction was introduced at the University of Central Lancashire (United Kingdom) in the law program. While the targeted courses did not have high rates of low grades or withdrawal, there were several other reasons for their selection: enhancement of students' competencies and skills; leadership development; appreciation for learning outside of the formal classroom environment; and increased understanding of substantive legal issues.

Kelly, B. A. (1992). *And it came to PASS: Peer Assisted Study Sessions*. Unpublished manuscript, Queensland University of Technology, Brisbane, Queensland, Australia. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.

This paper discusses the development of the Peer Assisted Study Sessions (PASS) program at Queensland University of Technology (Brisbane, Australia). PASS is based upon the Supplemental Instruction (SI) model. The program was piloted in two classes in Anatomy for Nursing and Statistics for Information Technology. Research results indicated a lower rate of withdrawal and higher final course grades for participants.

Kelly, B. A. (1995). Peer-Assisted Study Sessions: An instrument for quality assurance in high risk subjects. *Higher Education Research and Development Society of Australia Conference Proceedings* Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper describes the use of Peer Assisted Study Sessions (PASS), a local name for the Supplemental Instruction program as it is used at the Queensland University of Technology in Australia. The PASS program is being used as part of the institution's quality assurance (QA) system to regularly examine the needs of its customers (i.e., students enrolled in the courses that had PASS attached to them, faculty members who taught the courses, and the general community who employed the students). There was special concern for courses in which the faculty members were instructing students from other college majors. The PASS leaders served as a conduit for weekly communications with the faculty members regarding the comprehension level of the students and can make decisions regarding modifying their classroom delivery. This "just-in-time" feedback system provides immediate benefit to the students and lectures as weekly incremental improvements can be made.

Kelly, B. A. (1991). *Selection of leaders to facilitate Peer Assisted Study Sessions (PASS).* Unpublished manuscript, University of Queensland, Australia. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This article describes the selection procedures for Peer Assisted Study Sessions (PASS) leaders. PASS is a locally used name at Queensland Institute of Technology and the University of Queensland in Australia for the Supplemental Instruction (SI) program. Several suggestions include distributing leaflets and encouraging former PASS participants to apply as leaders. Group interviews are used to same time and to make students feel more at ease during the interview process. To meet the need for the program to fit the institutions use of Total Quality Management (TQM), PASS leaders were asked to complete a questionnaire at the end of their PASS sessions and to maintain a diary of session activities. This information was used to improved the PASS program and provide helpful feedback to the course instructors.

Kelly, B. A., & Gardiner, R. (1994). *Student peer mentoring: An effective strategy to promote student learning.* Paper presented at the HERDSA Annual Conference, July 6-10, 1994.
The Peer Assisted Study Sessions (PASS) program is based upon the Supplemental Instruction (SI) program developed in the U.S. PASS was used at the Queensland University of Technology (Brisbane, Australia). A pilot program was carried out in 1992. Since then, the SI program has spread to seven disciplines in five faculties, and has attracted four 1994 CAUT grants.

Kelter, P. B., & Carr, J. D. (1996). *Personalizing the large general chemistry lecture experience*. Unpublished manuscript, The University of Nebraska at Lincoln. Retrieved July 1, 2004, from http://wwitch.unl.edu/kelter/paulpap.html
This report that includes information about the use of Supplemental Instruction (SI) was published online in connection with New Initiatives in Chemical Education, an on-line symposium, June 3 to July 19, 1996. SI was selected since it helps to provide a support structure to help individuals in the large class sections of Chemistry 109 and 110. Data from Fall 1995 showed that SI participants received a higher final course grade (2.80 vs. 1.99), a higher rate of A and B final course grades (53.1% vs. 34.9%), a lower rate of D and F final course grades (13.6% vs. 39.4%). Data suggests what when students are classified on the basis of ACT quartile scores, those who participated in the SI sessions receive a considerably higher grade in Chem 109 that those who did not if they had higher ACT scores (top quartile: SI, 3.18 vs. 2.53 non-SI; middle two quartiles: 2.60 vs. 2.04; bottom quartile: 1.97 vs. 1.68).

Kemmet, L. C., & Mizeur, L. M. (1903). *Supplemental Instruction: Students helping students*. Unpublished manuscript, North Dakota State University. Available from the author: Linda M Mizeur, Department of Chemistry, North Dakota State University, 1025 16th St. N., Fargo, ND 58102, Lindell.Kemmel@ndsu.nodak.edu
Supplemental Instruction (SI) was used at North Dakota State University in the chemistry department and targets five courses: Conceptual Chemistry, General Chemistry I and II, and Organic Chemistry I and II with positive academic achievement for SI participants.

Kenney, P. A. (1989). *Effects of Supplemental Instruction on student performance in a college-level mathematics course*. Paper presented at the 1989 Annual Meeting of the American Educational Research Association, San Francisco, CA. (ERIC Document Reproduction Service No. ED 347874).
This paper describes a research study that used Supplemental Instruction (SI) in a first-semester calculus course for business and economics majors at the University of Texas at Austin. The experimental design for this study used Campbell and Stanley's Nonequivalent Control Group model. The study used two lecture classes with the same instructor. Each class was divided into two discussion sections, and of those, one from each received the SI treatment. In the control sections the teaching assistant performed typical duties. In the SI sections the assistant performed the same duties but in addition she provided instruction on the study skills relevant to the course as it progressed and other activities that SI leaders would perform or facilitate. The results showed a statistically significant difference favoring the SI treatment group: the control group mean course grade point average of 2.43 and that for the treatment group of 3.00; the control group mean semester grade point average (GPA) of 2.51 and that for the treatment group GPA of 2.95. A multiple linear regression model was then chosen as a more complete method of analysis. Three of the independent variables had coefficients which were significant at the .05 level -- high school class rank, discussion section attendance, and control/treatment group membership. This helps to answer the question of whether SI was just a form of "double exposure" to the course content. Since SI sessions were qualitatively different than the traditional discussion sections (as evaluated by outside observers using a observation protocol) and that the students who

participated in the SI sessions earned higher mean final course grades, it appears that SI sessions were more than double exposure. A multiple regression analysis of semester grade point average found that three of the variables were significant at the .05 level -- the SAT Mathematical score, discussion section attendance, and group membership.

Kenney, P. A. (1990, April). *Effects of Supplemental Instruction on student performance in a college-level mathematics course: A report of additional results*. Paper presented at the 1990 Annual Meeting of the American Educational Research Association, Boston, MA. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper details additional results from an experiment on the effects of Supplemental Instruction (SI) on student performance in a college business calculus course. The paper is a continuation of research first reported at the 1989 AERA Annual Meeting. SI participants who withdrew from the course most often cited their perceived lack of prerequisite skills or to problems with calculus concepts. The author postulates that the exposure to SI raised their awareness of their lack of skills. Non-SI participants who withdrew from the course most often cited "personal" reasons. Of the 26 students who failed or withdrew from the original calculus course, former SI participants were more likely to immediately reenroll in the course (six students) than the non-SI participants (one student). Another study focused on the academic performance of SI and non-SI participants in a succeeding academic term in courses where SI was not offered. Former SI participants earned no F grades or withdrew from the second-semester business calculus course. The former SI participants earned a slightly higher mean final course grade (2.63 vs. 2.48), though it was not a statistically significant difference. The author speculates that the absence of SI with the second calculus course may had a bigger impact on former SI participants -- narrowing the positive difference in academic achievement with the control group -- since a support service which they were used to accessing was not available in the next course in the sequence.

Kenney, P. A. (1989). Effects of Supplemental Instruction (SI) on student performance in a college-level mathematics course [Dissertation, The University of Texas at Austin, 1988]. *Dissertation Abstracts International, 50*(02), 378A. (University Microfilms, No. 8909688).
This doctoral dissertation describes a research study that used Supplemental Instruction (SI) in a first-semester calculus course for business and economics majors at the University of Texas at Austin. The experimental design for this study used Campbell and Stanley's Nonequivalent Control Group model. The study used two lecture classes with the same instructor. Each class was divided into two discussion sections, and of those, one from each received the SI treatment. In the control sections the teaching assistant performed typical duties. In the SI sections the assistant performed the same duties but in addition she provided instruction on the study skills relevant to the course as it progressed and other activities that SI leaders would perform or facilitate. The results showed a statistically significant difference favoring the SI treatment group: the control group mean course grade point average of 2.43 and that for the treatment group of 3.00; the control group mean semester grade point average (GPA) of 2.51 and that for the treatment group GPA of 2.95. A multiple linear regression model was then

chosen as a more complete method of analysis. Three of the independent variables had coefficients which were significant at the .05 level -- high school class rank, discussion section attendance, and control/treatment group membership. This helps to answer the question of whether SI was just a form of "double exposure" to the course content. Since SI sessions were qualitatively different than the traditional discussion sections (as evaluated by outside observers using a observation protocol) and that the students who participated in the SI sessions earned higher mean final course grades, it appears that SI sessions were more than double exposure. A multiple regression analysis of semester grade point average found that three of the variables were significant at the .05 level -- the SAT Mathematical score, discussion section attendance, and group membership. Controlling for exposure, it was suggested that these gains were due to the benefits of SI, not to the increased exposure of the group to course material. To investigate any residual effects from the SI program, the students from the initial study were tracked for an additional semester. Results from the follow-up study showed that students who had experienced SI had a pattern of fewer F grades in and withdrawals from the second-semester business calculus course. Of the 26 students who failed or withdrew from the original calculus course, former SI participants were more likely to immediately reenroll in the course (six students) than the non-SI participants (one student). Another study focused on the academic performance of SI and non-SI participants in a succeeding academic term in courses where SI was not offered. Former SI participants earned no F grades or withdrew from the second-semester business calculus course. The former SI participants earned a slightly higher mean final course grade (2.63 vs. 2.48), though it was not a statistically significant difference. The researcher speculates that the absence of SI with the second calculus course may had a bigger impact on former SI participants -- narrowing the positive difference in academic achievement with the control group -- since a support service which they were used to accessing was not available in the next course in the sequence.

Kenney, P. A. (1990). *Suggestions for mathematics Supplemental Instruction sessions*. Unpublished manuscript, Pennsylvania State University at College Park.
This paper was developed to accompany a videotape that provides suggestions for strategies to use during Supplemental Instruction (SI) sessions. These suggestions are based upon direct experience while serving as a SI leader in a calculus course at the University of Texas at Austin while she was completing here Ph.D. on the effectiveness of SI. Some of the suggestions included: constantly referring to the course syllabus throughout the academic term; discussing effective note taking in math classes by the SI leader sharing their strategy; discussing ways to maximize the usefulness of the textbook; providing additional structure to the SI sessions; focuses on the problem-solving protocols rather than on just finding correct answers; SI leader providing worksheets to guide SI sessions that help generate group discussion, focus on key concepts, help review for exams, and practice problem-solving skills; test question prediction; and taking practice exams to prepare for in class examinations.

Kenney, P. A. (1997). *Supplemental Instruction in mathematics: Needs and approaches, critical aspects of mathematics training and the role of SI*. Unpublished manuscript, Pennsylvania State University at College Park.
Mathematics presents a challenge to many students in higher education. This paper

describes some of these challenges and two approaches to Supplemental Instruction (SI) that may help students. Critical components of math SI sessions: 1) a welcome period during which the glossary terms and protocols are discussed; 2) a period during which students use the protocols to solve problems similar to the homework; and 3) a period during which students may attempt some homework problems.

Kenney, P. A. (1988). *Supplemental Instruction sessions in math courses.* [Videotape]. Garland, M. (Producer) Kansas City, MO: Center for Supplemental Instruction, University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This video tape features Dr. Patricia Kenney discussing ways in which Supplemental Instruction (SI) in mathematics courses differ from those in other content areas. Kenney served as a math SI leader during her doctoral research on the effectiveness of SI in math sessions at the University of Texas at Austin.

Kenney, P. A., & Kallison, J. M. (1992). *Learning to study college-level mathematics: Effects of a Supplemental Instruction (SI) program in first-semester calculus courses*. Paper presented at the American Educational Research Association 1992 Annual Conference, San Francisco, CA. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper details results from a Supplemental Instruction program designed for students in college-level calculus courses during Fall 1989. The studies were conducted at the University of Texas at Austin by two teaching assistants employed by the mathematics department and were selected and trained by the SI program by the staff of the University's Learning Skills Center. The first study compared the performance of students in Business Calculus. While SI was beneficial to all SI participants (2.39 vs. 1.96 for non-SI participants), it was especially helpful for lower-ability students. The second study focused on an Engineering Calculus course. While the difference was closer for the two groups (2.01 vs. 1.91 for non-SI participants), SI provided disproportionate help to the lower-ability students as measured by SAT quantitative scores. More than 70 percent of students felt that the study strategies introduced by the SI leaders were either "very helpful" or "helpful." Almost 80 percent indicated that exposure to study strategies for calculus changed the way they studied either "very much" or "somewhat," and that the techniques that these skills would help them in future courses either "very much" or "somewhat." More than 80 percent of the students responded that it was either "very important" or "important" that all SI leaders incorporate study strategies into discussion sections. SI leaders mentioned the positive impact of the SI program on themselves as well: reflect about their teaching methods; develop new teaching methods; and learned how to integrate learning strategies with content instruction.

Kenney, P. A., & Kallison, J. M. (1994). Research studies of the effectiveness of Supplemental Instruction in mathematics. In D. C. Martin, & D. Arendale (Eds.), *Supplemental Instruction: Increasing achievement and retention* (pp. 75-82). New Directions for Teaching and Learning No. 60. San Francisco, CA: Jossey-Bass, Inc.

Given the emphasis on the need to succeed in college-level mathematics courses, these authors take a careful look at the effects of Supplemental Instruction participation on student performance. In addition to reviewing other research studies, this chapter focuses on the use of SI in Fall 1989 at the University of Texas at Austin in Calculus for Business Students and Calculus for Engineering and Natural Science Students. This paper describes a research study that used Supplemental Instruction (SI) in a first-semester calculus course for business and economics majors at the University of Texas at Austin. The experimental design for this study used Campbell and Stanley's Nonequivalent Control Group model. The study used two lecture classes with the same instructor. Each class was divided into two discussion sections, and of those, one from each received the SI treatment. In the control sections the teaching assistant performed typical duties. In the SI sections the assistant performed the same duties but in addition she provided instruction on the study skills relevant to the course as it progressed and other activities that SI leaders would perform or facilitate. The results showed a statistically significant difference favoring the SI treatment group: the control group mean course grade point average of 2.43 and that for the treatment group of 3.00; the control group mean semester grade point average (GPA) of 2.51 and that for the treatment group GPA of 2.95. A multiple linear regression model was then chosen as a more complete method of analysis. Three of the independent variables had coefficients which were significant at the .05 level -- high school class rank, discussion section attendance, and control/treatment group membership. This helps to answer the question of whether SI was just a form of "double exposure" to the course content. Since SI sessions were qualitatively different than the traditional discussion sections (as evaluated by outside observers using a observation protocol) and that the students who participated in the SI sessions earned higher mean final course grades, it appears that SI sessions were more than double exposure. A multiple regression analysis of semester grade point average found that three of the variables were significant at the .05 level -- the SAT Mathematical score, discussion section attendance, and group membership. Additional studies were conducted concerning SI. The first study compared the performance of students in Business Calculus. While SI was beneficial to all SI participants (2.39 vs. 1.96 for non-SI participants), it was especially helpful for lower-ability students. The second study focused on an Engineering Calculus course. While the difference was closer for the two groups (2.01 vs. 1.91 for non-SI participants), SI provided disproportionate help to the lower-ability students as measured by SAT quantitative scores.

Kernick, G., Kedian, J., Seneque, M., & Louw, R. (1993). *Supplemental Instruction: Toward a conceptual framework*. Paper presented at the South African Association for Academic Development Annual Conference, University of the Western Cape, South Africa.

Many academic leaders at postsecondary institutions in South Africa report that many students lack the necessary skills to become successful autonomous learners. Supplemental Instruction (SI) is being used to help students develop these skills outside of class since the traditional passive lecture-based educational delivery system will be slow to change. SI is differentiated from traditional tutorial sessions since in SI it is learner-controlled.

King, P. (1992, Winter). Kingston University: A British supervisor's Supplemental Instruction experience. *Supplemental Instruction Update,* 1, 3.
This newsletter article describes the use of Supplemental Instruction (SI) at Kingston University in London, UK. The author describes the use of the Assistant SI supervisor to help supervise an expanding SI program. The need for all SI leaders to attend frequent update training sessions is urged with the entire group meeting at the beginning of the meeting and then breaking into smaller groups based on academic disciplines for the remainder of the time.

King, P. (1994). Supervision of Supplemental Instruction leaders: A practical guide. In C. Rust, & J. Wallace (Eds.), *Helping students to learn from each other: Supplemental Instruction, SEDA Paper 86* (pp. 81-84). Birmingham, England: Staff and Educational Development Association.
This chapter describes the Supplemental Instruction supervision system at Kingston University in the United Kingdom. Common issues mentioned by SI leaders included: SI session difficulties; SI session leadership skills; strategies to build SI attendance; and SI leader morale.

King, P. (1994). Supplemental Instruction as a staff development model. In C. Rust, & J. Wallace (Eds.), *Helping students to learn from each other: Supplemental Instruction, SEDA Paper 86* (pp. 37-39). Birmingham, England: Staff and Educational Development Association.
This article describes the partnership between the faculty development unit at Kingston University (United Kingdom) and a member of the instructional faculty (professional full-time tutor who also delivered lectures to the students) as they used Supplemental Instruction for student enrichment and staff development. Several courses were targeted in the School of Surveying: Quantity Surveying and Urban Estate Management and European Estate Management studies. The tutor adopted several SI session activities to use during times that were traditionally conducted in a tutorial format. Behavioral changes in students included: students took initiative in sessions for selecting and discussing topics; students worked with each other to identify additional information; students asked more challenging questions of the tutor in class; and students looked to each other for support when challenged with academic matters.

Klein, D. (1990, January 16). Program lets students teach class: Volunteers from biology classes are taught how to think. *Daily Kent Stater Newspaper*, Kent, OH, p. 8.
This newspaper article provides an overview of the Supplemental Instruction (SI) program at Kent State University (OH). Lowell Orr and LaVerne White from the biology department reported that SI participants earned higher mean final course grades in two courses: "Cells and Systems" and "Strategies for Survival in the Biological World." Students with high attendance patterns (10 or more times per term) generally receive a final course grade one full letter grade higher than non-SI participants.

Knott, A. (1997). Towards developing a theoretical and institutionally contextualised model of Supplemental Instruction in the curriculum which entails greater intra- and inter-institutional collaboration between Supplemental Instruction supervisors and academic development practitioners in the region. *1997 South African Association for Academic Development Conference Proceedings* Vista University, Port Elizabeth

Campus, Republic of South Africa. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper critically discusses the model of Supplemental Instruction (SI), an academic student assistance program that has been implemented on the Port Elizabeth campus of Vista University within the context of offering suggestions on how SI can be used by academic development (curriculum and institutional development). SI is one part of a comprehensive learning environment that promotes alternative teaching and learning methodologies and delivery systems that are relevant to the diverse needs of all students.

Koch, E. (1997). *Lecturing between hope and despair: Lecturers' perceptions of academic development needs of students and lecturers at the University of Port Elizabeth.* Port Elizabeth, Republic of South Africa: University of Port Elizabeth, Centre for Academic and Organizational Development.
This report assessed the perceptions of lecturers of the success of academic development at the University of Port Elizabeth in the Republic of South Africa. The problem which emerged from the discussions was the growing number of underprepared and unprepared students who desire to attend tertiary education. Supplemental Instruction (SI) is regarded as a good program, but lecturers do not think that it reaches the targeted group of student effectively and deals adequately with the underlying problems. Since SI is voluntary, not all students who should come do so. Additionally, lecturers believe an increase in the structure of SI sessions may raise academic performance of the underprepared students who they believe need this. Additional solutions offered by the lecturers include: extended curriculum to provide more time-on-task; alternative learning methods by inclusion inside the class the use of collaborative learning, computerized self-paced instruction, and other methods.

Koch, E. (1996). The relationship of attendance of Supplemental Instruction with the performance of first year students at the University of Port Elizabeth. *Proceedings of the Conference on Student Contributions to Learning* (pp. 104-127). Rhodes University, Grahamstown, Republic of South Africa: Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
The use of Supplemental Instruction (SI) at The University of Port Elizabeth (South Africa) was investigated by examining the statistical relationship of attendance of SI with performance through multiple regression analysis. The sample consisted of first year students in the Science and Humanities faculties. In most of the courses there was a positive relationship between attendance of SI and performance. This was especially true for students who attended five or more times.

Koch, E., & Mallon, P. (1998). Evaluation of Supplemental Instruction: A performance assessment approach. *South African Journal of Higher Education, 12*(3), 173-178.
This article about the use of Supplemental Instruction (SI) was originally presented at the South African Association for Academic Development Conference in Bloemfontein, Republic of South Africa. This research investigation assesses the performance of the SI program in terms of efficiency, quality, and effectiveness. Three concern areas were

identified: voluntary attendance in SI sessions, unstructured approach in science courses, and ineffectiveness in increasing the pass rate of very under-prepared students. Key factors associated with positive program outcomes included: skill and ability of the SI leader with both facilitation but also knowledge/enthusiasm for the subject; involvement and support of the course lecturer; type of work covered in SI sessions; training both initially and ongoing of SI leaders; and more structure in SI sessions in science and other problem-solving areas.

Kochenour, E. O., Jolley, D. S., Kaup, J. G., Patrick, D. L., Roach, K. D., & Wenzler, L. A. (1997). Supplemental Instruction: An effective component of student affairs programming. *Journal of College Student Development, 38*(6), 577-586. Retrieved July 1, 2004, from http://www.sa.utah.edu/lep/si/article.htm and http://www.eou.edu/lcenter/SIpaper.htm
The effectiveness of Supplemental Instruction (SI) was examined using 11,000 participants enrolled in eight courses at the University of Utah, a large research university. Corelational analyses and analysis of covariance support the hypothesis that SI is an effective program. The data was collected between Autumn 1992 and Spring 1994. Students on average attended about 3.7 times for each academic quarter. There was a positive correlation between higher grades and higher levels of attendance in SI: zero, 2.387; 1 to 2, 2.597; and 3 or more times, 2.848. Though students of various previous levels of academic achievement attended SI in similar patterns, research suggests that SI sessions had the most impact on students with lower previous grade point averages. Additional analysis examined the interaction of SI performance and class size, PGPA and other variables. An unusual finding was that the percent of SI attendance decreased with increasing class size.

Kochenour, E., & Roach, K. (1999). SI: An effective program within student affairs. In *Proceedings of the First National Conference on Supplemental Instruction and Video-based Supplemental Instruction* (pp. 8-10). Kansas City, MO: Center for Supplemental Instruction, University of Missouri-Kansas City. Available from the Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, Kansas City, MO 64110. Retrieved July 1, 2004, from http://www.saff.utah.edu/lep
This article is based on one previously published in the November/December 1997 issue of the *Journal of College Student Development, 38*(6), 577-586. The article contains a study from the University of Utah that examined the effectiveness of SI with nearly 12,000 students enrolled in 82 classes. Among the findings: average grade of participating students was 0.603 higher than nonparticipants; percentage of attendance in SI decreased as class size increased; cost of SI was $4.00 per contact hour which does not include administrative overhead and was less expensive as compared to other forms of academic assistance offered to students such as tutoring.

Koehler, C. (1995, Spring). Supplemental Instruction and critical thinking. *Supplemental Instruction Update,* 1, 3.
This article by an assistant professor of Communication Studies at the University of Missouri-Kansas City describes the utility of Supplemental Instruction (SI) for developing the critical thinking skills of SI participants. SI sessions involve a natural environment for inquiry by a community of learners. The SI leader helps participants to

develop independent thinking. As students become engaged and active participants in the intellectual discourse that occurs during SI session, students move to higher levels of thought.

Kotze, G. S. (1994). *Essentials of a program for Supplemental Instruction as academic support for technikon students in mathematics courses at entry-level*. Unpublished doctoral dissertation, Faculty of Education (Department of Diadactics) at the University of the Orange Free State, Bloemfontein, Republic of South Africa. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This Doctor of Philosophy dissertation is focused on the effectiveness of Supplemental Instruction (SI) with postsecondary students in entry-level mathematics courses at an institution in the Republic of South Africa. The SI model was evaluated regarding its effectiveness with providing the necessary psychological, philosophical, educational, and sociological components that can contribute towards successful mathematics mastery. Through qualitative and quantitative evaluations, the SI model was found to support increased academic achievement and mastery of mathematical concepts.

Kowal, P., & Shaw, G. (1998). Academic support: The bridge and catalyst for academic success and student development. In P. L. Dwinell, & J. L. Higbee (Eds.), *Developmental education: Meeting diverse student needs* (pp. 29-34). Morrow, GA: National Association for Developmental Education.
Many learning support professionals consider themselves developmental educators. The process of facilitating the academic growth of students is grounded in developmental theory. This chapter discusses how academic assistance programs such as Supplemental Instruction, tutor training, freshman experience programs and collaborative efforts promote the cognitive and personal development of participating students.

Kreke, P. J., & Gibbon, T. C. (2003). *Organic chemistry and Supplemental Instruction*. Unpublished manuscript, Mount St. Mary's College (MD). Available from the authors: Patricia Kreke, Science Department, Mount St. Mary's College, Emmitsburg, MC 21727, kreke@msmary.edu, gibbon@msmary.edu
Supplemental Instruction (SI) is used at Mount St. Mary's College (MD), a small liberal arts college, in an organic chemistry course. Qualitative and quantitative research studies have found benefits of the SI program for SI participants, SI leaders, and the faculty members who host SI in their course.

Langan, M. B. (1999). *The effect of Supplemental Instruction on the grades of college students*. Unpublished Master's of Arts (M.A.) thesis, University of Detroit Mercy, Detroit, MI. Available: Interlibrary loan from University of Detroit Mercy, Detroit, MI.
This study of Supplemental Instruction at the University of Detroit Mercy focused on conditionally admitted students in the University College Program during 1997 concerning their grade point average. These students were enrolled in one or more of the following courses: Principles of Human Anatomy, Principles of Chemistry II, General Chemistry I, Elementary Algebra, College Algebra, Mathematical Analysis I, and Elementary Functions. SI attendance was broken into four categories: 0-25%, 26-50%,

51-75%, and 76-100%. While SI attendance was statistically significant in relation to higher final course grade, there was not a perfect corresponding relationship with increasing rates of SI attendance: 0-25%, 1.83 GPA; 26-50%, 2.07; 51-75%, 1.83; and 76-100%, 2.37.

Lazari, A., & Simons, K. (2003). Teaching college algebra using Supplemental Instruction versus the traditional lecture method. *Georgia Journal of Science, 61*(4), 192-198. Retrieved March 15, 2005, from http://web1.infotrac-custom.com/pdfserve/gd_item/1/Sed79a8w1_1/SB024-01.pdf
This article describes the use of Supplemental Instruction (SI) at Valdosta State University with a college algebra course. Students with predicted weaker entry level math skills, as measured by the SAT, who participate in SI will achieve similar final course grades with students who have average math skills. More often students with weaker entry math skills chose to voluntarily participate in SI sessions.

Lee, R. C. (1998, June 16). UTA offers help with tough courses: Supplemental Instruction boots grades, officials and students say. *Fort Worth Star-Telegram Newspaper*, Fort Worth, TX, p. 1.
This newspaper article describes the use of Supplemental Instruction (SI) at the University of Texas-Arlington.

Levine, P. (1975, November 13). 'Whiz-Kids' and troubled flock to learning center. *UNews (University of Missouri-Kansas City Student Newspaper)*, Kansas City, MO, pp. 1, 13.
This newspaper article describes the use of Supplemental Instruction (SI) with some of the most gifted students at the University of Missouri-Kansas City. Skills that these students used in high school are not sufficient for the academic rigor experienced at the university.

Levitz, R. (1990). Supplemental Instruction takes off. *Recruitment and Retention in Higher Education Newsletter, 4*(11), 7.
This newsletter article provides a short overview of the Supplemental Instruction (SI) program. George Russell, chancellor at UMKC was quoted, "The SI approach avoids both the remedial stigma of typical assistance programs and the high costs of one-on-one tutoring.".

Levy, T. (1991, October 14). Students get into the upliftment business. *Business Day Newspaper*, Wits, South Africa, p. 10.
This newspaper article describes the use of Supplemental Instruction (SI) at Wits University in South Africa. The SI program will be started by commerce students at the university. The SI program will be aimed at assisting Black students who have been disadvantaged by the secondary school system.

Lilley, L. L. (1997). Retention of racial-ethnic minority students within Virginia baccalaureate schools of nursing (nursing education) [Dissertation, George Mason University, 1997]. *Dissertation Abstracts International, 58*(07), 3559B.
The purpose of this dissertation research study was to examine the relationship

between retention strategies and retention rates of racial-ethnic minority baccalaureate nursing students attending public universities and colleges within the State of Virginia. Tinto's Model of Student Departure was used as the framework for the study. A cross-sectional one-part mailed survey design was used for this study. A descriptive methodology was used to summarize and describe the data. Qualitative comments were also analyzed for themes about retention. Statistically significant findings included: lack of close tracking of retention of racial-ethnic minority students by the schools; no statistical significance between the variable of retention problems and the variables of tutoring for racial-ethnic minority students; and fewer than 37% of the schools had Supplemental Instruction or related programs available at the department or school level, although they may have been offered elsewhere on campus.

Lipsky, S. A. (Ed.). (2003). *Internet homepage for the NADE SI Special Professional Interest Network* [On-line]. Retrieved July 1, 2004, from http://www.iup.edu/lec/AcadAssist/SI/SI%20Help.htm
This Internet homepage is maintained by the National Association for Developmental Education Supplemental Instruction Special Professional Interest Network. It provides a central location for information about SI provided by national members of this group. Some of the menu items include: overview of SI; SI materials; and a directory of SI-related documents. Currently more than 40 documents are available for viewing at this site about SI by authors from colleges across the U.S.

Lipsky, S. A. (2001). Enhancing students' academic performance via Supplemental Instruction and linked courses. *The ACT 101 Journal, 8*(1), 3-6.
The Learning Center program at Indiana University of Pennsylvania is a comprehensive freshman-experience program providing academic support services to approximately 400 at-risk freshmen. Supplemental Instruction (SI) is an important component of this program to increase student academic achievement and persistence. Participating students earned a final course grade approximately half a letter grade higher than nonparticipants with nearly two-thirds of students participating in the SI program.

Livingston, S., Duda, D., & Lucas, K. (2001). Supplemental Instruction at LaGuardia Community College. *PEPnet 2000 Innovation in Education: Postsecondary Education Programs Network Annual Conference* (pp. 241-246). Knoxville, TN: Postsecondary Education Programs Network. Retrieved July 1, 2004, from http://www.pepnet.org/pdf/conference/241-246-LIVINGSTON-DUDA.pdf
The Supplemental Instruction (SI) program at LaGuardia Community College (NY) has been expanded and adapted to serve students who are deaf and hard-of-hearing. Too often interpreters have been expected to serve the role of tutor with the advantage of specific training. In the LaGuardia model, the interpreter is trained to provide services as interpreter as well as SI leader. Some of the adaptations of the SI model include the following. The interpreter also takes as many notes as possible while they are interpreting the lectures. This allows them to provide some model note taking for the hearing impaired students to consider for adoption. "Text interpretation" is another strategy of the hybrid SI leader. In this activity key passages from the textbook or other print resources are made into transparencies and projected during the SI session. This activity is used for vocabulary development of key terms and support improved reading

comprehension. At the beginning of the academic term all the hearing impaired students are encouraged to enroll in the same section of the core curriculum course that is supported by the hybrid SI leader. Results suggest that SI participants earn higher final course grades.

Lockie, N. M., & Van Lanen, R. J. (1997). Nursing students' success and retention in chemistry courses: A collaborative approach . *1997 International Nursing Research Congress Abstracts* Indianapolis, IN: Sigma Theta Tau.
This article describes the use of Supplemental Instruction (SI) with improving academic performance of nursing students in chemistry courses. The authors used the SI program at Saint Xavier University in Chicago, IL.

Lockie, N. M., & Van Lanen, R. J. (1994). Supplemental Instruction for college chemistry courses. In D. C. Martin, & D. Arendale (Eds.), *Supplemental Instruction: Increasing achievement and retention* (pp. 63-74). New Directions for Teaching and Learning No. 60. San Francisco, CA: Jossey-Bass.
Strategies for maximizing the effectiveness of Supplemental Instruction in college chemistry courses are presented. The authors share lessons from use of SI in Principles of Inorganic Chemistry, Principles of Organic Chemistry and Biochemistry, General Chemistry 1, and Organic Chemistry I and II at Saint Xavier University (Chicago, IL). Some of the SI session strategies include: problem-solving strategies; review of basic chemistry content; accurate use of chemical language; collaborative learning activities that promote active learning by all SI session participants; quizzes to provide comprehension checkpoints; and sharing study strategies with each other.

Lockie, N. M., & Van Lanen, R. J. (1992, January). Supplemental Instruction in Chemistry: A collaborative relationship among students, faculty, and a peer facilitator. *Illinois Association for Personalized Programs Newsletter, 1*, 3-4.
This newsletter article describes the use of Supplemental Instruction (SI) at Saint Xavier College (Chicago, IL) in chemistry courses. Data from a 1990-91 study with a Chemistry 108 course suggests that SI participants earn higher mean final course grades and receive lower rates of D, F and withdrawals (15.4% vs. 37.1%) than non-SI participants.

Lockie, N. M., & Van Lanen, R. J. (1991). Utilizing Supplemental Instruction to enhance student performance in a freshman level chemistry course. *Transactions of the Illinois State Academy of Science, 84*(10), 10.
This abstract describes the use of Supplemental Instruction (SI) with entry-level chemistry students at Saint Xavier University (Chicago, IL).

Loh, H. (1997). *Multidisciplinary peer collaborative study programs for first year Aboriginal and Torres Strait Islander students*. Unpublished manuscript, Queensland University of Technology at Brisbane, Queensland, Australia. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This report describes the use in 1995 of Supplemental Instruction (SI) at Queensland University of Technology (Australia) with first year Aboriginal and Torres Strait Islander (A&TSI) students. Many of these students began postsecondary education with high

anxiety (79% student response), low to medium confidence in passing their courses, limited knowledge of study skills, and high to moderate difficulty levels within their respective subjects. A&TSI students had an attrition rate nearly double other students at QUT (32.7% vs. 18.4%). About half the A&TSI students participated in the SI program. Using a four point scale (greatly, moderately, slightly, not at all), data obtained from end of academic term student surveys of SI participants suggests that SI: was helpful for increased learning (70% of students selected "greatly"), lowered anxiety levels (45% greatly and 45% moderately), increased confidence levels (50% greatly, 50% moderately), improved enthusiasm and motivation to perform better (45% greatly, 45% moderately), and helped to create a favorable environment supporting learning (100% greatly). SI participant grades were evaluated on a seven point scale: fail, one to three; pass, 4; credit, 5; distinction, 6; high distinction, 7. When analyzing the grade distribution for all A&TSI students, 22.9% of SI participants earned grades of 6 or 7 as compared with 0% for the non-SI. When examining the failing grades (1, 2 or 3) the SI group had a dramatically lower rate (22.8%) when compared with the non-SI group (78.3%). SI leaders reported that their participation in the program led to the following outcomes: developed facilitation and group organizational skills; improved confidence and self esteem; and developed their own learning skills.

Loh, H. (1992). *Peer Assisted Study Sessions for LSB181, Anatomy for the Nursing Students, 1992*. Unpublished manuscript, Queensland University of Technology, Brisbane, Queensland, Australia. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This report discusses the use of Supplemental Instruction (SI), which is called Peer Assisted Study Sessions (PASS) at the local institution with nursing students enrolled in a anatomy course. Approximately half the students attended the SI sessions during the academic term. The program reduced the failure rate of students (7.8% vs. 19.1%), increased the percent of students receiving high marks (5, 6 or 7 on a scale of 0-7), and improved the mode and mean final course grade.

Loh, H. (1993). Peer Assisted Study Sessions in anatomy for nursing students. *Peer tutoring: Learning by teaching* (pp. 193-201). Auckland, New Zealand: The University of Auckland. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This article describes the use of Peer Assisted Study Sessions (PASS), the local institutional name for their adaptation of the Supplemental Instruction (SI) model at Queensland University of Technology (Brisbane, Queensland, Australia). Following an institutional commitment to Total Quality Management (TQM), some TQM principles were found consistent with the SI model of academic achievement. An anatomy course with first year nursing students was selected as a pilot for the SI program. Program outcomes include the following for SI participants: reported an increase in their confidence with the course after participating in SI sessions (87%); reduced percent of students failing the course (7.8% vs. 19.3%); agreed that the SI leaders motivated them to work harder (80%); increased their learning skills (90%); increased their understanding of the content material (87%); and increased their ability to apply the knowledge gained from class lectures (82%). SI leaders reported the following benefits

to them: developed leadership and character, improved their own learning and facilitating techniques, acquired skills in group management, developed presentation skills, and increased their own confidence and self esteem.

Loh, H. (1994). Strategies to overcome the first year high failure rate in anatomy for nursing students. *Proceedings of the 7th International Conference on the First-Year Experience, Dublin, Ireland* (pp. 79-80). Columbia, SC: The National Resource Center for the Freshman Year Experience and Students in Transition.
This paper describes the use of Supplemental Instruction (SI) since 1992 with nursing students at the Queensland University of Technology (Australia) in an anatomy course (LSB 181). At QUT, SI is known as PASS (Peer Assisted Study Sessions). Data from 1992 through 1995 suggest substantial benefits of the SI program to students, SI leaders and the course instructor. The performance of the students were examined on a 3 to 7 scale (3=fail, 4=pass, 5=credit, 6=distinction, 7=high distinction). SI participant interviews and 1995 survey data suggested agreement with the following statements regarding the impact of SI: increased confidence levels (87.0%), lowered anxiety levels (61.5%), higher motivation to achieve grades of distinction (84.6%), and developed new study skills (70.3%). Based on data from 1992 in the anatomy course, the SI participants achieved significantly ($p < .01$) higher levels of academic achievement. In comparison with non-SI participants, there were more grades of level 6 or 7 (39% vs. 27%) and less grades of level 3 (10% vs. 25%). When comparing failure rates, the results favored the SI participants. SI participants in 1995 failed the class at a rate of 2.7% while the non-SI group failed the class at a higher rate of 13.3%. To investigate the possible impact of student motivation, the failure rate of students who desired to participate in SI but were unable to attend due to time conflicts failed at nearly the same rate (12.7%) as the entire non-SI group (13.3%). This appears to support the conclusion that student motivation was not the major variable impacting student academic performance. The overall class average (including all SI and non-SI participants) for grades of level 3 (failure) were reduced from 22.8% before the introduction of SI down to 7.1% after the fourth year of SI. SI leaders reported the following positive results: developed leadership skills; improved their facilitation skills; improved their study skills; acquired group management skills; and increased their own confidence and self esteem. Instructors who had SI attached to their course reported the following positive results: rapid dissemination of information and instructions to the SI participants; provided benefits of small group instruction within the large lecture sections ($n = 400$); instructors received feedback from students which allowed them to "fine-tune" teaching and improve teaching performance; involvement with the SI program provided new avenues for grants; enhancement of curriculum vitae; and improved positive attitude and sense of achievement since students improved academic performance.

Loh, H. (1993). Strategies to overcome the high failure rate in a subject. *Proceedings of the 6th International Conference on the First Year Experience, July 10-13, 1993, Boston, MA* (p. 39). Columbia, SC: The National Center for the Study of the Freshman Year Experience and Students in Transition. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
The Queensland University of Technology (Brisbane, Australia) has investigated the

applicability of Total Quality Management (TQM) for improving student academic success. An anatomy course for nursing students saw its failure rate drop from 22.8% to 13.6% after the introduction of several interventions, including Supplemental Instruction (SI). The local institutional name used is Peer Assisted Study Sessions (PASS). Course lecturers listed the following benefits of the program: rapid dissemination of information and instruction to students via the SI leaders; rapid feedback from students concerning course content; provided small group benefits in large lecture classes; improved and increased the amount of communications between students and the lecturer; and the lecturer was able to give students increased responsibility for the learning process. SI leaders mentioned the following benefits to themselves: developed leadership and character, improved their own learning and facilitating techniques, acquired skills in group management, developed presentation skills, and built their own confidence and esteem.

Loh, H. (1996). Supplemental Instruction: A peer collaborative learning program applied within anatomy for first year nursing students. *Proceedings of the 2nd Pacific Rim Conference on the First Year in Higher Education* (pp. 281-290). Melbourne, Queensland, Australia: University of Melbourne. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper describes the use of Supplemental Instruction (SI) since 1992 with nursing students at the Queensland University of Technology (Australia) in an anatomy course (LSB 181). At QUT, SI is known as PASS (Peer Assisted Study Sessions). Data from 1992 through 1995 suggest substantial benefits of the SI program to students, SI leaders and the course instructor. The performance of the students were examined on a 3 to 7 scale (3=fail, 4=pass, 5=credit, 6=distinction, 7=high distinction). SI participant interviews and 1995 survey data suggested agreement with the following statements regarding the impact of SI: increased confidence levels (87.0%), lowered anxiety levels (61.5%), higher motivation to achieve grades of distinction (84.6%), and developed new study skills (70.3%). Based on data from 1992 in the anatomy course, the SI participants achieved significantly ($p < .01$) higher levels of academic achievement. In comparison with non-SI participants, there were more grades of level 6 or 7 (39% vs. 27%) and less grades of level 3 (10% vs. 25%). When comparing failure rates, the results favored the SI participants. SI participants in 1995 failed the class at a rate of 2.7% while the non-SI group failed the class at a higher rate of 13.3%. To investigate the possible impact of student motivation, the failure rate of students who desired to participate in SI but were unable to attend due to time conflicts failed at nearly the same rate (12.7%) as the entire non-SI group (13.3%). This appears to support the conclusion that student motivation was not the major variable impacting student academic performance. The overall class average (including all SI and non-SI participants) for grades of level 3 (failure) were reduced from 22.8% before the introduction of SI down to 7.1% after the fourth year of SI. SI leaders reported the following positive results: developed leadership skills; improved their facilitation skills; improved their study skills; acquired group management skills; and increased their own confidence and self esteem. Instructors who had SI attached to their course reported the following positive results: rapid dissemination of information and instructions to the SI participants; provided benefits of small group instruction within the large lecture sections (n = 400);

instructors received feedback from students which allowed them to "fine-tune" teaching and improve teaching performance; involvement with the SI program provided new avenues for grants; enhancement of curriculum vitae; and improved positive attitude and sense of achievement since students improved academic performance.

Loh, H., & Kelly, B. A. (1994). *Supplemental Instruction (SI) in anatomy for first year nursing students*. Unpublished manuscript, The Queensland University of Technology, Brisbane, Australia. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper describes the use of Supplemental Instruction (SI) since 1992 with nursing students at the Queensland University of Technology (Australia) in an anatomy course (LSB 181). At QUT, SI is known as PASS (Peer Assisted Study Sessions). The SI modeled was contextualized in several ways: two SI leaders facilitated each group, allowing for larger numbers to attend each SI session; principles of Total Quality Management were employed to use SI as a feedback loop between the students and the lecturer, thereby providing data to the instructor to allow for immediate changes in the content and delivery. Data from 1992 through 1995 suggest substantial benefits of the SI program to students, SI leaders and the course instructor. The performance of the students were examined on a 3 to 7 scale (3=fail, 4=pass, 5=credit, 6=distinction, 7=high distinction). SI participant interviews and 1995 survey data suggested agreement with the following statements regarding the impact of SI: increased confidence levels (87.0%), lowered anxiety levels (61.5%), higher motivation to achieve grades of distinction (84.6%), and developed new study skills (70.3%). Based on data from 1992 in the anatomy course, the SI participants achieved significantly ($p < .01$) higher levels of academic achievement. In comparison with non-SI participants, there were more grades of level 6 or 7 (39% vs. 27%) and less grades of level 3 (10% vs. 25%). When comparing failure rates, the results favored the SI participants. SI participants in 1995 failed the class at a rate of 2.7% while the non-SI group failed the class at a higher rate of 13.3%. To investigate the possible impact of student motivation, the failure rate of students who desired to participate in SI but were unable to attend due to time conflicts failed at nearly the same rate (12.7%) as the entire non-SI group (13.3%). This appears to support the conclusion that student motivation was not the major variable impacting student academic performance. The overall class average (including all SI and non-SI participants) for grades of level 3 (failure) were reduced from 22.8% before the introduction of SI down to 7.1% after the fourth year of SI. SI leaders reported the following positive results: developed leadership skills; improved their facilitation skills; improved their study skills; acquired group management skills; and increased their own confidence and self esteem. Instructors who had SI attached to their course reported the following positive results: rapid dissemination of information and instructions to the SI participants; provided benefits of small group instruction within the large lecture sections (n = 400); instructors received feedback from students which allowed them to "fine-tune" teaching and improve teaching performance; involvement with the SI program provided new avenues for grants; enhancement of curriculum vitae; and improved positive attitude and sense of achievement since students improved academic performance.

Loviscek, A. L., & Cloutier, N. R. (1997). Supplemental Instruction and the enhancement of student performance in economics principles. *American Economist, 41*(2), 70-76.
The authors presented an empirical evaluation of Supplemental Instruction (SI) in an economics principles course at the University of Wisconsin-Parkside. Using a two-equation model and student transcript data readily available to instructors and academic researchers, the authors evaluated the effectiveness of the SI program in economics principles. The analysis explicitly considers the confounding factor of self-selection in program participation. They found that ordinary least squares significantly underestimates the positive impact of SI. The results suggest that formal programs designed to increase the intensity of instruction can have a demonstrable payoff in the form of increased student learning.

Loy, W., Crown, K., & Wessley, A. (1996). *Academic support service as a means for professional development*. St. Louis, MO: St. Louis Community College at Meramec. Retrieved July 1, 2004, from http://www.wvmccd.cc.ca.us/mc/esl/fac/chan/NISOD/AcadSupport.html
This paper describes the use of Supplemental Instruction (SI) as serving both the purpose of providing academic support to students while providing a venue for faculty professional development. The authors presented the paper at the 1996 NISOD conference. During the process of instituting SI, faculty re-familiarize themselves with good student qualities. Faculty learn about collaboratively learning and study strategies that often can be incorporated into classroom. Faculty learn more about curriculum development and learning experiences. The instructor receives continual assessment and feedback through the SI program.

Lukoshus, W. (2004, December 31). 2004 a transformational year for Indiana University-Purdue Calumet. *The Post-Tribune Newspaper*, Gary, IN, p. B2.
This newspaper article describes the use of Supplemental Instruction (SI) at the Indiana University-Purdue Calumet.

Lukoshus, W. (2003, August 17). More than 50 classes at South Lake sites. *The Post-Tribune Newspaper*, Gary, IN, p. B6.
This newspaper article describes the use of Supplemental Instruction (SI) at the Indiana University-Purdue Calumet.

Lukoshus, W. (2004, April 23). New program helps freshmen. *The Post-Tribune Newspaper*, Gary, IN, p. B2.
This newspaper article describes the use of Supplemental Instruction (SI) at the Indiana University-Purdue Calumet. Preliminary research studies suggest lower withdrawal rates and higher retention rates for SI participants.

Lundeberg, M. A. (1990). Supplemental Instruction in chemistry. *Journal of Research in Science Teaching, 27*(2), 145-155.
This two-year study (148 students) at the University of Wisconsin (River Falls, WI) was designed to measure some effects of Supplemental Instruction in General Organic and Biological chemistry courses. Goals of the SI program included: develop conceptual understandings; articulate both understandings and misconceptions in a think-aloud

fashion; connect, relate, and integrate scientific information; develop confidence and ability in problem solving; and learn how to learn science. Some of the challenges with students are: motivating students to use problem-solving strategies; failure to accurately understand the problem before using a problem-solving strategy; attempt to use rote memory when solving; and failure to integrate new material with old. Quantitative studies suggested that SI contributed to higher mean final grades (2.80 vs. 2.26, $p < .002$) and lower rates of D, F and withdrawals for SI participants. Qualitative studies of SI participant comments suggested that SI was helpful in a variety of ways. In addition, SI leaders maintained journals. Six themes emerged from the journals: accommodating needs of diverse learners; understanding versus memorizing; depth versus breadth of discussion; relationships between ability, knowledge, and confidence; social relationships with students; and challenges to SI leaders' knowledge. The first three of these themes represent tensions that reoccurred several times over the academic term.

Lundeberg, M. A., & Moch, S. D. (1995). Influence of social interaction on cognition: Connected learning in science. *Journal of Higher Education, 66*(3), 312-335.
This article explores the use of Supplemental Instruction (SI) for increasing the academic success of women in science. "Connected knowing" -- a preferred learning environment for women that is a personal, cooperative approach to learning -- is thought by some to more naturally occur in SI sessions rather than the traditional pedagogical style used by most classroom professors. A research study of nursing students at the University of Wisconsin (River Falls) was conducted to test this idea. Qualitative research studies of the SI sessions suggested the following themes: spirit of cooperation, a circle of community, a shift of power to the SI participants, and risk-taking behavior (acknowledge uncertainty, experiment new ideas without fear of lower grades or punishment). Cognitive learning aspects included confirming the capacity for learning (encouragement), calibrated teaching (SI leader adjusted SI session agenda), and connected learning (placing abstract class lectures into context of personal lives). The article author provides several suggestions on how the classroom professor can introduce several of the SI session activities into their lecture sessions.

Lupkin, M. (1994, July 28). Linking science to students' lives. This summer program offers academic aid to minorities. *Philadelphia Inquirer Newspaper*, Philadelphia, PA, p. 3.
This newspaper articles mentions that Supplemental Instruction (SI) is a component in a special program for minority students at Rutgers University at Camden (PA) called "Success in the Sciences." Students are brought in for a special four-week enrichment program before the beginning of the freshman year to prepare them for the rigor of courses at Rutgers. SI is offered in connection with their first-year courses in math, chemistry and biology. The program has been partly funded with a $500,000 grant from the William Penn Foundation and $50,000 grant from the Coca-Cola Foundation.

MacGregor, J. (2000). Restructuring large classes to create communities of learners. In J. MacGregor, J. L. Cooper, K. A. Smith, & P. Robinson (Eds.), *Strategies for energizing large classes, New Directions for Teaching and Learning, No. 81* (pp. 47-61). San Francisco: Jossey-Bass.
This article provides an overview of a variety of programs for providing peer collaborative learning groups either inside or outside the classroom. The Emerging

Scholars Program (ESP) and Supplemental Instruction (SI) have several pages of text devoted to both of them providing a basic program overview and several citations to research studies that support their program claims of effectiveness for improved student outcomes.

MacIsaac, D. L., Falconer, K. A., Maglione, C. A., & Masxka, C. (2002). Using Supplemental Instruction to improve minority success in gatekeeper science courses. In *Proceedings of the 225th American Chemical Society National Meeting* Washington, D.C.: American Chemical Society.
This paper provides a post-hoc study of the use of Supplemental Instruction (SI) in the department of physics at SUNY Buffalo State College (Buffalo, NY). The study examined the impact of SI with 6,000 students over six semesters. Irrespective of student preparation level, the SI participants earned higher grades than non-participants. There were significant academic achievement gaps between the minority and majority student regarding preentry attributes. There differences were reduced to nonsignificance for students who participated in SI. Qualitative research confirmed the effectiveness for minority students, especially for those who were Native-American.

Macisaac, D. L., Falconer, K. A., & Maxka, C. (2003). Using Supplemental Instruction to improve minority success in gatekeeper science courses. *Abstracts of Conference Papers for the 225th American Chemical Society National Meeting* (p. CHED-1157). Washington, D.C.: American Chemical Society. For more information, contact the authors at the Department of Physics, SUNY Buffalo State College, 222SCI Bldg BSC, 1309 Elmwood Ave., Buffalo, NY 14222, macisadl@buffalostate.edu.
Supplemental Instruction (SI) was used at Buffalo State College (NY) and several others to improve the academic achievement of minority students enrolled in challenging science courses. A study of over 6,000 students over six semesters compared SI participants and nonparticipants. Outcomes included: higher grades regardless of ethnic or racial background. With SI as a covariate, the academic achievement of all ethnic groups was the same.

Makins, V. (1991, July 5). Passing on a year's experience: How peer tutors at Kingston Polytechnic help students combat isolation. *The London Times*, London, England, pp. 1-3
The article describes how Kingston Polytechnic in England has customized the use of Supplemental Instruction (SI) at their institution. The campus SI supervisor reports that a challenge in the SI sessions is the requirement that SI leaders redirect all questions back to the SI participants to answer.

Maldonado Gonzalez, M. (2000). The Supplemental Instruction culture: A qualitative program evaluation of context-specific patterns [Dissertation, Washington State University, 1999]. *Dissertation Abstracts International, 60* (11), 3904.
This study explores the Supplemental Instruction (SI) world at a land grant university of the United States of America and the peripheral cultural ecologies it generates. The qualitative study was conducted over a period of 10 weeks and it involved 50 students, 6 faculty members, 4 peer instructors and 1 staff member. It followed a two-phase research design. In the first phase, the delimitation of assessment goals and revision of program documents took place. In the second, phase the researcher conducted field

observation, interviews, and surveys, and data were screened through several conceptualizations: participation frameworks (Shiffrin), linguistic of discrimination (Fawler), classroom ecology (Bowers & Flinders), teaching paradigms (Brooks & Brooks), and proxemics of communication (Hall). Five themes emerged: (1) Collaborative vs. competitive frameworks of participation: Unlike the discriminatory patterns of communication existing in the at-risk courses, communication in the study sessions is a pro-social activity in which students and leader share participatory roles. (2) Symmetrical vs. asymmetrical patterns of speech visibility: The relationship between the SI leader and the students exemplifies a proactive transmission of power that increases the students' speech visibility. A factor that is minimized in at-risk courses where the teacher's visibility is maximized. (3) Traditional vs. constructivist power ecology: The SI support a constructive flow of authority distributing participatory power among the students, who assume learning responsibilities through processes of collective thinking, negotiation of solutions, and peers' assistance. (4) Linguistic signs of coercive paternalism vs. nurture: The contrast between the superior-subordinate relationship in the at-risk-courses and the egalitarian relationship in the study sessions is exemplified through the linguistic indicators peculiar to the facilitators' discourse in each of these environments. The at-risk courses facilitator's discourse contains linguistic signs of coercive paternalism, whereas the SI leaders' discourse reflects feminist caring linguistic signs. (5) Proxemicist alienation versus proxemicist inclusion: The proxemics and kinesic indicators embedded in the context of the at-risk courses impact the participants' territorial distance creating a climate of exclusion. In the study sessions the territorial distance is reduced, which fosters an atmosphere of students' inclusion. The study profiles the academic environment of SI and the interactions the participants displayed. Attention is given to the students' perceptions of SI and how it affected their academic performance. It proposes a grounded theory about the interplay of two academic cultures, suggests strategies for SI improvement, teaching development and future research.

Maloney, R. S. (1992). *The Supplemental Instruction program as an alternative field experience for secondary education majors*. Unpublished undergraduate honors thesis (Bachelor of Science with Honors in Education), University of New Orleans, LA. Available: Interlibrary loan from the University of New Orleans, LA.
The College of Education at the University of New Orleans, LA (UNO) requires all education majors to complete twenty five hours of a Professional Laboratory Experience (PLE), which has traditionally been as a teacher aide in an area high school, prior to the student teaching experience. The goal of the PLE is to provide a varied and enriching teaching experience for prospective student teachers. The primary purpose of this study is to study the use of Supplemental Instruction (SI) in College Life sections of English 0150 during Fall 1991 to provide an effective alternative field experience for secondary education majors prior to student teaching. Students were divided into two groups: one group served as SI leaders in the English course and the other group were placed in the traditional high school teacher aide position. Surveys were given to the secondary education majors -- those who completed their PLE at the high school and those who served as SI leaders at the college -- prior to and at the completion of their PLE (course name EDCI 3205) to measure their preparedness to perform specific teaching tasks. The results suggest that there is a greater change in preparedness levels for those who

participated as SI leaders in the following areas: lesson preparation (write performance objectives, choose appropriate materials, vary methodology, allocate time for content coverage, construct evaluation instruments, and provide feedback of assessment and evaluation results); classroom management (manage time, mange classroom routines, maintain student engagement, manage task related behavior, and monitor and maintain student behavior); and instructional skills (initiate lessons and activities, provide accurate content information, emphasize essential elements of content knowledge, and implement learning activities at an appropriate pace). The researcher suggested that one of the reasons for the significant gains for the SI leaders was that they had more power to select and experiment with activities. The high school teaching aides were limited by the cooperating high school teacher. Based upon analysis of the data, the researcher suggests that SI can serve as an alternative experience for education majors.

Marcus, D. (1996). Supplemental Instruction with mentoring support at Anne Arundel Community College. In R. Shoenberg (Ed.), *Lessons learned from Fund for the Improvement of Postsecondary Education Projects III* . Washington, D.C.: Fund for the Improvement of Postsecondary Education, U.S. Department of Education. Retrieved July 1, 2004, from http://www.ed.gov/offices/OPE/FIPSE/LessonsIII/anne.html
This chapter describes the use of Supplemental Instruction (SI) at Anne Arundel Community College (Arnold, MD) for faculty development purposes in addition to increasing academic achievement of participating students. SI leaders were paired with faculty mentors who participated in the initial training workshop for SI leaders. For the first four weeks of the term the faculty mentor participated as learners by attending class lectures and SI sessions whose student SI leaders they supervise and by keeping a journal of their experiences. Mentors were placed in courses outside their discipline so that they would focus on the learning process rather than being tempted to critique the instructional content of the course professor. Mentors reported that they increased their own teaching skills and their view of the learning process.

Marra, R. M., & Litziner, T. A. (1997). A model for implementing Supplemental Instruction in engineering. In *Proceedings of the 1997 Annual Conference on Frontiers in Education Conference* (pp. 109-115). Pittsburgh, PA: International Electrical Engineers in Education. Retrieved July 1, 2004, from http://fie.engrng.pitt.edu/fie97/papers/1070.pdf
Supplemental Instruction (SI) is used at Pennsylvania State University (University Park, PA) to help students earn higher grades in electrical engineering courses. Penn State's SI program was piloted as a part of our larger Undergraduate Teaching Intern Program. The Teaching Intern (TI) Program allows undergraduate students to partner with a professor on a particular course in order to learn about the responsibilities of being a faculty member. This paper provides an overview of both the SI and TI programs, specific details on how to run a course to train for these programs, and preliminary results of the SI program in terms of experiences of the three student SI leaders and achievement results of those students who attended SI sessions versus those who did not.
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Marshall, S. (1994). Faculty development through Supplemental Instruction. In D. C. Martin , & D. Arendale (Eds.), *Supplemental Instruction: Increasing achievement and retention* (pp. 31-40). New Directions for Teaching and Learning No. 60. San Francisco, CA: Jossey-Bass.
Involvement of faculty members with the Supplemental Instruction program can lead to personal and professional renewal for the faculty participants. The author describes the impact of SI with faculty members at Salem State College. Faculty members received an indirect faculty development experience through the following activities: attending training workshops initially designed for the SI leaders; frequent meetings with the SI leader assigned to their class; and participating in monthly seminars that involved SI leaders in discussing learning and teaching skills (group facilitation skills, critiques of teaching presentations, motivation activities, dealing racism and sexism, reviewing SI data studies). Faculty members who participated in this faculty development project reported numerous positive changes in their attitudes and classroom behaviors.

Martin, D. C. (1980). Learning centers in professional schools. In K. V. Lauridsen (Ed.), *Examining the scope of learning centers* (pp. 69-79). San Francisco, CA: Jossey-Bass.
This chapter describes the role of academic assistance for students in professional schools. The use of Supplemental Instruction (SI) for medical students is described. Several research studies suggest that SI contributes to higher academic achievement and the rate of D, F and course withdrawals have been reduced by 20 percent. Fifty to seventy percent of the medical students enrolled in a given course participate in the service. Data suggests that there is a transfer effect of SI, students who take advantage of SI maintain their GPA lead over nonparticipating students during the following academic term in the second course in the same sequence.

Martin, D. C., & Arendale, D. (1993). Foundation and theoretical framework for Supplemental Instruction. In D. C. Martin, & D. Arendale (Eds.), *Supplemental Instruction: Improving first-year student success in high-risk courses* 2nd ed., (pp. 41-50). Monograph Series No. 7. Columbia, SC: National Resource Center for The Freshman Year Experience and Students in Transition. (ERIC Document Reproduction Service No. ED354839). Retrieved June 12, 2005, from http://www.tc.umn.edu/~arend011/REVTHEOR.pdf
This chapter provides an overview of SI's educational pedagogy. Piaget and Vygotsky's writings on constructivism serve as a major basis for describing how students "construct" their own knowledge. This requirement for students to actively create their own knowledge drives many SI session strategies. Tinto's theories on student departure based on students' need for academic and social integration also guide the implementation of the SI program. Additional theorists include Keimig (Hierarchy of Learning Improvement Programs), Weinstein (metacognition), and a variety of researchers concerning collaborative learning.

Martin, D. C., & Arendale, D. (1997). *Mainstreaming of developmental education: Supplemental Instruction and Video-based Supplemental Instruction*. Unpublished Manuscript, The University of Missouri-Kansas City. Retrieved June 12, 2005, from http://www.tc.umn.edu/~arend011/mainstreamDE97.pdf

This paper describes the development of Supplemental Instruction (SI) and Video-based Supplemental Instruction (VSI) to serve an effective way to mainstream the best features of developmental education into traditional college-level courses. The historical development and modern day implementation of both programs are described.

Martin, D. C., & Arendale, D. (1993). Review of research on Supplemental Instruction. In D. C. Martin, & D. Arendale (Eds.), *Supplemental Instruction: Improving first-year student success in high-risk courses* 2nd ed., (pp. 19-26). Monograph Series No. 7. Columbia, SC: National Resource Center for The Freshman Year Experience and Students in Transition. (ERIC Document Reproduction Service No. ED354839). Retrieved June 12, 2005, from http://www.tc.umn.edu/~arend011/SIresearch93.pdf
This chapter compares a national research study concerning the effectiveness of Supplemental Instruction with studies from the University of Missouri-Kansas City. The National Center for SI collects SI data from a diverse sample of higher education institutions from across the U.S. The national study included data from 49 institutions that had offered SI in 1,477 courses of diverse curriculum areas. The findings suggest that SI participants in comparison with non-SI participants earn higher final course grades (2.46 vs. 2.12), earn a higher percent of A and B final course grades, and receive a lower percent of D, F and withdrawal final course grades (23% vs. 38%). Data collected from 1980 to 1992 in 217 courses with an enrollment of 9,365 students at UMKC confirms the national studies. Additional studies conducted at UMKC suggested higher academic achievement for SI participants with reenrollment (90.0% vs. 81.5%) and graduation rates (30.6% vs. 18.2%). Several studies from UMKC studied the potential impact of student motivation levels, ethnicity, and previous levels of academic preparation. These were not found to have a statistically significant impact upon the research studies.

Martin, D. C., & Arendale, D. (1998). Supplemental Instruction and Video-based Supplemental Instruction. In American Association for Higher Education, American College Personnel Association, and National Association of Student Personnel Administrators (Eds.), *Powerful partnerships: A shared responsibility for learning* (pp. 6-7). Washington, D.C.: Editors.
This report describes the different ways that institutions build campus partnerships to deepen student learning both inside and outside the classroom. AAHE, ACPA, and NASPA formed a Joint Taskforce on Student Learning to identify successful models that have implications for pedagogy, curricula, learning environments, and assessment. Both the Supplemental Instruction and Video-based SI programs were highlighted as being a model for the first principle of learning and collaborative action: Learning is fundamentally about making and maintaining connections: biologically through neural networks; mentally among concepts, ideas, and meanings; and experientially through interaction between the mind and the environment, self and other, generality and context, deliberation and action.

Martin, D. C., & Arendale, D. (Eds.) (1993). *Supplemental Instruction: Improving first-year student success in high-risk courses* (2nd ed.). Monograph Series No. 7. Columbia, SC: The University of South Carolina and the National Resource Center for the Freshman Year Experience and Students in Transition. (ERIC Document

Reproduction Service No. ED354839).
This monograph describes Supplemental Instruction (SI), a study assistance program designed to improve the academic success of college freshmen based on the idea that if students are not being successful in courses then perhaps they will withdraw from the institution. The first chapter reviews the SI model. Chapter two explains in detail how SI works in the freshman year. Chapter three offers a review of the research on SI. Chapter 4 examines why educators and students choose SI. Chapter five shows how SI has been adapted to an urban high school, to English composition classes, and to a law school at the University of Missouri-Kansas City. The last chapter reviews the foundation and theoretical framework of SI. An appendix lists institutions currently using SI.

Martin, D. C., & Arendale, D. (1990). *Supplemental Instruction: Improving student performance, increasing student persistence*. Kansas City, MO: University of Missouri-Kansas City. (ERIC Document Reproduction Service No. ED327103).
This report describes the Supplemental Instruction (SI) program at the University of Missouri-Kansas City. Among the topics in the paper: narrative overview of the SI model; history of the development of SI at UMKC and other institutions across the U.S.; outcomes for students and the institution; and potential for adoption by other institutions.

Martin, D. C., & Arendale, D. (1993). Supplemental Instruction in the first college year. In D. C. Martin, & D. Arendale (Eds.), *Supplemental Instruction: Improving first-year student success in high-risk courses* 2nd ed., (pp. 11-18). Monograph Series No. 7. Columbia, SC: National Resource Center for The Freshman Year Experience and Students in Transition. (ERIC Document Reproduction Service No. ED354839). Retrieved June 12, 2005, from http://www.tc.umn.edu/~arend011/SIfirstyear.pdf
This chapter describes how the Supplemental Instruction program can help meet some of the unique needs presented to students during their first year of college: integrating learning/study strategies within regular content courses; and supporting students enrolled in historically-difficult first-year courses; assisting student subpopulations make a successful transition into college (academically talented, remedial/developmental, field-dependent). Like other successful programs for students in the first-year, central objectives of the SI program are to: develop a felt sense of community; involvement of students in the life of the institution; and providing an environment to support academic and social integration.

Martin, D. C., & Arendale, D. (Eds.). (1994). *Supplemental Instruction: Increasing achievement and retention*. New Directions for Teaching and Learning No. 60. San Francisco, CA: Jossey-Bass.
This monograph features nine chapters concerning: overview and foundation of the Supplemental Instruction (SI) program; use of SI for faculty development; SI in the content areas (humanities, mathematics, chemistry); research studies concerning SI; and the newest innovation of SI called Video-based Supplemental Instruction (VSI).

Martin, D. C., & Arendale, D. (1993). Understanding the Supplemental Instruction model. In D. C. Martin, & D. Arendale (Eds.), *Supplemental Instruction: Improving first-year student success in high-risk courses* 2nd ed., (pp. 3-10). Monograph Series No. 7.

Columbia, SC: The National Resource Center for The Freshman Year Experience and Students in Transition. (ERIC Document Reproduction Service No. ED354839). Retrieved June 12, 2005, from http://www.tc.umn.edu/~arend011/UnderstandingSI93.pdf
Theoretical and philosophical underpinnings for the Supplemental Instruction model is included in this overview. Some of the major issues are reviewed: common factors in student attrition; focus on "high-risk courses" rather than "high-risk students;" proactive assistance before problems occur; key SI features; essential partners for SI success; creating awareness and generating support for SI on campus; and movement from a reactive to a proactive mode of student academic assistance.

Martin, D. C., Arendale, D., & Blanc, R. A. (1997). *Mainstreaming of developmental education: Supplemental Instruction and Video-based Supplemental Instruction*. Unpublished manuscript, The University of Missouri-Kansas City. Retrieved June 12, 2005, from http://www.tc.umn.edu/~arend011/mainstreamDE97.pdf
This manuscript was originally delivered as a paper at a special conference in January 1998 on "Alternatives to Developmental Education" that was sponsored by the U.S. Department of Education funded National Center for Lifelong Learning based at Stanford University (CA). The conference was convened to deal with the growing concern by some states regarding traditional developmental education credit courses. The conference was designed to identify several alternative ways of accomplishing the same purposes as developmental courses (e.g., linked courses, critical thinking courses, SI, VSI). This chapter first provides an overview of SI and VSI. Then it concludes with the pedagogical basis for both. In developmental education, research scholars embrace the reductionist approach by seeking first to identify the separate and distinct skills required for academic success, then to measure the degree to which these are present or absent in the individual, and finally to isolate and teach those skills that are in deficit. Practitioners assume that mastery of a series of independent skills lead to academic competency. SI and VSI break with this view and provide a holistic approach to education. Given sufficient efficiency on task, effective guidance, and the time and opportunity to do so, any serious student can learn.

Martin, D. C., Arendale, D., & Widmar, G. E. (1998). Creating communities for learning. In L. Hardge (Ed.), *Bridges to student success: Exemplary programs 1998* (pp. 27-33). Washington, D.C.: National Association for Student Personnel Administrators.
This monograph chapter provides a basic overview of the Supplemental Instruction (SI) model. In addition to the basic overview, the authors describe how SI provides a pluralistic environment where students can learn to value the unique perceptions of others who may view the world differently than themselves. SI provides a structured environment for students to participate in learning communities outside the supervision of the class professor.

Martin, D. C., & Blanc, R. A. (1984). Improving reading comprehension through reciprocal questioning. *Life Long Learning, 7*(4), 29-31.
"Reciprocal questioning" is a technique that promotes active learning. It helps students: a) become aware of the implicit as well as the explicit meaning of a reading passage; b) improve their analytic skills with respect to reading; c) improve their reasoning; and d) strengthen the questioning skills that are integral to comprehension. Reciprocal

questioning is adapted from Manzo's "The ReQuest Procedure." Reciprocal questioning is a strategy used as appropriate with Supplemental Instruction or Video-based Supplemental Instruction sessions.

Martin, D. C., & Blanc, R. A. (1981). The learning center's role in retention: Integrating student support services with departmental instruction. *Journal of Developmental and Remedial Education, 4*(3), 2-4, 21-23.
This article provides a historical background for the creation of the Supplemental Instruction (SI) program at the University of Missouri-Kansas City. Research studies of SI in a first-year American history course at UMKC during Fall 1980 suggest the following: SI participants earned a higher percent of A and B final course grades (54.1% vs. 38.9%); had a lower rate of D, F and withdrawal grades (21.7% vs. 42.4%); had a higher rate of reenrollment the following academic term (86.2% vs. 72.1%); and there was no statistically significant differences (e.g., prior academic achievement, standardized test scores) between SI and non-SI participants.

Martin, D. C., & Blanc, R. A. (1994). Supplemental Instruction: An organic model in transition, the views of SI's initiator. In C. Rust, & J. Wallace (Eds.), *Helping students to learn from each other: Supplemental Instruction, SEDA Paper 86* (pp. 91-94). Birmingham, England: Staff and Educational Development Association.
This chapter describes the history and development of Supplemental Instruction in the United States by the program's creator. The essential elements of successful SI programs are described. In addition, the chapter reviews the adaption of the SI model for the British higher education system through the work of Jenni Wallace of Kingston University, London.

Martin, D. C., & Blanc, R. A. (1994). Video-Based Supplemental Instruction: A pathway to mastery and persistence. In D. C. Martin, & D. Arendale (Eds.), *Supplemental Instruction: Increasing achievement and retention* (pp. 83-92). New Directions for Teaching and Learning No. 60. San Francisco, CA: Jossey-Bass.
The Video-Based Supplemental Instruction (VSI) delivery system using Supplemental Instruction that is described here combines developmental studies with core curriculum courses, offering an alternative to remedial/developmental instruction. Students that are least prepared at the institution need a more powerful academic support service. The difference between the VSI approach and those traditionally used in postsecondary education lies in the centrality of students to the process as opposed to the centrality of the material to be learned: students conduct the preview; students determine the pace of the lecture; students assure their own mastery as the lecture progresses; students select the key points for immediate review; and students identify misconceptions and modify and adapt their conceptions to achieve, eventually, more complete understanding. VSI was designed to allow such students to both earn credit for core curriculum courses while they develop the requisite learning strategies needed for academic success. This provides an alternative way to provide developmental education.

Martin, D. C., Blanc, R. A., & Arendale, D. (1994). Mentorship in the classroom: Making the implicit explicit. *Teaching Excellence, 6*(1), 1-2. Retrieved June 12, 2005, from http://www.tc.umn.edu/~arend011/mentor97.pdf
Based upon experiences gained through the Supplemental Instruction (SI) program, the authors make a number of suggestions on how faculty members can use SI strategies in their classes. Some suggestions include: remind students of the "big picture" throughout the academic term of the most important concepts; refer to the syllabus during the term so that students will value and use it; share the thinking process that the professor uses to solve the problems with the students; administer a short examination with low grade impact early in the academic term to give students an opportunity to test their comprehension level and encourage them to modify study behaviors and perhaps seek academic support (e.g., SI); provide visual matrices during lectures to give models to students on how to organize the material; and make explicit what is expected on examinations.

Martin, D. C., Blanc, R. A., & Arendale, D. (1996). Supplemental Instruction: Supporting the classroom experience. In J. N. Hankin (Ed.), *The Community College: Opportunity and Access for America's First-Year Students* (pp. 123-133). Columbia, SC: University of South Carolina: The National Resource Center for The Freshman Year Experience and Students in Transition. (ERIC Document Reproduction Service No. ED393486). Retrieved June 12, 2005, from http://www.tc.umn.edu/~arend011/SItwoyear96.pdf
This chapter reviews the impact of the Supplemental Instruction program with fifty-nine two-year colleges across the U.S. The research study contained reports from 480 classes that enrolled 23,979 students. The data suggests that SI participation was correlated with higher academic achievement: higher mean final course grades (2.30 vs. 1.63); higher percentage of A or B final course grades (50.6% vs. 32.9%); and lower rates of D, F and withdrawals (25.9% vs. 46.3%). Similar findings occurred when the data was separated by broad academic disciplines: business, health science, mathematics, natural science, social science/humanities, and technical/vocational. In addition, the themes of attrition identified by Tinto (adjustment, isolation, difficulty, and incongruence) are used as a paradigm to examine the possible reasons for the positive impact of the SI program. Several SI programs reported the use of SI for faculty development: faculty serve as SI supervisors and adopt SI sessions strategies into their own lectures; faculty SI supervisors provide requested feedback to the course professors that they observe concerning class presentation activities; and faculty who observe SI sessions report using more student-led collaborative learning activities during their class sessions.

Martin, D. C., Blanc, R. A., & DeBuhr, L. (1983). *Retention with integrity through Supplemental Instruction*. Kansas City, MO: The University of Missouri-Kansas City, Student Learning Center. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110
This monograph provides a comprehensive overview of the Supplemental Instruction (SI) program. It can serve as a training manual for SI supervisors and SI leaders to implement the program on a college campus. Topics include: overview of SI; establishing and conducting SI sessions; guidelines for SI leaders; SI program evaluation procedures; writing lab adaptations of SI; adapting SI to English composition

classes; SI on a small campus; student denial; and diagnosing learning problems of gifted adults.

Martin, D. C., Blanc, R. A., & DeBuhr, L. (1982). Supplemental Instruction: A model for increasing student performance and persistence. In L. Noel, & R. Levitz (Eds.), *How to succeed with academically underprepared students: A catalog of successful practices* (pp. 75-79). Iowa City, IA: ACT National Center for the Advancement of Educational Practices.
This article provides a basic overview of the Supplemental Instruction (SI) program. Included is a research study of 746 students enrolled in seven Arts and Sciences courses in Spring semester 1980. SI participants earned higher mean final course grades (2.70 vs. 2.25) and received lower rates of D, F and withdrawal grades (18.4% vs. 44.0%).

Martin, D. C., Blanc, R. A., DeBuhr, L., Alderman, H., Garland, M., & Lewis, C. (1983). *Supplemental Instruction: A model for student academic support*. Kansas City, MO: The University of Missouri-Kansas City and ACT National Center for the Advancement of Educational Practices. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This monograph provides a basic overview of the Supplemental Instruction (SI) model: basic overview; UMKC student academic performance in seven Arts and Sciences courses during 1980 reported earlier in the 1983 article by Blanc, DeBuhr and Martin (final course grades, impact of student motivation, reenrollment rates, performance of students separated by upper and lower quartile scores, and changes in D, F and withdrawal rates for the courses) and new studies examining students of color and medical school students; generating campus awareness and support; case studies of SI's use outside of UMKC (Maple Woods Community College - MO, Bethel College - KS, Kansas State University - KS); training SI leaders; and evaluation procedures for program review.

Martin, D. C., DeBuhr, L., & Garland, M. (1987, January 4). *Developing critical thinking skills of college students through Supplemental Instruction*. Paper presented at the Third International Conference on Thinking, Honolulu, HI. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
The authors describe the use of Supplemental Instruction (SI) for improving the critical thinking skills of students. Some SI session activities help foster improved thinking skills: modeling of thinking processes by the SI leader; probing questions; redirective and higher levels of questioning; facilitating student discussions of their thought processes; escalation of discussions from concrete to abstract levels; and precise use of content vocabulary.

Martin, D. C., & Gravina, M. (1990). Serving students where they fail: In class. *Thresholds in Education, 16*(3), 26, 28-30.
This article provides a general overview of the Supplemental Instruction (SI) model. Rather than focusing on "at-risk" students, the authors suggest that the emphasis should be placed on identifying historically difficult courses that create an environment

that may be challenging for any student, despite previous academic success in other courses.

Martin, D. C., Hall, P. T., & Arendale, D. (1991). Academic success for inner city high school youth: The positive effects of Supplemental Instruction with an urban high school. *Proceedings of the National Association of State Universities and Land Grant Colleges Conference* Washington, D.C.: National Association of State Universities and Land Grant Colleges. Retrieved June 12, 2005, from http://www.tc.umn.edu/~arend011/SIhighschool91.pdf
This paper describe the use of Supplemental Instruction (SI) with an urban high school in Kansas City, Missouri. Westport High School is a culturally-diverse school located in the central city. Over half the students were one or two years behind grade levels in reading and mathematics and an equal number were economically disadvantaged. SI was provided to students enrolled in 9th and 10th grade English and history classes. SI sessions were scheduled during a scheduled time during the school day three times each week. Research studies suggested that there was improvement in final course grades of students in the English (A and B grades: 28.7% vs. 13.6% before SI; F grades: 23.2% vs. 32.7% before SI)and history classes. Interviews with students and teachers suggest that participation in the SI program also promoted higher levels of class participation and higher achievement on standardized test scores.

Martin, D. C., Hall, P. T., & Arendale, D. (1993). Use of Supplemental Instruction at an urban high school. In D. C. Martin, & D. Arendale (Eds.), *Supplemental Instruction: Improving first-year student success in high-risk courses* 2nd ed., (pp. 31-33). Monograph Series No. 7. Columbia, SC: National Resource Center for The Freshman Year Experience and Students in Transition. (ERIC Document Reproduction Service No. ED354839). Retrieved June 12, 2005, from http://www.tc.umn.edu/~arend011/SIhighschool91.pdf
The authors describe the use of Supplemental Instruction -- traditionally a post-secondary academic program -- with an urban high school in Kansas City, Missouri. Westport High School is a culturally-diverse school located in the central city. Over half the students were one or two years behind grade levels in reading and mathematics and an equal number were economically disadvantaged. SI was provided to students enrolled in 9th and 10th grade English and history classes. SI sessions were scheduled during a scheduled time during the school day three times each week. Research studies suggested that there was improvement in final course grades of students in the English (A and B grades: 28.7% vs. 13.6% before SI; F grades: 23.2% vs. 32.7% before SI) and history classes. Interviews with students and teachers suggest that participation in the SI program also promoted higher levels of class participation and higher achievement on standardized test scores.

Martin, D. C., & Hurley, M. (2005). Supplemental Instruction. In M. L. Upcraft, J. N. Gardner, & B. O. Barefoot (Eds.), *Challenging & supporting the first-year student: A handbook for improving the first year of college* (pp. 308-319). San Francisco, CA: Jossey-Bass.
This chapter provides an overview of Supplemental Instruction (SI). After providing guiding principles of SI, evidence of effectiveness is cited from the original developing

site, University of Missouri-Kansas City as well as several other representative institutions. Two adaptations of the SI model are cited: Video-based SI and the Advanced Preparation Program. The chapter closes with recommendations for increasing the effectiveness of SI.

Martin, D. C., Lorton, M., Blanc, R. A., & Evans, C. (1977). *The learning center: A comprehensive model for colleges and universities*. Grand Rapids, MI: Aquinas College. (ERIC Document Reproduction Service No. ED162294).
Intended for use by educators responsible for developing post-secondary learning centers, this manual emphasizes the design and administration of such centers rather than the various aspects of skill instruction. Its seven chapters discuss the concept of a learning center; the components of the model, including Supplemental Instruction, recruitment and selection of staff, the training of tutorial and teacher assistants, learning materials, distinct labs, noncredit readiness in content areas, and extension of the model; diagnosis of institutional and individual needs; instructional methodology, specifically listening, note taking, study skills, vocabulary, and comprehension; affective consideration, with a discussion of a "relaxation" project; evaluation, including sample data and forms; and proposal preparation.

Martin, D. C., & Wilcox, F. K. (1996). Supplemental Instruction: Helping students to help each other. In G. Wisker, & S. Brown (Eds.), *Enabling student learning: Systems and strategies* (pp. 97-101). Birmingham, England: Kogan Page Publishers and the Staff and Educational Developmental Association (SEDA). (ERIC Document Reproduction Service No. ED396611). Retrieved July 1, 2004, from http://www.umkc.edu/cad/si/sidocs/dmhelp96.htm
This chapter reviews the development of the Supplemental Instruction (SI) model in the United States and its recent introduction into the United Kingdom. Several additions were made to the SI model with its use in the United Kingdom. Due to scheduling conflicts for SI leaders, it is necessary to provide several SI leaders in each course. An advantage of this decision is that the SI program provides more professional development opportunities for the SI leaders. Another feature of the SI program in the UK is the common practice of the SI leader providing feedback to the course professor and the course tutor concerning student comprehension of the lecture material. The authors emphasize the need for academic support and learning enrichment for all students in higher education.

Mason, D., & Verdel, E. (2001). Gateway to success for at-risk students in a large-group introductory chemistry class. *Journal of Chemical Education, 78*(2), 252-255.
This study examined students enrolled at The University of Texas at San Antonio regarding the impact of a special program for at-risk students enrolled in a chemistry course with no laboratory component. Supplemental Instruction (SI) was one part of this special program. The study was carefully controlled regarding the possible impact of variables. At-risk students were enrolled in both a large lecture class and a small one. The results were mixed and the authors postulate on the possible advantages of the heterogenous large course with students of varying academic abilities who interacted with the at-risk students and the more homogeneous small class with only at-risk students enrolled.

Matthews, S., Liparato, S., Shah, P., Smigell, E., Smith, T. , & Schmidt, T. (1993, Summer). Supplemental Instruction and biology. *Supplemental Instruction Update,* 1, 3.
The article describes the use of Supplemental Instruction (SI) in biology at Wayne State University (Detroit, MI). The authors selected biology for several reasons: large lecture sections; lecture-focused course; fast-moving lectures; problem-solving approach; focus on interrelatedness of content material; and relationships between of ideas and concepts. Common SI session activities included: finding connections between classroom lectures and textbook; developing charts and graphs to organize and visualize information and demonstrate relationships; moving away from just memorizing content to deeper discussions of meaning and relationships.

Maxwell, M. (1992). Cost effective alternatives to tutoring. *Journal of Learning Improvement, 1*(1), 1-4.
The author reviews several academic support programs that serve as alternatives to traditional tutoring since there is very little evidence that generally peer tutoring directly affects the student's grades. The article provides an overview of Supplemental Instruction (SI) and adjunct courses. The article reports on a 1986 data study that examined the use of SI at a geographically diverse collection of 35 institutions that had offered SI to 4,276 students in 154 classes of a variety of academic disciplines. The data suggests SI has a positive impact upon raising final course grades (2.44 vs. 1.78) and reducing D, F and course withdrawal rates (20% vs. 35%) and higher graduation rates within six years for SI participants (30.6% vs. 18.2%). It is suggested that part of the reason for SI's positive impact is that there is immediate transfer of the study strategies to course content.

Maxwell, M. (1990). Does tutoring help? A look at the literature. *Review of Research in Developmental Education, 7*(4), 1-5.
The author reviews the research on tutoring and examines the problems of doing research in this area. Research studies generally are unable to show that individual tutoring, by itself, leads to higher grades for developmental students. Some studies suggest tutoring is beneficial for high ability students. Supplemental Instruction is cited as an approach that research suggests does improve student academic achievement.

Maxwell, M. (1993). Evaluating course-related learning programs (Supplemental Instruction, adjunct skills courses and the College Restoration Program). In M. Maxwell (Ed.), *Evaluating academic skills programs: A source book* (pp. 5-1 to 5-12, A5-1 to A5-6). Kensington, MD: M. M. Associates.
The author provides a basic overview of the Supplemental Instruction (SI) model, a summary of research, and references to other SI publications. The appendix provides samples of SI participant questionnaires, suggested time lines of SI program activities, criteria for evaluating SI programs, and instruments for evaluation.

Maxwell, M. (1997). *Improving student learning skills: A new edition*. Clearwater, FL: H&H Publishing
Supplemental Instruction and Video-based Supplemental Instruction are described in several sections of this comprehensive book on developmental education and learning assistance programs. Short selections are contained in Chapter 7, successful programs

and strategies for teaching high-risk college students and Chapter 12, increasing science skills.

Maxwell, M. (1987). Improving student learning skills: An update. *Journal of Educational Opportunity, 3*(1), 1-9.
In an overview of strategies for students to employ in developing their learning skills, the author provides a short overview of the Supplemental Instruction (SI) program. SI is an example of a program that rather than being student-oriented is instead content-oriented and/or process-oriented.

Maxwell, M. (1979). Overcoming problems of learning services. In M. Maxwell (Ed.), *Improving student learning skills* (pp. 158-160). San Francisco: Jossey-Bass.
The author provides an overview of the Supplemental Instruction (SI) program. Deanna Martin, creator of the SI model, is quoted regarding the relationship between the faculty member and the SI program. The SI leader can serve as a feedback mechanism for the course professor regarding the comprehension level of the students if invited to do so. This provides an opportunity for the course professor to review or clarify lecture content at the next class meeting. Martin urges caution not to use the SI program as a tool by administrators to change teacher behavior or the bond of cooperation between the SI program and the professor may be placed at risk.

Maxwell, M. (1997). Successful programs and strategies for teaching high-risk college students. In M. Maxwell (Ed.), *Improving student learning skills* (2nd ed., pp. 158-178). Clearwater, FL: H&H Publishing.
This chapter provides an overview of the Supplemental Instruction (SI) program and Video-based Supplemental Instruction (VSI) program on pages 169 to 172. A case study of SI at California State University at Long Beach indicated that the program was modified due to financial funding problems to turn SI into an adjunct course bearing one unit of nonbaccalaureate credit toward financial aid and other full-time enrollment obligations. Academically disadvantaged students (e.g., TRIO or Equal Opportunity Program students) attend SI at higher rates due to this higher level of commitment. Grades are based on a credit/no credit basis. Comparing performance of students with their own peer group reveals that underprepared students usually benefit more from SI that traditional students.

Maxwell, M. (1997). *What are the functions of a college learning assistance center?* (ERIC Document Reproduction Service No. ED413031).
To be effective, college learning assistance centers (LACs) must reflect the mission and goals of the institution and be coordinated with existing programs and services. Based on the professional literature, LACs engage in fourteen major functions. One of them is providing Supplemental Instruction (SI) for academic support and enrichment in historically-difficult courses. Although most SI programs are voluntary and offer no credit, there are exceptions. At California State University at Long Beach the Learning Assistance Center offers 20 to 30 SI classes in different academic subjects each term. These students can earn one academic credit for attending weekly SI sessions and completing other course requirements.

Maxwell, W. E. (1998). Supplemental Instruction, learning communities, and studying together. *Community College Review, 26*(2), 1-18.
This study was designed to investigate the extent to which peer relations increased among students who participated in a modified program of Supplemental Instruction (SI) at a large community college in California. SI was modified by using instructors from the regular courses and, to a lesser extent, by financial aid counselors. Only financial aid recipients from 19 courses were invited to attend voluntary SI sessions. This allowed the study to more clearly study the impact of SI with low-income students. SI participants received a $100 grant if they attended weekly for the 16 week academic term (only 22% of SI participants earned the grant). Research suggests that the SI workshops promoted the growth of student study networks. At least 20% to 25% more of the SI students reported studying with other students and joining a study group outside of class.

McCarthy, A., Smuts, B., & Cosser, M. (1997). Assessing the effectiveness of Supplemental Instruction: A critique and a case study. *Studies in Higher Education, 22*(2), 221-231.
This article argues that methods of assessing effectiveness of Supplemental Instruction (SI) have been inadequate. The authors suggest ways of isolating SI effects on student achievement, and recommends broadening research methods to include qualitative forms of assessment and use of multivariate linear regression analysis of quantitative data. The article concludes with a case study at the University of Witwatersrand, Johannesburg, South Africa that suggests that SI is highly effective in raising academic achievement of students from both low and high previous levels of academic performance. It may be that the authors' concerns are based on an unclear understanding of the differences between the educational systems in South Africa and the U.S. and how student variables are used in data analysis. Also, a more complete review of current published SI research methodology would reveal that many of their suggestions regarding qualitative and quantitative research methodology have already been implemented.

McCormick, J. (1983). Writing lab adaptions of Supplemental Instruction. In D. C. Martin (Ed.), *Supplemental Instruction: A model for student academic support* (pp. 87-93). Kansas City, MO: The University of Missouri-Kansas City and the ACT National Center for the Advancement of Educational Practices.
The author describes how the Supplemental Instruction (SI) was customized for use within the University of Missouri-Kansas City's writing laboratory. Since students in the group are enrolled in the same content course (e.g., American history), all have a common experience and see direct application of their writing skills since the discussions are not in isolation from the content course for which the writing assignment is due. This increases student motivation and aids in the transfer effect to other content courses. Peer review and mutual responsibility for critiquing each other's work encourages collaboration.

McGinty, D. A. (1990). A path analysis of the effects of multiple programs on student persistence: dormitory residence, orientation, tutoring, Supplemental Instruction [Dissertation, The University of Texas at Austin, 1989]. *Dissertation Abstracts*

International, 51(02), 368A. (University Microfilms No. 9016936).
The models of Spady and Tinto depict student dropout as the result of an inadequate integration into the social and academic systems of the college. This doctoral dissertation research study hypothesizes that persistence for the traditional freshman at a large university is based on background characteristics (gender, ethnicity, rank in high school, aptitude, and college enrolled in) and variables of the academic environment (tutoring, Supplemental Instruction, student orientation, living in residence hall, and grade point average). The model hypothesizes that the academic environment variables have important direct and indirect effects. These four academic programs are described in the literature as promoting student retention. This dissertation researched the effect each program has on student persistence as well as the effect of participation in multiple programs. Path analysis was selected to explain the interactive process of the variables. Multiple regression analysis was used to investigate the strength and direction of the relationships in the path model. It is postulated that the impact of the SI program may have been diminished due to the low number of SI participants (55 of the 560 students in the overall study) which may have clouded results during data analysis. There were moderately significant differences for residence hall, Supplemental Instruction, and the combined effects of orientation and dorm and GPA. SI participants with lower SAT scores performed at academic levels similar to non-SI participants who had higher SAT scores. Further exploratory analyses indicate that the different retention programs have varying effects on students based on ability and past performance levels. The results suggest that retention programs should be targeted at specific populations based on ability and past performance levels.

McGlone, F. D. (1995). The integration of the principles of Supplemental Instruction in undergraduate law subjects. *Proceedings of the Inaugural Pacific Rim First-Year Experience Conference* Brisbane, Australia: National Center for the Study of the Freshman Year Experience and Students in Transition. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper describes the use of Supplemental Instruction (SI) at two classes in Australia's Queensland University of Technology Faculty of Law. SI was contextualized for use within the law curriculum as was described as a Student Peer Mentor (SPM) program. The program concentrated on improving qualitative learning outcomes for the students: promote student use of deep approaches to learning, develop generic lifelong learning skills, and increase student autonomy while encouraging them to work and learn cooperatively with their peers. Several unique features of SPM are identified: selected classes are not historically difficult, the class instructor and the SPM supervisor are the same person, and that the class has always provided a one hour staff-led small group seminar for each two hours of lecture. Other than those previously noted , many common features are shared by SI and SPM.

McGlone, F. D. (1996). Student peer mentors: A teaching and learning strategy designed to promote cooperative approaches to learning and the development of lifelong learning skills. *Queensland University of Technology Law Journal, 12*, 201-220. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.

This paper describes the use of Supplemental Instruction (SI) at two classes in Australia's Queensland University of Technology Faculty of Law. SI was contextualized for use within the law curriculum as was described as a Student Peer Mentor (SPM) program. The program concentrated on improving qualitative learning outcomes for the students: promote student use of deep approaches to learning, develop generic lifelong learning skills, and increase student autonomy while encouraging them to work and learn cooperatively with their peers. Several unique features of SPM are identified: selected classes are not historically difficult, the class instructor and the SPM supervisor are the same person, and that the class has always provided a one hour staff-led small group seminar for each two hours of lecture. Other than those previously noted , many common features are shared by SI and SPM.

McGlone, F. D. (1994). *A training and implementation program for first year student peer mentors*. Unpublished manuscript, Queensland University of Technology, Brisbane, Queensland, Australia. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
The Queensland University of Technology (QUT) Faculty of Law (Brisbane, Australia) Supplemental Instruction (SI) program encouraged students to: develop deep approaches to learning, develop generic learning skills, and increase student autonomy while encouraging them to work and learn cooperatively with others. The SI program operates in two classes: Torts and Contracts with class sizes exceeding 350. In addition to improving academic performance of student participants, the SI leaders reported enhanced communication and interpersonal skills which they perceived to increase their job marketability.

McGrath, E. T. (1988). *Supplemental Instruction: A study of its efficacy on the Greenville College campus*. Unpublished master's thesis, Greenville College, IL. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
The purpose of this master's thesis study from Fall 1986 and Spring 1987 was to evaluate the effects of Supplemental Instruction at Greenville College (IL) regarding: 1) mastery of course content (SI participants earned a higher final course grade -- 3.16 vs. 2.66 -- and a lower rate of D, F and withdrawal final course grades than nonparticipants (ratio of 3:4); 2) transference of learning skills from one course to another (former SI participants received a higher cum GPA in succeeding academic terms than nonparticipants, 3.14 vs. 2.66); and 3) higher course and institutional retention rates (97 percent for SI participants vs. 83 percent for nonparticipants).

McGraw, S. P., & Newkirk, S. L. (1995). Adaptation of Supplemental Instruction with mentoring support at Anne Arundel Community College. In S. P. McGraw, & S. L. Newkirk (Eds.), *Fund for the Improvement of Postsecondary Education Program Book* . Washington, D.C.: Fund for the Improvement of Postsecondary Education, U.S. Department of Education. Retrieved July 1, 2004, from http://www.ed.gov/offices/OPE/FIPSE/95ProgBk/annarun.html
This chapter describes how Rosemary Wolfe, FIPSE Project Director for Supplemental Instruction (SI) with Mentoring Support, will be working with Ashland Community

College in Kentucky to adapt the SI program for underprepared students enrolled in required general education courses; Daytona Community College to adapt the program to math courses and the peer review process; Dutchess Community College to adapt the program to lab courses; and Community College of Philadelphia to adapt the program to student success in difficult courses. Expected outcomes for faculty include increased interactive teaching skills and the development of new teaching approaches, an awareness of their teaching styles and an understanding of students' needs.

McGraw, S. P., & Newkirk, S. L. (1996). Disseminating proven reforms: Supplemental Instruction with mentoring support at Anne Arundel Community College. In S. P. McGraw, & S. L. Newkirk (Eds.), *Fund for the Improvement of Postsecondary Education Program Book* . Washington, D.C.: Fund for the Improvement of Postsecondary Education, U.S. Department of Education.
This chapter describes how Rosemary Wolfe, FIPSE Project Director for Supplemental Instruction (SI) with Mentoring Support, worked Ashland Community College in Kentucky, Daytona Community College, Dutchess Community College, and the Community College of Philadelphia. Expected outcomes for faculty include increased interactive teaching skills and the development of new teaching approaches, an awareness of their teaching styles and an understanding of students' needs.

McManus, S. M. (1992). *The relationship between Supplemental Instruction and student achievement in university mathematics courses*. Unpublished Master's of Science (M.S.) thesis, North Carolina State University at Raleigh. Available: Interlibrary loan from North Carolina State University at Raleigh.
The relationship between Supplemental Instruction (SI) and student achievement during Fall 1990 at North Carolina State University at Raleigh (NCSU) was the focus of this study. The target population was 198 freshmen and sophomore students enrolled in entry-level mathematics courses at NCSU. During the academic term, 60 students attended one or more times (SI group) while 138 students chose not to attend any SI sessions (non-SI group). Students were enrolled in two sections of Math 241, a second-semester calculus course that was taught by the same professor. The initial section of the paper provides a review of the professional literature concerning SI. The author traces the importance of the following in understanding the unique method of SI: Piaget's constructivism, cooperative learning, student questioning skills, and study strategies. A Pearson Product Moment correlation ® = -.1771) and a Multiple Regression Analysis found no significant relationship between the number of SI sessions attended and final course grade. However, students who attended 5 or more SI sessions steadily increased throughout the academic term while the scores of other SI participants fluctuated. The researcher postulates that this suggests the beneficial effect of frequent SI attendance for improving academic performance. A t-test used found that students attending the SI sessions received statistically significantly higher final course grades than those who did not attend (mean final course grade: 86.44 vs. 77.62; $t = 2.95$, $df = 194$, $p < .01$). Following is a comparison between the SI and non-SI groups for each of the course exams. In each comparison the SI group earned higher mean grades: test 1: 76.41 vs. 71.92; test 2: 83.57 vs. 77.01; test 3: 87.57 vs. 79.06; test 4: 83.24 vs. 70.87; test 5: 86.12 vs. 78.82; final exam: 75.31 vs. 67.33; final course grade: 86.45 vs. 77.62. Each comparison was statistically significant except for test 1.

McMichale, E. (1994, November 29). 'Natural teachers:' Tutors work alongside students in "K' program. *Kalamazoo Gazette*, Kalamazoo, MI, p. C1.
This newspaper article describes the use of Supplemental Instruction (SI) at Western Michigan University located in Kalamazoo, Michigan.

McMillin, J. (1983). Adapting Supplemental Instruction to English composition classes. In D. C. Martin (Ed.), *Supplemental Instruction: A model for student academic support* (pp. 95-100). Kansas City, MO: The University of Missouri-Kansas City and The ACT National Center for the Advancement of Educational Practices.
This chapter describes the customization of the Supplemental Instruction model for use in English composition classes at Point Loma College (CA). The author emphasized the following elements of SI with use in the composition classes: discovery of learning in a non-threatening environment; a focus on developing a "co-worker" relationship between the SI leader and students; an awareness of process as well as content in teaching and learning; importance of reasoning skills in developing writing competency; and the role of the student as a responsible agent in his/her own educational process. This chapter provides a simulated conversation of an editing session between the SI leader and the student to illustrate the above elements.

McMillin, J. (1993). Adapting Supplemental Instruction to English composition classes. In D. C. Martin, & D. Arendale (Eds.), *Supplemental Instruction: Improving first-year student success in high-risk courses* 2nd ed., (pp. 34-37). Monograph Series No. 7. Columbia, SC: National Resource Center for The Freshman Year Experience and Students in Transition. (ERIC Document Reproduction Service No. ED354839).
This chapter, initially published in 1983, describes the customization of the Supplemental Instruction model for use in English composition classes. The author emphasized the following elements of SI with use in the composition classes: discovery of learning in a non-threatening environment; a focus on developing a "co-worker" relationship between the SI leader and students; an awareness of process as well as content in teaching and learning; importance of reasoning skills in developing writing competency; and the role of the student as a responsible agent in his/her own educational process. This chapter provides a simulated conversation of an editing session between the SI leader and the student to illustrate the above elements.

Meikle, J. (1993, February 16). Learning to help others. *Guardian Education Newspaper*, London, England, p. 10.
This newspaper article describes the use of Supplemental Instruction (SI) at Kingston University in the United Kingdom. In an interview with Jenni Wallace, SI Certified Trainer for the United Kingdom, she explains that SI sessions are positioned between the classroom lectures by the professor and the tutorial sessions. The SI sessions help students to be better prepared to maximize their time spent in the tutorial sessions. There are reports that former SI leaders and participants in succeeding academic terms form their own study groups in classes where formal SI sessions are not offered. Former SI leaders report that potential employers are impressed with the skills that they developed as facilitators of the study groups.

Merriwether, V. E. (1999). Managing an expanding program or "SI empire". In *Proceedings of the First National Conference on Supplemental Instruction and Video-based Supplemental Instruction* (p. 15). Kansas City, MO: Center for Supplemental Instruction, University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, Kansas City, MO 64110.
The author discusses strategies in managing a large SI program, or a program that is expanding with very limited staff available to deal with the day to day activities of supervising SI leaders, as well as administrative duties.

Merwin, D. D. (1991). A comparative analysis of two tutoring methods assessing student achievement and retention [Dissertation, Montana State University, 1990]. *Dissertation Abstracts International, 52*(02), 438A. (University Microfilms No. 9109700).
The purpose of this doctoral dissertation research study was to compare the effectiveness of two tutoring methods with regard to achievement and retention for high-risk undergraduate students at Northern Montana College (Havre, MT) enrolled in English 150 during the 1986-87 academic school year (eleven courses sections over the fall, winter and spring academic terms). English 150 is a three-credit course considered to be developmental in content since it encompassed the basic skills areas (sentence structure, parts of speech, grammar, usage, punctuation, and paragraph development). The two tutoring methods were group tutoring (i.e., Supplemental Instruction, or SI) and individual tutoring. The treatment was randomly assigned to each of the eleven course sections and attendance was mandatory by the students. The problem was investigated by: (1) examining how the tutoring methods and other independent variables affected student achievement and student retention, and (2) comparing the two tutoring methods in terms of cost effectiveness. Achievement was measured by the pretest-posttest gain score from the Tests of Adult Basic Education (TABE). The TABE test for English measured students' competency in capitalization, punctuation, expression, and spelling. Retention was measured by the ratio percentage of the number of student credit hours earned compared to the number of hours attempted for the first and second years following treatment. The cost effectiveness of both tutoring methods was compared by determining the cost of one grade level of improvement. Some of the major findings were: students in SI tutoring had higher retention rates than students receiving individual tutoring for the first and second years following treatment; the combined results of the two tutoring methods did make a significant difference in student achievement; the SI tutoring method compared to the individual tutoring method was more cost effective ($3.46 average cost for SI program to improve one grade level of one students vs. $16.30 for one-on-one tutoring to do the same); and individual tutoring had a relatively short-term effect. An unexpected finding was that students who participated in SI groups continued to meet at other times outside of class and that the groups were heterogeneous groupings. Interviews with these students revealed that they had met the other students through the SI sessions. It was assumed that students would tend to meet with their own homogeneous affinity groups. The SI students revealed that they enjoyed the social interactions in the groups and felt more comfortable working with other SI participants when they needed additional academic assistance with the English 150 course. The SI program also had an impact upon the SI leaders. Three of the seven SI leaders changed their degrees --

two were business majors and one was a vocational-technical major -- to education so they could become professional teachers. One-on-one tutors reported frustration with the tutoring program when students canceled their scheduled tutoring sessions. Since SI leaders worked with groups, they did not encounter that problem.

Metcalf, K. J. (1996). The impact of the training format on tutors' attitudes, beliefs, values, and practices in college level tutoring [Dissertation, State University of New York at Buffalo, 1996]. *Dissertation Abstracts International, 57*(09), 3780A.
There is a lack of empirical data to support which, of several training formats (models), is the best format for training tutors. The purpose of this present dissertation study was to identify which of four training formats produced a positive chance in tutor's attitudes towards tutoring, the tutoring process, and its administration. Accredited Course (AC), Supplemental Instruction Liaison (SIL) Course, Comprehensive Course (CC), and Short Course (SC).A dual methodology was used. In the quantitative study, data was gathered from student-tutors in 30 postsecondary tutor training programs, using a pre and post-test quasi-experimental research design. The College Student Peer-Tutor Survey (CSPTS) was developed to assess whether length or amount of tutor training influenced a positive change in student-tutors' attitudes toward tutoring. The qualitative component of the overall study sought to capture the insights and perceptions of the tutor coordinators/trainers from the 30 tutor training programs in relation to: (a) understanding the programs' organization and instructional content, (b) refining the typology of formats, and (c) developing recurrent themes. As a result of training and experience tutoring, statistically significant changes in tutor's attitudes towards tutoring were evidenced in all four formats. SIL tutors showed more positive change in relation to the importance of "A tutor being an expert in the subject area he/she is tutoring in." Results from the qualitative component of the study focused attention on three recurrent themes: (a) the need for further refinement of the typology of formats, (b) the need for staff development, and (c) the precariousness of program status.

Millard, M. (1995, October 19). First African-American to hold post: New Chancellor at City College helps win $1.67 million grant. *The Sun Reporter*, San Francisco, CA, p. 1.
This newspaper article describes how Del Anderson, the new Chancellor of San Francisco City College (CA), will use a $1.67 Title III grant from USDOE to help students in "high risk" courses and to bring the Internet into the classroom. The chancellor, formerly president of San Jose City College, mentioned that she had developed many programs for students of color to help them achieve higher transfer and graduation rates.

Miller, V., Oldfield, E., & Bulmer, M. (2004). Peer Assisted Study Sessions (PASS) in first year chemistry and statistics courses: Insights and evaluations. In *UniServe Science Scholarly Inquiry Symposium Proceedings* (pp. 30-35). Sydney, Australia: University of Sydney. Retrieved June 2, 2005, from http//science.uniserve.edu.au/pubs/procs/wshop9/2004webproceedingsFINAL.FINAL3.pdf
Peer Assisted Study Sessions (PASS), based upon the Supplemental Instruction (SI) model, was used in first year chemistry and statistics courses at the University of Queensland in Australia. This study analyzed results from 2003 and found that PASS participants earned higher final course grades than nonparticipants. Other reported

positive outcomes through qualitative research findings were higher student confidence, increased desire to continue in the academic discipline, increased in analytical and creative approach to learning, and greater sense of belonging within a community of learners.

Miller, C. J. M., & Packham, G. A. (1999). Peer-Assisted Student Support at the University of Glamorgan: Innovating the learning process? *Mentoring & Tutoring, 7*(1), 81-95.
Peer-Assisted Student Support (PASS) is based upon Supplemental Instruction (SI) and is the predominate name used in the United Kingdom. This article provides an overview of PASS.

Miller, K. J. (1996). *Developmental education at the college level*. Bloomington, IN: Phi Delta Kappa Educational Foundation.
This monograph provides an overview of developmental education at the postsecondary level. On pages 32 and 33 a short overview of Supplemental Instruction (SI) is provided.

Miner, J. (1991, October 16). *Politics of remediation.* [Videotape]. Miner, J. (Producer)Los Angeles, CA: DeAnza College. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This video teleconference was concerned with a review of successful practices for serving academically underprepared students. Featured panelists included John Roueche and Lee Noel. An eight minute segment featured an interview with Deanna Martin, creator of the Supplemental Instruction (SI) model. Martin provided an overview of the SI program and discussed how the program can be used to serve both the best and least prepared students.

Moore, I. (1992). *Undergraduate students as assistant demonstrators in the first year physics laboratory*. (Report No. 27). Unpublished manuscript, Queensland University of Technology, School of Physics, Brisbane, Queensland, Australia: Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper describes the use of a modified Supplemental Instruction (SI) program in the School of Physics at Queensland University of Technology (Brisbane, Australia). The pilot project used second and third year physics major students as assistant demonstrators in the first year physics laboratory. In addition to improvement by the students in the class, the assistant demonstrators also showed improvements in their class performance. Through qualitative research, it appears that the assistant demonstrators helped students to improve their own learning process, focus on the process rather than rushing to complete the task, and think of new issues and questions.

Muraskin, L. (1997). *"Best practices" in Student Support Services: A study of five exemplary sites*. Washington, D.C.: U.S. Department of Education. (ERIC Document Reproduction Service ED416784).
This report examines "best practices" in the delivery of Student Support Services (SSS),

one of the Special Programs for Disadvantaged Students collectively known as the TRIO programs. The study is based on case studies that were conducted in five local SSS projects during early 1996. The five projects were drawn from 30 projects in the National Study of Student Support Services, a longitudinal survey of students begun in 1991. A common theme of academic support at all five institutions was with providing learning assistance for developmental and popular freshman courses. Two of the five sites used Supplemental Instruction (SI) as an integral part of academic enrichment for SSS students. Another site used a variation of SI.

Murray, L. (1997, October 24). New program relies on peer instruction. *The Daily Reveille (Louisiana State University School Newspaper)*, Baton Rouge, LA, p. 7. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This newspaper article provides a basic overview of the Supplemental Instruction (SI) model. SI will be implemented on the Louisiana State University campus in Spring 1998.

Murray, M. H. (1996, November). Alternative to lecturer-centred teaching enhances student learning and costs no more. *Academic Staff Development Unit Update (Queensland University of Technology, Australia),* 6-7. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This article describes the use of Supplemental Instruction (SI) in the School of Civil Engineering, Queensland University of Technology (Australia). A basic engineering statics course in the first year has been transformed from a traditional lecturer-centered teaching mode into a student-centered resource-based model. Central to this transformation has been the integration of SI into the course. The SI sessions focus on interaction, discussion, and investigation rather than just simple problem solving. Before integration of SI in the course the total class (SI and non-SI students) mean final score was 46, in 1996 after the integration the score increased to 55. These results are based on the aggregated score from four quizzes during the semester, from a spaghetti bridge design/build/test project, and from a final end-of-semester exam. Based on standardized scores, the students in 1996 were less academically prepared than the ones in 1994 before SI was introduced. The SI participants received a higher mean final percentile grade in each year of the study (1995: 48 vs. 41; 1996: 56 vs. 42). There was a positive increase in final course score and higher levels of SI attendance. Students evaluated the SI session most useful of all course components (SI sessions, 53%; lecture, 22%; text book, 16%; study guide, 13%; and tutorial, 9%). SI leaders mentioned the following benefits of the program for themselves: increased skill in group management; improved public speaking; gained skills in team building; increased group facilitation skills; improved personal time management; and increased interest from potential employers because of skills developed as a SI leader.

Murray, M. H. (1997, October). Better learning through curricular design at a reduced cost. *Journal of the American Society of Engineering Education,* 1-5. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper describes the use of Supplemental Instruction (SI) in the School of Civil

Engineering, at Queensland University of Technology, Australia. After an initial discussion of the changes economic and educational trends in Australia, the report reviews the use of SI with students in a first year engineering course (Engineering Mechanics 1). It is an introduction to rigid body statics, equilibrium, moments, forces, and properties of plane areas. Using the Australian system of 7 point grading (1 = lowest, 7 = highest), the data suggests that the performance of SI participants was higher than non-SI participants (1995: 3.3 vs. 2.7; 1996: 4.4 vs. 2.8). Due to the use of SI, the course was restructured with a reduction of professor lecture time. This resulted in a lower student unit cost. Before SI's introduction, the student unit cost was more than $51 in 1994 (each week 2 hours of lecture and 1 hour of tutorials) and was reduced to less than $42 in 1997 (each week one hour of lecture, one hour of tutorial, one hour of SI, study guides, computer exercises, and E-mail).

Murray, M. H. (1995). *Report on Peer Assisted Study Sessions in Engineering Mechanics 2*. Unpublished manuscript, Queensland University of Technology, Brisbane, Queensland, Australia. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, Kansas City, MO 64110.
This report discusses the use of Peer Assisted Study Sessions (PASS), the local institutional term for the Supplemental Instruction (SI) program used at Queensland University of Technology (Brisbane, Queensland, Australia) in CEB185, Engineering Mechanics 2. PASS participants earned higher mean final course grades (3.6 vs. 2.8 on a 0 to 7 scale). The most significant change in grades was in improving the performance of students who previously were projected to earn low grades and see them now achieve final grades in the mid range. PASS participants mentioned the following reasons for attending the sessions: working on past exam and test solutions; discussion of problems; being able to ask questions freely and not look stupid; realizing there were different ways to tackle a problem; and interaction with fellow students and leaders who had recently done well in the course.

Murray, M. H. (1996). Resources for the resourceless: Maximizing student learning. *Proceedings of the 8th Conference of the Australian Association of Engineering Education* (pp. 162-166). Sydney, Australia: Australian Association of Engineering Education. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This article (which won "Best Paper" award at the conference) describes the use of Supplemental Instruction (SI) in the School of Civil Engineering, Queensland University of Technology (Australia). A basic engineering statics course in the first year has been transformed from a traditional lecturer-centered teaching mode into a student-centered resource-based model. Central to this transformation has been the integration of SI into the course. The SI sessions focus on interaction, discussion, and investigation rather than just simple problem solving. Before integration of SI in the course the total class (SI and non-SI students) mean final score was 46, in 1996 after the integration the score increased to 55. These results are based on the aggregated score from four quizzes during the semester, from a spaghetti bridge design/build/test project, and from a final end-of-semester exam. Based on standardized scores, the students in 1996 were less academically prepared than the ones in 1994 before SI was introduced. The SI participants received a higher mean final percentile grade in each year of the study

(1995: 48 vs. 41; 1996: 56 vs. 42). There was a positive increase in final course score and higher levels of SI attendance. Students evaluated the SI session most useful of all course components (SI sessions, 53%; lecture, 22%; text book, 16%; study guide, 13%; and tutorial, 9%). SI leaders mentioned the following benefits of the program for themselves: increased skill in group management; improved public speaking; gained skills in team building; increased group facilitation skills; improved personal time management; and increased interest from potential employers because of skills developed as a SI leader.

Murray, M. H. (1999). SI down under -- Australian innovations: Funding, solutions, and analysis. In *Proceedings of the First National Conference on Supplemental Instruction and Video-based Supplemental Instruction* (p. 1731). Kansas City, MO: Center for Supplemental Instruction, University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, Kansas City, MO 64110.
SI was established in Australia during the early 1990s. The author reports on the adaptations that have been made to the American SI model to meet challenges. Most SI programs do not receive funding from central administration but instead have to solicit funds from separate academic units. Responses to this challenge include restructuring of courses to increase effectiveness and integration of SI along with the use of advanced SI leaders to serve as assistant SI supervisors since often the SI program receives no full-time administrative oversight but instead relies upon the individual course faculty members who offer SI in connection with their course. An unanticipated benefit of the SI program has been the professional development of the SI leaders.

Murray, M. H. (1997). Students, learning resources: An inseparable triad. *Australian Journal of Engineering Education, 7*(2), 129-139. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper describes the use of Supplemental Instruction (SI) at the School of Engineering, Queensland University of Technology (Australia) with two first year engineering courses. SI is compared with the traditional, lecture-centered model of learning. The introductory engineering courses were reorganized to integrate SI into the learning delivery system. Based on the seven point grading scale employed in Australian education (1 = low; 7 = high), the academic performance of students with SI was raised to 4.3 from the previous level of 3.0 before the introduction of the SI model.

Murray, M. H. (2001). Students managing to learn and teachers learning to manage. In J. E. Miller, J. E. Groccia, & M. S. Miller (Eds.), *Student-assisted teaching: A guide to faculty-student teamwork* (pp. 50-55). Bolton, MA: Anker Publishing Company. (ERIC Document Reproduction Service No. ED449713).
This chapter describes the use of Supplemental Instruction (SI) at Queensland University of Technology (QUT), an inner-city, multicampus university with 35,000 students in Australia. SI was implemented in the engineering course taught by the author. Final course scores were higher and attrition rates lower for SI participants in the 1995-96 study. The overall cost of offering the course was reduced through introduction of SI since additional part-time lecturers and tutors were replaced by the SI

scheme. The author also reported benefits for the SI leaders in terms of personal and professional growth.

Murray, M. H., Grady, J., & Perrett, S. (1997). *Students managing students' learning*. Paper presented at the 9th Annual Conference of the Australian Association of Engineering Education, December 14-17, 1997. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper describes the use of Supplemental Instruction (SI) at Queensland University of Technology (Brisbane, Australia) in engineering classes (Engineering Mechanics I and II). Student participant comments said that participation in SI sessions: developed greater understanding, more helpful than tutorials, made discussions more enjoyable, developed greater confidence, enjoyed group work, and found the atmosphere more relaxed and helpful. SI leaders mentioned the following benefits for themselves: reinforced own learning and study skills, developed more confidence, made academic coursework more challenging and satisfying.

Nolting, P., & Ruble, K. (1999). Supplemental Instruction with math study skills templates. In *Proceedings of the First National Conference on Supplemental Instruction and Video-based Supplemental Instruction* (p. 16). Kansas City, MO: Center for Supplemental Instruction, University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, Kansas City, MO 64110.
SI can be expanded to include mathematics study skills as integral content to learning math and at the same time organize the SI design designs. The authors focus on the content of math study skills and provide examples of how these specific study strategies can structure the student learning activities.

O'Donnell, L. E. (1996). Inclusion for learning disabilities: Technology with learning variables research and Supplemental Instruction. *International Journal of Special Education, 11*(2), 27-32.
Learning Variables Research and Supplemental Instruction (LVR/SI) provide an innovative approach to inclusion for intellectually normal and gifted students with learning disabilities. The original Supplemental Instruction (SI) model is generally used with traditional college undergraduate and graduate students. Video-based Supplemental Instruction (VSI) allows enrolled high school or college students view the videotaped lectures of a college level course (e.g., Western Civilization, General Chemistry) and allow them opportunity to control the flow of information (e.g., stop, repeat, discuss material before proceeding). SI, and especially VSI, can be very helpful for students with learning disabilities since they can be served inside the same content class rather than requiring an additional class for the students to attend to deal with their specialized learning needs. The LVR/SI approach refines either the SI or VSI model with individualized learning variables and computer technology for application in junior high, senior high, and higher education. Rather than using video tape with VSI, computer technology might be substituted. In addition, the SI leader or VSI facilitator is provided critical information about students with disabilities. This technology-based

program allows individuals with learning disabilities to succeed academically in integrated, inclusive classrooms.

O'Donnell, L. E. (1995). Inclusion for learning disabilities: Technology with learning variables research and Supplemental Instruction. *Empowering children with special needs: Practices around the world* (pp. 192-195). Whitewater, UK: International Association of Special Education.
Learning Variables Research and Supplemental Instruction (LVR/SI) provide an innovative approach to inclusion for intellectually normal and gifted students with learning disabilities. The original Supplemental Instruction (SI) model is generally used with traditional college undergraduate and graduate students. Video-based Supplemental Instruction (VSI) allows enrolled high school or college students view the videotaped lectures of a college level course (e.g., Western Civilization, General Chemistry) and allow them opportunity to control the flow of information (e.g., stop, repeat, discuss material before proceeding). SI, and especially VSI, can be very helpful for students with learning disabilities since they can be served inside the same content class rather than requiring an additional class for the students to attend to deal with their specialized learning needs. The LVR/SI approach refines either the SI or VSI model with individualized learning variables and computer technology for application in junior high, senior high, and higher education. Rather than using video tape with VSI, computer technology might be substituted. In addition, the SI leader or VSI facilitator is provided critical information about students with disabilities. This technology-based program allows individuals with learning disabilities to succeed academically in integrated, inclusive classrooms.

O'Flaherty, K., & Siera, M. (1985). The use of Supplemental Instruction in an Introduction to Sociology course. *ASA Teaching Newsletter, 10*(6), 13-16.
At Wichita State University (KS) the Supplemental Instruction (SI) model was used to help improve student academic performance in an Introduction to Sociology course. This Spring 1984 study suggested that SI attendance was positively correlated with higher mean final course grades. Of the SI participants, 75 percent received a final course grade of A or B while 59 percent of non-SI participants received a similar grade.

Ochae, R. (1995). Writers at risk: An experiment with Supplemental Instruction in freshman writing classrooms. In *Black Hills State University Research and Scholarly Work Symposium Proceedings* (pp. 67-72). Spearfish, SD: Black Hills State University. (ERIC Document Reproduction Service No. ED414830).
This book chapter describes the use of Supplemental Instruction (SI) during Fall 1994 at Black Hills State University (Spearfish, SD) with a beginning writing class (English 101). The institution has an open admission policy and high attrition and dropout rates in the first writing course. To measure effectiveness of SI, a diagnostic essay (EDE) was administered to the English 101 students, based on a common essay prompt and scored holistically by the entire English faculty. Results suggested that SI helped SI participants to improve writing skills (gain of 15.7% on the EDE vs. 14.0% for courses taught by the same professor but without SI), earn higher mean final course grades (2.6 vs. 2.5, reduce failure rates (13.8% vs. 16.0%), and lower course withdrawal rates (6.1% vs. 6.9%).

Ochae, R. (1995). *Writing partners: Improving writing and learning through Supplemental Instruction in freshman writing classrooms*. Paper presented at the Annual Meeting of the National Council of Teachers of English in San Diego, CA: ERIC Document Reproduction Service No. ED395323.
A study was conducted at Black Hills State University (SD) which has an open admission policy and high attrition and dropout rates in the first writing course. Results suggested that SI helped SI participants to improve writing skills (gain of 15.7% on standardized test vs. 14.0% for courses taught by the same professor but without SI), earn higher mean final course grades (2.6 vs. 2.5, reduce failure rates (13.8% vs. 16.0%), and lower course withdrawal rates (6.1% vs. 6.9%).

Ogden, P., Thompson, D., Russell, A., & Simons, C. (2003). Supplemental Instruction: Short- and long-term impact. *Journal of Developmental Education, 26*(3), 2-4. 6, 8.
The purpose of this study was to assess Supplemental Instruction (SI) for short- and long-term impact on college academic performance and retention at Georgia State University. Data were compiled for students registered in a political science course supported by SI. Four groups were identified according to their university entry status and SI participation: traditional (regularly admitted) SI participants, conditional (Learning Support Programs and/or English as a Second Language entry status) SI participants, traditional non-SI participants, and conditional non-SI participants. All SI participants volunteered for the program. There was no statistically significant differences between SI and non-SI participants in the two comparison groups when preentry attributes were analyzed. Conditional students participating in SI had significantly higher short- and long-term outcomes compared to conditional non-SI participants. Conditional SI participants reenrolled at a higher rate than did the other three student groups included in this study. Traditional SI participants earned higher final course grades than their non-SI counterparts, though the results were not statistically significant. The ESL students were equally distributed among the four comparison groups and did not serve as a statistically significant factor in outcomes studied.

Ogilvie, C. (1991, April). Supplemental Instruction: The California State University model. *Illinois Association for Personalized Learning Programs Newsletter,* 4-5.
This newsletter article provides an overview of the Supplemental Instruction (SI) program at California State University. To increase attendance at the SI sessions, students are required to register for a section of one credit and pay tuition to allow attendance at the SI sessions. SI is provided to 35 sections of courses.

Oliver, R. (1994 July). University of Port Elizabeth rector on the right road. *Eastern Province Herald Newspaper*, Port Elizabeth, South Africa, p. 11.
This newspaper article reports on the signing of an agreement between the University of Missouri-Kansas City and the University of Port Elizabeth in South Africa concerning Supplemental Instruction (SI). UPE is implementing the SI program to help bridge the gap caused by differences in the education systems in the country.

Oliver, S. (1995). Empowering student learning with Supplemental Instruction. *Developing skill-based curricula through the disciplines: Case studies of good practice in geography, SEDA Paper 89* . Birmingham, England: Staff and Educational

Development Association. Retrieved July 1, 2004, from http://www.lgu.ac.uk/deliberations/seda-pubs/Oliver.html
This article describes the introduction of Supplemental Instruction (SI) to the United Kingdom in the 1990s. The author describes some of the issues associated with its implementation at his institution of Saint Mary's University College in London.

Overly, C. (1995). *Supplemental Instruction overview.* [Videotape]. Overly, C. (Producer)Kalamazoo, MI: The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This ten minute videotape provides an overview of the Supplemental Instruction (SI) program. It includes brief interviews with SI leaders, SI supervisors and faculty members.

Packham, G., Cramphorn, C., & Miller, C. (2001). Module development through Peer-Assisted Student Support: An initial evaluation. *Mentoring & Tutoring, 9* (2), 113-124.
OPeer-Assisted Study Sessions (PASS), based upon the Supplemental Instruction (SI) model, are used with institutions within the United Kingdom for improvement of the course curriculum. Feedback is provided to the course instructors in such a way that is not easily obtainable through more traditional means. Data is collected through meeting logs, observations, interviews, and questionnaires. This article focused on the use of PASS for this purpose at the University of Glamorgan's Business School.

Packham, G., & Miller, C. (2000). Peer-Assisted Student Support: A new approach to learning. *Journal of Further and Higher Education, 24*(1), 55-65.
Peer-Assisted Student Support (PASS) is based upon Supplemental Instruction (SI) and is the predominate name used in the United Kingdom. This article provides an overview of PASS with specific information about its use at the University of Glamorgan during the 1997-98 academic year in the Business School. PASS is most popular with female students and those under 21 years of age. Evaluation of the positive impact of PASS participation is limited to the course in which the students attended PASS sessions. Higher rates of PASS attendance was correlated with higher final course grades.

Painter, S. (Ed.). (2001-2005). *Internet homepage for the National Center for Supplemental Instruction* [On-line]. Retrieved July 1, 2004, from http://www.umkc.edu/cad/si/
This Internet homepage maintained by the National Center for Supplemental Instruction at the University of Missouri-Kansas City provides a central location for information about SI. Some of the menu items include: overview of SI; links to homepages of SI leaders at UMKC; information about upcoming SI Supervisor training workshops; instructions on how to subscribe to the SI listserv discussion group; SI materials for sale; directory of known SI homepages from other colleges around the world; and a directory of SI-related documents. Currently more than 100 documents are available for viewing at this site about SI by authors at UMKC and elsewhere.

Painter, S. (Moderator). (2001-2005). *Supplemental Instruction Internet computer discussion listserv* [On-line]. Kansas City, MO: The University of Missouri-Kansas,

Center for Supplemental Instruction. Retrieved July 1, 2004, from http://www.umkc.edu/cad/si/
This moderated computer discussion listserv is provided by the National Center for Supplemental Instruction (SI). Discussion topics include: customizing SI for different content areas; strategies to increase SI attendance; methods to conduct qualitative and quantitative research; and other topics. Subscription to the listserv and is free to anyone, regardless of whether they have an active SI program or not. SI Leaders as well as SI Supervisors are especially invited to join the list. Approximately 350 persons from several countries are members of the listserv. To subscribe to the listserv, send an E-mail message to listserv@listserv.umkc.edu. In body of the message type: subscribe SInet yourfirstname yourlastname. For more information on SInet, send message to: SInet-Request@listserv.umkc.edu.

Pappas, J. G. (1997, June 5). Pappas praises Supplemental Instruction program. *Central Washington University Observer*, Ellensburg, WA, p. 5.
This newspaper article by the Dean of Academic Services at Central Washington University describes the use of Supplemental Instruction (SI) program at the institution. The data from the institution suggest that SI participants earn higher mean final course grades. A higher than estimated number of students (69 percent) participate in the program.

Patt, G. R. (1996). The best way to learn is to teach. *Biosource, 4* (2).
This article describes the use of Supplemental Instruction (SI) as a form of peer-group instruction in biology at Southern Illinois University at Edwardsville. SI leaders report benefits for them since it helps them to prepare for comprehensive examinations such as MCAT or GRE as well as developing teaching skills. Data from Fall 1995 reports that those who attended SI session four or more times earned a mean final course grade of a low B, those who attended one to three times earned a C, and those who did not attend any SI sessions earned a high D grade.

Payton, J., & Overly, C. (1994, Summer). Supplemental Instruction and Physical Geology. *Supplemental Instruction Update,* 1, 3.
This article provides an overview of the use of Supplemental Instruction (SI) in a Physical Geology course at Western Michigan University. This course has served as a "gatekeeper" course for students who are considering geology as a major. Frequently cited SI session activities included: vocabulary development/review; ask group to assist with generating SI session agenda; create a visual matrix to help organize information; frequently use the "informal quiz" to check for comprehension level of SI participants; and create opportunities for students to connect lecture material to SI participants' lives.

Peled, O. N., & Kim, A. C. (1996). Evaluation of Supplemental Instruction at the college level. *The Learning Assistance Review: The Journal of the Midwest College Learning Center Association, 1*(2), 23-31. (ERIC Document Reproduction Service No. ED410777).
This article analyzed the Supplemental Instruction (SI) model as it was used in 14 sections of the same high-risk biology course between Winter 1990 through Winter 1993 at National-Louis University (Chicago, IL) which is a multicultural, multiethnic

university campus. Rather than reviewing a comparison of SI and non-SI attendees within the same class, the comparison was the academic performance of students in classes that had SI available and classes that did not. The researchers believed that this was another way to help control for the possible effects of student motivation. Examination grades indicated that the average grade of students in classes that had SI sessions was significantly higher than that of students in classes where SI sessions were not offered (scale 0 to 100: SI classes, 74.1 percentile vs. 67.6 non-SI classes, $p < .05$). Within classes that had SI sessions offered for students, SI participants earned a final course grade 12 percent higher than non-SI participants. In classes in which an SI leader was available, the number of students receiving grades below 60 percent decreased; whereas, the number of students receiving grades above 80 percent increased.

Peled, O. N., & Kim, A. C. (1996). Supplemental Instruction in Biology at the college level. *Selected Conference Papers of the 19th Annual Conference* (pp. 23-24). Chicago, IL: National Association for Developmental Education. (ERIC Document Reproduction Service No. ED394414).
Supplemental Instruction (SI) in 14 biology classes at National Louis University (Chicago, IL) was found to significantly increase student achievement (74.1 percentile vs. 67.6 percentile for non-SI participants). An additional analysis studied students with low grades (below the 60th percentile) and high grades (above the 80th percentile). SI attendance was positively correlated with higher grades. Many of the SI leaders in biology have been students intending to major in elementary education.

Peoples, D. M. (1993). *Supplemental Instruction: Is it effective?* Unpublished Master of Arts (M.A.) thesis, Rowan College of New Jersey: Available: Interlibrary loan from Rowan College of New Jersey.
This Master of Arts Thesis studied the impact of Supplemental Instruction (SI) in 1991-1992 with fifteen 7th and 8th grade junior high school students with a disability enrolled in Overbrook Junior High School of the Lower Camden County Regional High School District Number 1 (NJ). The students were classified either Emotionally Disturbed, Perceptually Impaired or Neurologically Impaired. The students in the study were divided into three groups: those currently receiving SI (CSI) and are mainstreamed in all four of the core academic subject areas; those who previously received SI (PSI) and are mainstreamed in three of the subject areas and only receive resource room instruction; and those who never received SI (NSI) and are mainstreamed in two of the subject areas and only receive resource room instruction. The significance of this study is that SI provides another venue for students with a disability to be educated in the least restrictive environment and be mainstreamed with other students. Departing from the traditional SI model, the following modifications were made to the delivery of the SI program: (1) due to state regulations the SI leader in this study was a certified teacher of disabilities for grades N-12; (2) SI participants were limited to the "at-risk" students with a disability; and (3) due to state regulations the SI groups were limited to no larger than five students. The researcher noted that a common characteristic of SI for traditional college students and the high school students with a disability is that both populations had varying academic ability levels. The CSI students most of the time received higher final course grades than the PSI group, which in turn generally received

higher grades than the NSI group. Interviews with parents suggested high satisfaction with the SI program and favored it over the resource room instruction. Students also requested assistance more during the SI sessions than during the resource room instruction. The researcher suggested that the smaller size of the SI sessions in comparison with the resource room instruction was less threatening for students to reveal their needs.

Perrone-Saneski, C. (1984, May 13). Course sharpens freshmen's reasoning skills. *Troy Times Newspaper*, Troy, NY, p. 1.
This newspaper article provides an overview of the Supplemental Instruction (SI) program. The article contains an interview with Deanna Martin, SI's creator. According to Martin, as many as 50 percent of college freshmen do not have the learning skills necessary to understand their coursework since they lack advanced reasoning skills. Martin was in Albany, NY presenting a seminar sponsored by the ACT National Center for the Advancement of Educational Practices concerning the use of SI in improving academic performance of students.

Peters, C. B. (1990). Rescue the perishing: A new approach to Supplemental Instruction. In *The Changing Face of College Teaching* (pp. 59-68). San Francisco, CA: Jossey-Bass, Inc. (ERIC Document Reproduction Service No. ED344539).
This chapter describes an experiment of providing an a modified version of the Supplemental Instruction program at the University of Rhode Island (Kingston, RI). The author is an associate professor of sociology and anthropology. Rather than hiring student SI leaders to facilitate the SI sessions, the course professor performs the task. According to the author, these out-of-class sessions appear similar to ones facilitated by student leaders. Participating students report satisfaction with the sessions.

Phillips, K. (Ed.). (2001). *Proceedings of the First National Conference on Supplemental Instruction/VSI* Kansas City, MO: Center for Academic Development, University of Missouri-Kansas City.
This set of conference proceedings provides an overview to the First National Conference on Supplemental Instruction/VSI here in Kansas City, MO in May 1999. Articles include: SI, an effective program within student affairs, Edit Kochenour and Kenneth Roach; Get creative, working with SI data, Jeanne Wiatr and Barbara Stout; SI supporting quality in higher education in the United Kingdom, Jenni Wallace; Managing an expanding program or SI empire, Valeric Merriwether; Supplemental Instruction with math study skills templates, Paul Nolting and Kimberly Ruble; SI down under, Australian innovations, Martin Murray; Distance PALS in real and virtual classes, Judith Couchman; SI leadership and personal grown, a South African perspective, Linda Smith; Discipline-specific SI strategies for writing, Sandra Zerger; VSI, partnerships, and the transformation of education in South Africa, Paul Du Plooy and Cathy Clark; and SI leaders, the real winners, Maureen Donelan.

Phillips, K. (1995). *Supplemental Instruction in Australia.* Unpublished manuscript, The University of Missouri-Kansas City.
This report records the observations by a staff member from the National Center for Supplemental Instruction (SI) located in Kansas City, MO during her professional

development leave in Australia in the first half of 1997. The author records her observations concerning the SI programs operating at Queensland University of Technology, University of Southern Queensland, and the University of Western Sydney-Nepean. Some of the adaptations of the SI model frequently used with Australian higher education include: use of multiple SI leaders in a single class, SI leaders work in pairs during SI sessions, and the SI program is usually decentralized on campus. Often the course lecturer selects, hires, trains, evaluates, and supervises the SI leader. This administrative procedure encourages higher involvement of the lecturer in the SI program. A drawback mentioned by the author is that this responsibility is added due to heavy work demands placed upon the lecturer for other responsibilities. There is continuing discussion with Australian educators regarding the strengths and challenges with a decentralized SI administrative structure.

Pollock, K. (2005, March 1). Tracking D, F, and W students could bring at-risk students, classes to light. *Enrollment Management Report,*
Supplemental Instruction (SI) is identified as an effective program for increasing academic success of at-risk students.

Potts, S. A. K. (1998). Impact of mixed method designs on knowledge gain, credibility, and utility of program evaluation findings [Dissertation, Arizona State University, 1998]. *Dissertation Abstracts International, 59*(06), 1942A.
This dissertation study attempted to understand the relationship between evaluation approach and the perceived knowledge gain, credibility, and utility of findings. Specifically, the researcher investigated whether or not quantitative, qualitative, and mixed-method evaluations produced different kinds and amounts of knowledge gain, different levels of credibility, or suggested different types of use. To investigate this question, the researcher selected a group of consumers of evaluations, presented them with three simulated evaluation case summaries, and interviewed them for their reactions. Participants included ten administrators from academic success and student service programs at Arizona State University. The evaluation case summaries were of a study counseling center, a summer transition program, and a Supplemental Instruction (SI) program. Each summary highlighted the evaluation's purposes, research questions, data collection methods, findings, conclusions, and recommendations. Participants ranked the mixed-method summary the highest in knowledge gain because it portrayed the most comprehensive picture of program participants, processes, and outcomes. The mixed-method summary was ranked the highest in credibility because it allowed participants to experience the program through the eyes and voices of the students. Participants also ranked the mixed-method summary the highest in utility since it prepared them for such internal administrative responsibilities such as strategic planning, high stakes decision-making, and programmatic improvement. Even though SI was not the primary focus of this study, the findings illustrate the need for careful evaluation of SI programs. The research suggests that SI program administrators should use the mixed-method evaluation system to provide the most helpful and convincing data for policy makers.

Price, M., & Rust, C. (1994). Introducing Supplemental Instruction in business courses in a modular programme. In C. Rust, & J. Wallace (Eds.), *Helping students to learn from*

each other: Supplemental Instruction, SEDA Paper 86 (pp. 31-36). Birmingham, England: Staff and Educational Development Association.
Oxford Brookes University in the United Kingdom is using the Supplemental Instruction program in the School of Business. SI was implemented with larger business courses (400 to 500 students) to enhance the learning environment for the students enrolled in these elective courses that are outside their field of study. Rather than paying the SI leaders, they were given academic credit for the experience. The research studies of students enrolled in the targeted courses suggested a positive correlation ($p < .05$) between SI participation (two or more times) and higher final course grades (Introduction to Business, 61.4 percentile vs. 56.2 percentile for non-SI participants; Managing Concepts, 60.7 vs. 54.6; and Changing Environment of Business, 56.6 vs. 46.2) . The SI participants attracted a higher percentage of female and older students than represented in the total class.

Price, M., & Rust, C. (1995). Laying firm foundations: The long-term benefits of Supplemental Instruction for students in large introductory courses. *Innovations in Education and Training International, 32*(2), 123-130.
This article contains the results of the use of Supplemental Instruction (SI) to support student learning in business modules at Oxford Brookes University in the United Kingdom. The courses were selected due to their large size and the need to ensure mastery of course material that was prerequisite for the next course in the sequence. Quantitative and qualitative studies in 1993-94 suggest that SI was beneficial in increasing mean final course grades in the courses supported by SI (Introduction to Business: 61.4 percentile for SI participants vs. 56.2 percentile for non-SI; Managing Concepts: 60.7 vs. 54.6; Changing Environment of Business: 59.6 vs. 46.4). Further analysis showed that there was no correlation between entry qualifications and performance in the classes. In comparison with non-SI participants, former SI participants earned mean final course grades that were higher in subsequent courses in the business sequence that did not have SI support provided (54.9 percentile for former SI participants vs. 48.8 percentile for former non-SI). This finding was confirmed through interviews with students who reported using learning strategies from SI sessions in other classes. This suggests that SI provided transferable benefits for additional courses in the sequence.

Pryor, S. A. (1990). The relationship of Supplemental Instruction and final grades of students enrolled in high-risk courses [Dissertation, Western Michigan University, 1989]. *Dissertation Abstracts International, 50*(07), 1963A. (University Microfilms, No. 8923554).
The purpose of this doctoral dissertation research study was to determine if there was a significant relationship between attendance at Supplemental Instruction (SI) and final course grades. Unlike some other studies that included SI leaders who were graduate students, community persons, or faculty members, this study only examined SI sessions that were facilitated by undergraduate students. The three science courses at Western Michigan University studied were Animal Biology, Plant Biology, and Introduction to Physics. Attendance at SI was significantly related to final course grades (4.0 grade point scale: 2.64 for SI participants vs. 2.27 for non-SI participants, $p< .002$), and students who attended SI earned significantly higher final course grades than students

who did not attend SI. Even when final course grades were adjusted for composite ACT score, the SI group maintained the half letter grade positive difference. There was also a significant difference in the grade distribution of students who attended SI and students who did not attend SI. The rate of D, F and course withdrawals much significantly lower for the SI group (25% vs. 39%, $p < .05$). There was a positive correlation between higher levels of SI attendance and higher mean final course grades. Students who attended three or more SI sessions earned a full letter grade higher than the non-SI group (adjusted mean final course grades: zero SI attendance, 2.27; attended SI once or twice, 2.45; attended three to six SI sessions, 3.07; and attended SI sessions seven or more times, 3.10).

Quinn, K. B. (1990). Retaining undergraduates and training graduates: A variation on Supplemental Instruction in a College Biology class. *Selected Conference Abstracts of the 14th Annual Conference of the National Association for Developmental Education* (pp. 48-49). Chicago, IL: National Association for Developmental Education.
This article described a retention program based on a variation of the Supplemental Instruction (SI) model piloted in the Academic Skills Program at the University of Illinois at Chicago. SI leaders were graduate students enrolled in the Masters of Teaching Science program at the university. The intent of the pilot program was not only to increase the academic performance of students and the number of students who completed Biology 102 -- one of the most difficult courses for non-majors at the university -- but also to provide a training experience for graduate students who were going into teaching science in the public schools and the community colleges. Research suggests that freshmen SI participants earned higher mean final course grades (3.23 vs. 2.90). Students who attended SI six or more times during the academic term received no lower than a final course grade of B. There was a positive correlation between SI attendance and higher grades (zero to five point scale): attended one SI session, mean final course grade of 3.16; attended two to five, 3.56; attended six to ten, 4.50; attended eleven to twenty-seven, 4.00.

Ramirez, G. M. (1997). Supplemental Instruction. *Proceedings of the 13th and 14th Annual Institutes for Learning Assistance Professionals: 1992 and 1993* (pp. 78-91). Tucson, AZ: University Learning Center, University of Arizona. Retrieved July 1, 2004, from http://www.pvc.maricopa.edu/~lsche/proceedings/923_proc/923proc_ramirez.htm
This article provides a basic overview of Supplemental Instruction (SI). Data is reprinted from a 1983 research study by Drs. Martin and Blanc on the effectiveness of SI. The SI program was customized at California State University, Long Beach to more effectively target first-generation and economically-disadvantaged students for service. Participating students attended SI sessions on a weekly basis and received academic credit. Research studies from 1990 suggest that students from less academically-prepared backgrounds benefitted twice as much as traditional students who attended SI. Results were highest in SI sessions where the SI leader emphasizes both content mastery and development of critical thinking/study skills in comparison with SI leaders who focused primarily on mastery of the academic course material.

Ramirez, G. M. (1997). Supplemental Instruction: The long-term impact. *Journal of Developmental Education, 21*(1), 2-4, 6, 8, 10, 28.

This study addresses two questions about the impact of Supplemental Instruction (SI) on students in a large urban university (California State University, Long Beach): what academic performance benefit is realized beyond the target course supported by SI, and whether SI participation strengthens the persistence patterns of particular student populations. A unique feature of the SI program at Long Beach is that students enroll for a one-unit prebaccalureate class to gain admission to SI sessions. In this way SI becomes a part of the student's weekly schedule and student participation is higher than programs where SI attendance is voluntary. Participants from various student groups were tracked for a period of 8 semesters beginning in Fall 91, and their performance and retention patterns were compared with those of control peer groups of nonparticipants. SI was found to have essentially an immediate impact (grade range: 4.0 to 0.0; target course: 2.86 vs. 2.27 and semester GPA: 2.77 vs. 2.49) on traditional students; however, it has a substantial impact on both performance [2.52 vs. 1.82] and retention [70% vs. 51%] for special-admit students and a definite benefit for underrepresented/underprepared students. Low motivated students, as evidenced by their prior college performance, maintained consistent improvement after SI participation.

Ramming, V. (1989, Fall). Supplemental Instruction: A proactive frontloading model. *New Jersey Association of Developmental Educators Newsletter,* 1.
This newsletter article provides an overview of the Supplemental Instruction (SI) program.

Reeve, A. (1989, August). Different approach to tutoring: Supplemental Instruction. *Aspirations: Association of Special Programs in Region Eight Newsletter, 2*, 1.
This newsletter article provides an overview of the Supplemental Instruction (SI) program with advantages of the SI model in comparison with traditional tutoring.

Reittinger, D. L., & Palmer, T. M. (1996). Lessons learned from using Supplemental Instruction: Adapting instructional models for practical application. *Research and Teaching in Developmental Education, 13*(1), 57-68.
This article describes the use of Supplemental Instruction to increase student academic achievement. A research study suggests that SI contributed to higher mean final course grades in an introductory psychology course (Psychology 110) over five semesters in seven sections. Several lessons learned included: SI provides professional development opportunities for the SI leader; SI attend may be negatively affected if the SI leader quits attending the class lecture sessions; students will not attend SI if the scheduled times are inconvenient; and requiring students to attend 90 percent of the SI sessions to receive extra academic credit from the course instructor results in less than ten percent of the students choosing to attend at that level.

Rich, C. E., Williford, A. M., & Kousaleous, S. L. (1997). Supplemental Instruction at Ohio University: Improving student performance. In P. L. Dwinell, & J. L. Higbee (Eds.), *Developmental Education: Enhancing student retention* (pp. 37-44). Carol Stream, IL: National Association for Developmental Education.
This study of student performance compared final course grades of students who attended Supplemental Instruction (SI) study sessions with grades of those who did not

attend SI study sessions during the period of Fall 1993 through Spring 1995. Results indicated that, with gender and aptitude controlled, students who attended SI study sessions generally finished the targeted course with higher grades than students who did not attend, and that frequent attendees completed courses with final course grades that were generally higher than infrequent or non-attenders. Students who most need academic support, as identified by lower aptitude scores, comprised a majority of attenders. Poor performance, early withdrawal, and failure rates were lower among SI attenders than among non-attenders for most courses in which SI was offered.

Richardson, S. (1994). How Supplemental Instruction came to Britain. In C. Rust, & J. Wallace (Eds.), *Helping students to learn from each other: Supplemental Instruction, SEDA Paper 86* (pp. 15-16). Birmingham, England: Staff and Educational Development Association.
The author describes the role of Dennis Congos -- a Certified SI Trainer -- in introducing the Supplemental Instruction model at Kingston University in the United Kingdom.

Richter, A. M., & Augdahl, J. (2003). Supplemental Instruction for introductory chemistry courses at North Dakota State University. *Abstracts of Conference Papers for the 225th American Chemical Society National Meeting* (p. CHED-292). Washington, D.C.: American Chemical Society. For more information, contact the authors at the Department of Chemistry, North Dakota State University, Fargo, ND 58105, amy.richter@nodak.edu.
Supplemental Instruction (SI) is used at North Dakota State University to support students enrolled in challenging introductory chemistry courses.

Rizvi, T. (1997, June 16). Law students give each other help, reduce failure rate. *Campus Report: The University of Dayton Newspaper*, Dayton, OH, p. 1.
This newspaper article describes the use of an academic support program modeled after Supplemental Instruction (SI) with first-year law students at the University of Dayton (OH). Interviews with faculty members and students emphasized that the program was not about students being underprepared, rather it was to help students bridge into a different learning style. The failure rate for students of color involved in the program have dropped from 30 percent three years ago to 6.5 percent last year. The article also contains an interview with David Arendale from the University of Missouri-Kansas City where the SI program has been used for five years in the UMKC School of Law with similar positive results.

Rizvi, T. (1988, September 23). Study with a buddy: Supplemental Instruction fills the learning gap. *Campus Report: The University of Dayton Newspaper*, Dayton, OH, p. 1.
This newspaper article describes the use of Supplemental Instruction (SI) in ECO 203 Microeconomics and ECO 204 Macroeconomics at the University of Dayton (OH).

Rockefeller, D. J. (2003). An online academic support model for students enrolled in Internet-based classes [Dissertation, University of North Texas, 2000]. *Dissertation Abstracts International, 63*(09), 3095.
This doctoral dissertation from the University of North Texas describes a research study that examined the effectiveness of an experimental Supplemental Instruction (SI)

program that utilized computer-mediated communication (CMC) rather than traditional SI review sessions. During the Spring 1999 semester, six sections of an introductory computer course were offered via the Internet by a suburban community college district in Texas. Using Campbell and Stanley's Nonequivalent Control Group model, the online SI program was randomly assigned to four of the course sections with the two remaining sections serving as the control group. The students hired to lead the online review sessions participated in the traditional SI training programs at their colleges, and received training conducted by the researcher related to their roles as online discussion moderators. Following recommendations from Congos and Schoeps, the internal validity of the groups was confirmed by conducting independent t-tests comparing the students' cumulative credit hours, grade point averages, college entrance test scores, and first exam scores. The study's four null hypotheses were tested using multiple linear regression equations with alpha levels set at .01. Results indicated that the SI participants earned better course grades even though they had acquired fewer academic credits and had, on average, scored lower on their first course exams. Both the control group and the non-SI participants had average course grades of 2.0 on a 4.0 scale. The students who participated in at least one SI session had an average final course grade of 2.5, exceeding their previous grade point average of 2.15. Participation in one SI session using CMC was linked to a one-fourth letter grade improvement in students' final course grades. Although not statistically significant, on the average, SI participants had slightly better course retention, marginally increased course satisfaction, and fewer student-initiated contacts with their instructors.

Rodriguez, C. (2001, September 20). Southern Illinois University hopes new kind of teaching will make more students stay. *Daily Egyptian*, Carbondale, IL,
This newspaper story describes the use of Supplemental Instruction (SI) at Southern Illinois University-Carbondale. Several students are interviewed for the story about the positive benefits of attending SI sessions.

Romoser, M. A., Rich, C. E., Williford, A. M., & Kousaleous, S. L. (1997). Supplemental Instruction at Ohio University: Improving student performance. In P. L. Dwinell, & J. L. Higbee (Eds.), *Developmental Education: Enhancing student retention* (pp. 37-44). Carol Stream, IL: National Association for Developmental Education. Retrieved July 1, 2004, from http://www.nade.net/documents/Mono97/mono97.4.pdf
This study of student performance compared final course grades of students who attended Supplemental Instruction o(SI) study sessions with grades of those who did not attend SI study sessions during the period of Fall 1993 through Spring 1995 at Ohio University (Athens, OH). Results suggested that, with gender and aptitude controlled, students who attended SI study sessions generally finished the targeted course with higher grades and lower rates of withdrawal than students who did not attend, and that frequent attenders (five or more times per academic term in one course) completed courses with final course grades that were generally higher than moderate (two to four times) infrequent (one time only) or non-attenders. For example, during Fall 1994 the following results occurred for higher aptitude students: non SI, 2.55; infrequent, 2.55; moderate, 2.73; and frequent, 2.95. For lower aptitude students for the same academic term: non SI, 1.94; infrequent, 2.09; moderate, 2.27; and frequent, 2.41. Through student evaluations three factors emerged that influenced student attendance: (1)

course content must be perceived as challenging, but manageable; (2) cooperating faculty member must endorse both the SI program, SI leader, and encourage students to attend SI; and (3) students must have some understanding of what SI is and what to expect at a study session. A locally-produced SI introductory video has been a helpful promotional took, second only to participant endorsements.

Ross, T. (1995). *Report on Peer Assisted Study Sessions conducted in visual arts, second semester 1995: AASB726, Introduction to Art History*. Unpublished manuscript, Queensland University of Technology, Brisbane, Queensland, Australia. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This report discusses the use of Peer Assisted Study Sessions (PASS), the local institutional name for the Supplemental Instruction (SI) program with students enrolled in an Introduction to Art History course (AAB726). For several reasons, the grades of PASS and non-PASS students were nearly the same. The author suggests that part of the difficulty for the PASS program was that the PASS leaders did not attend class along with the other students. The course curriculum had undergone a significant change between when the PASS leaders attended the same class and when they attempted to provide academic assistance to the students. However, surveys found that PASS leaders found the experience very helpful: improved interpersonal skills (100%); improved learning skills (100%); developed facilitating skills (100%); and developed leadership skills (100%).

Rust, C., & Price, M. (1994). Improving students' skills through Supplemental Instruction. *Proceedings of the 2nd International Symposium on Improving Student Learning* (pp. 386-395). Oxford, England: Oxford Centre for Staff Development.
Oxford Brookes University in the United Kingdom is using the Supplemental Instruction program in the School of Business. SI was implemented with larger business courses (400 to 500 students) to enhance the learning environment for the students enrolled in these elective courses that are outside their field of study. Rather than paying the SI leaders, they were given academic credit for the experience. The research studies of students enrolled in the targeted courses suggested a positive correlation ($p < .05$) between SI participation (two or more times) and higher final course grades (Introduction to Business, 61.4 percentile vs. 56.2 percentile for non-SI participants; Managing Concepts, 60.7 vs. 54.6; and Changing Environment of Business, 56.6 vs. 46.2).

Rust, C., & Wallace, J. (Eds.). (1994). *Helping students to learn from each other: Supplemental Instruction*. Birmingham, England: Staff and Educational Development Association.
This monograph provides a comprehensive review of Supplemental Instruction in the United Kingdom: overview of SI; background of introduction of SI; use of SI for staff and faculty development; benefits of SI for both the students and the SI leaders; statistical research reports; and eight case studies illustrating the experience of implementing SI into British higher education courses.

Ruth, D. (1987, March 7). Education bill helped economy. *The Times Picayune*, LA, p. A-18.
This newspaper article mentions that Supplemental Instruction (SI) is being used at the University of New Orleans with introductory courses in business administration, sociology and Afro-American culture. In these classes students are passing the courses at a rate of 73 percent. Before introduction of SI the pass rate was less than 50 percent.

Rye, P. D., & Wallace, J. (1994, March). Helping students to learn: Supplemental Instruction. *Student British Medical Journal, 2*, 79-80.
This short article provides an overview of Supplemental Instruction and its use with medical students.

Rye, P. D., & Wallace, J. (1994). Supplemental Instruction: A peer-group learning program for medical undergraduates. *Nordisk Medicin, 109*(11), 307.
This article describes the use of Supplemental Instruction (SI) with Norwegian undergraduate medical students. Various benefits of SI are described for the session participants: study strategies, life-long learning skills, and working in learning teams with other students.

Rye, P. D., Wallace, J., & Bidgood, P. (1993). Instructions in learning skills: An integrated approach. *Medical Education, 27*(6), 470-473.
The transition from school to university education and a medical school environment can be difficult for even the very best students. The article suggests that Supplemental Instruction (SI) would be useful to improvement academic performance of these students. Research studies from Kingston University (Surrey, England) in Computer Science, Electronics and Engineering are cited to suggest the Supplemental Instruction would also be helpful for medical students (62.3 percentile vs. 54.2 percentile for non-SI participants).

Sandmann, B. J., & Kelly, B. K. W. (1979). *Effect of Supplemental Instruction on student performance in a Pharmaceutics course*. Unpublished manuscript, The University of Missouri-Kansas City.
This investigation sought to determine if Supplemental Instruction (S) would effect student performance in a physical pharmacy course at the University of Missouri-Kansas City. Mean scores on pretest, quizzes, first, second, and final examinations for the two groups (SI and non-SI participants) were compared by conducting a t-test. While scores for the non-SI group remained relatively constant, the SI participant group's academic performance improved throughout the academic term.

Saunders, D. (1992). Peer tutoring in higher education. *Studies in Higher Education, 17*(2), 211-218.
This article describes the development of peer tutoring programs at many institutions in the United Kingdom. Supplemental Instruction (SI) is one of the programs that is being implemented in higher education institutions. Lecturers are being asked to experiment with a greater variety of teaching and learning strategies which complement the lecture tradition. The use of SI at Kingston Polytechnic is mentioned. The benefits of tutoring programs for the tutors are described.

Saunders, D., & Gibbon, M. (1998). Peer tutoring and peer-assisted student support: Five models within a new university. *Mentoring and Tutoring, 5*(3), 3-13.
This article describes the use of Supplemental Instruction (SI) -- called Peer Assisted Student Support (PASS) by the local institution -- in the Business School at the University of Glamorgan in Glamorgan, Wales, United Kingdom. SI has been offered in the School of Applied Sciences since 1991. It is called PASS within the Business School. Most of the PASS group facilitators are volunteers and have previously been participants in groups when they were first year students. Positive reports from facilitators included: satisfaction gained from being able to positively help their peers, improved self-confidence, better communication and oral presentation skills as a result of running sessions, and being able to strengthen their job resume. The author identified several challenges with the PASS scheme: student attendance was erratic due to perceived time conflicts of students; difficulty to maintain the voluntary program as committed PASS facilitators graduated and new leaders needed to be recruited to take over responsibilities.

Sawyer, J. (1990, October 26). University of Missouri involved in project with South Africans. *St. Louis Post-Dispatch*, St. Louis, MO, p. 15.
This newspaper article provides an overview of the Supplemental Instruction (SI) program as it is being implemented at the University of the Western Cape (UWC) in Cape Town, South Africa. The article reports on trips by UMKC's Larry De Buhr who went to UWC in 1987 and 1989 to help introduce the SI program.

Sawyer, S. J., Sylvestre, P. B., Girard, R. A., & Snow, M. H. (1996). Effects of Supplemental Instruction on mean test scores and failure rates in medical school courses. *Academic Medicine: Journal of the Association of American Medical Colleges, 71*(12), 1357-1359. Correspondence and requests for reprints should be addressed to Dr. Snow, University of Wisconsin Medical School, Dean's Office, 1142 Medical Sciences Center, 1300 University Avenue, Madison, WI 53706-1532.
The purpose of the research study was to determine whether Supplemental Instruction (SI) offered to first-year medical students reduces the number of examination failures. The SI program -- locally called the Medical Scholars Program (MSP) -- was offered at not cost to all first-year students at the University of Southern California School of Medicine in 1994-95. SI sessions were offered in biochemistry, gross anatomy, microanatomy, and physiology. Mean test scores and failure rates for students considered academically at risk and those not at risk were compared between the class entering in 1994 and the classes matriculating during the preceding three years. Since 85% of students elected to participate in the SI program, it was necessary to compare performance to previous academic terms rather than the non-SI group which was so small as to make same academic term comparisons difficult. At-risk students were defined as those with a total Medical College Admission Test score below 26 and a science grade-point average below 3.0. Comparisons were performed using two-tailed t-tests and chi-square tests. Statistically significant increases in mean test scores were achieved on most examinations by the class exposed to SI. Failure rates for at-risk students decreased by 46% during the year the SI program was offered. The authors listed other outcomes from the SI program: strengthened study strategies that could be used in other courses; students identified gaps in his or her knowledge in advance of

examinations; enhanced cooperative rather than competitive interaction with colleagues; hastened development of class camaraderie by broadening the student's circle of friends since they were randomly assigned to the SI groups; and increased student morale and self-esteem since the students experienced less academic failure. SI leaders reported the following benefits of the SI program for themselves: reviewed first-year material in the SI courses which helped them prepare for both the second-year courses and for Step 1 of the United States Medical Licensing Examination.

Schaefer, S., & Hopper, J. (1991). Successful funding and implementation of a biology adjunct. *Journal of College Reading and Learning, 24*(1), 55-62.
This article describes the use of Supplemental Instruction (SI) in an introductory course in biology -- BIO 90, Diversity of Life -- at the University of California, Irvine. SI is offered as a non-credit class that accompanies a specific course. The authors describe the process for gaining support to provide the program: contact with counselors, administrators, and faculty; identified the historically difficult course that needed assistance; wrote a grant proposal; and conducted a pilot test of SI with a limited number of students. Results of the program included: positive relationship between attendance in SI and final course grade; statistically significant positive change ($p < .01$) from pre- to post-test performance on the Nelson Denny Reading Comprehension Subtest; post-tests in writing showed that students were more likely to answer essay questions with correct answers in complete sentences; and for all the items on the self-assessment of reading, writing, and thinking skills there was a positive, and statistically significant change.

Schecker, F. (1982, March 29). Program gives boost to students. *The Kansas City Star Newspaper*, Kansas City, MO, p. 3A.
This newspaper article provides an overview of the Supplemental Instruction program at the University of Missouri-Kansas City.

Schuldt, G. (1991, May 15). Group tutoring program a success. *Milwaukee Sentinel Newspaper*, Milwaukee, WI, p. 10.
This newspaper article describes the use of Supplemental Instruction (SI) at Milwaukee Area Technical College (WI). Some of the courses that SI is offered include Intermediate Algebra, Introduction to Human Services, Oral Anatomy, Introduction to Occupational Therapy and nine other courses. Data from two courses was reported in the newspaper article. SI participants earned higher mean final course grades than non-SI participants: Oral Anatomy (3.0 vs. 2.2) and Introduction to Occupational Therapy (3.5 vs. 2.3).

Schuss, D. G. (1999, May 30). Many top college students use tutors to keep an edge: Study sessions aren't just for catching up. *The Boston Globe*, Boston, MA, p. D5.
This newspaper article describes the use of Supplemental Instruction (SI) and other forms of academic assistance at highly-selected post secondary institutions such as Worcester Polytechnic Institute, Harvard University, Wellesley College, Dartmouth College, Salem State College, and University of Massachusetts/Amherst. Interviews with campus administrators and students suggested the following reasons for interest in SI and other forms of academic enrichment: maintain top class rankings, improve study

strategies, understand class lectures from another perspective, and to improve student persistence towards graduation.

Schwartz, E. B. (1997, December). Program helps students make the grade. *Key Magazine,*
This short article provides an overview of the Supplemental Instruction (SI) program. The author is the Chancellor the University of Missouri-Kansas City, home of the SI program.

Schwartz, M. D. (1992). Study sessions and higher grades: Questioning the causal link. *College Student Journal, 26*(3), 292-299.
This article contains a data study of the use of Supplemental Instruction (SI) in a large sociology course at Ohio University (Athens, OH). While the study did not reveal statistical significance between SI attendance and final course grade, the students who attended the SI sessions tended to have fewer unexcused absences in the course. In turn, a higher number of unexcused absences was associated with lower course grades.

Sevos, S. (1991). *The effects of Supplemental Instruction on a developmental mathematics course*. Unpublished Master's of Science (M.S.) thesis, Kean College of New Jersey. Available: Interlibrary loan from Kean College of New Jersey.

Shaya, S. B., Petty, H. R., & Petty, L. I. (1993). A case study of Supplemental Instruction in biology focused on at-risk students. *BioScience, 43*(10), 709-711.
The effects of Supplemental Instruction (SI) in Basic Biology I course at Wayne State University (MI) is examined by studying the academic performance of academically at-risk students (low high school grade-point average, low ACT standardized test scores). The SI sessions were open to all students in the course. About 25 percent of the traditional admit students and 40 percent of the at-risk students voluntarily participated in SI sessions during the academic term. The data suggests that SI contributed to higher mean final course grades for SI participants (2.9) vs. nonparticipants (2.4). A separate analysis was conducted to compare the academic performance of at-risk students. At-risk SI participants received higher mean final course grades (2.65 vs. 1.31) and had a higher course completion rate (90 percent vs. 32 percent). To attempt to control for student motivation level, an analysis was conducted of high school grade point averages and ACT scores for SI and non-SI participants among the at-risk students. No significant differences were found. A second analysis for student motivation considered intrasemester SI entry. At-risk students who began to attend SI later in the academic term earned higher mean final course grades than at-risk students who chose not to attend SI. The data suggests that SI participation contributed to the majority of the variance concerning higher mean final course grades.

Shores, P., & Tiernan, J. (1996). *Peer mentor training: A collaborative exercise in systemic change*. Unpublished manuscript, University of Western Sydney at Nepean, New South Wales, Australia. Available: Ms. Penny Shores, Counseling and Health Unit, University of Western Sydney, Nepean, P. O. Box 10, Kingswood New South Wales 2747, Australia.

The Learning Center and the Counseling and Health Unit of the University of Western Sydney (Nepean, Australia) have been piloting a Peer Mentor program that is based on the American Supplemental Instruction (SI) program. The SI program is being used an a tool for systemic intervention at the institution by creating an environment for students to change their attitudes. The SI program is being used to serve the increasingly diverse population at the university. Much of the report centered on the training of the SI leaders. Some faculty members also report using the SI program as a feed back mechanism to identify the comprehension level of the students regarding the classroom lectures.

Simpson, M. L., Hynd, C. R., Nist, S. L., & Burrell, K. I. (1997). College academic assistance programs and practices. *Educational Psychology Review, 9*(1), 39-87. Correspondence should be directed to Michelle L. Simpson, Division of Academic Assistance, University of Georgia, Athens, GA 30602.
This comprehensive article provides an overview to academic assistance for college level learning tasks. After examining four critical issues confronting all academic assistance programs (Should generic or content-specific skills be taught? How can transfer be promoted? What is the role of task and context? What is the role of motivation in self-regulated learning?), the authors examined the goals, assessment procedures, salient features, and program evaluation methods of four prevalent program models: learning to learn course, Supplemental Instruction (SI), required programs for underprepared students, and integrated reading/writing courses. After providing an overview of the SI model, the authors point out that embedded strategy instruction (modeling of study strategies) is a major feature that distinguishes it from many other systems since they employ a direct instructional procedure to teach study skills. The authors concluded by outlining suggestions for future research (e.g., include both descriptive and experimental paradigms, investigate long-term effects, collect both product and process data, seek linkages across disciplines) and by listing specific questions that college students need to ask about the programs at their institutions.

Simpson, S. (1994, February 23). How to learn by example. *The Scotsman Education*, Glasgow, Scotland, p. 22.
This newspaper article describes the use of Supplemental Instruction (SI) at Glasgow Caledonian University in Scotland. The local name for the SI program is Peer Assisted Study Sessions (PASS). The article contained interviews with several students who mentioned some of the benefits of the SI program: filled gaps in knowledge; develop strategies to work out their own answers; provided a transition into difficult courses; encouraged students to form their own study groups in other classes were SI was not offered; and helped to deal with the high volume of material.

Smit, D. (1996). *A student's attitude towards skills, adjustment and performance, and the role of Supplemental Instruction*. Unpublished Bachelor of Arts' Thesis, University of Port Elizabeth, Republic of South Africa. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This thesis paper examines the use of Supplemental Instruction (SI) at the University of Port Elizabeth (South Africa). A qualitative research design was employed to study the

outcomes of the SI program with students regarding attitudes toward skills, adjustment, and performance. The subject of the study was a first year chemistry student. The researcher noted that since SI is a student-driven activity, some academic skills are emphasized based on SI participant interest.

Smith, J. (1998, September 4). UTA peer program has students helping each other. *Dallas Morning News*, Dallas, TX, p. 6A.
This newspaper article indicates that Supplemental Instruction (SI) is being used at the University of Texas at Arlington.

Smith, L. D. (1999). SI leadership and personal growth: A South African perspective. In *Proceedings of the First National Conference on Supplemental Instruction and Video-based Supplemental Instruction* (pp. 47-53). Kansas City, MO: Center for Supplemental Instruction, University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, Kansas City, MO 64110.
Many first year students at South African tertiary institutions come from a disadvantaged educational background. They tend to be passive learners and rely on rote memorization rather than understanding. This leaves many ill equipped for the demands of higher education. Although SI provides academic support, its emphasis on students' identifying problems, finding answers and taking responsibility for their learning requires a significant change in approach for both participants and the SI leader. This study documents the benefits of working as an SI leader. Initial attitudes are compared with those developed in the course of a year, by mans of a questionnaire covering self-confidence, self-efficacy, identification with institution, class participation and relationship with lecturers. The personal growth of SI leaders is also compared with that of a group of non-SI cohorts. Employers' perceptions of the responsibility, initiative, creativity and reliability of SI and non-SI graduates are documented.

Snyders, A. J. M. (1999). Foundation mathematics for diversity: Whose responsibility and what content? *The challenge of diversity: Proceedings of the Delta '99 symposium on undergraduate mathematics* (pp. 200-205). Whitsunday Coast, Australia: Retrieved July 1, 2004, from http://www.sci.usq.edu.au/staff/spunde/delta99/papers/snyders.pdf
This article describes the issues facing the University of Port Elizabeth in South Africa regarding instruction in foundation mathematics for an increasing diverse student body. Video-based Supplemental Instruction (VSI) and Supplemental Instruction (SI) have been implemented as part of a comprehensive approach. An extensive review of the professional literature concerning mathematics instruction composes the majority of the article.

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been implemented as part of a comprehensive approach. An extensive review of the professional literature concerning mathematics instruction composes the majority of the article.

Sollerman, J., & Näslund, M. (2003). *Implementation of Supplemental Instruction at the Department of Astronomy- A preparatory study.* Unpublished manuscript, Department of Astronomy, Stockholm University, Sweden. Retrieved July 1, 2004, from http://www.pu.su.se/pdf/purapporter/pu2003-1.pdf
This report describes a plan to implement Supplemental Instruction (SI) as a new pedagogical tool at the Department of Astronomy in Stockholm University, Sweden. The report is written for the second phase of the course Universitetspedagogik I Teorioch Praktik (University pedagogics in theory and practice), given by the unit for pedagogical development at Stockholm University. The report authors goal with this publication is to set the stage for the implementation of SI at the department by clarifying how SI can improve the current learning situation. A major objective of this report is to inform the faculty about what SI proposes to do. Due to this emphasis, the report provides a model for other colleges to consider when implementing the SI program for the first time and seeking to gain faculty support. The report also provides historical background about the development and expansion of SI within Sweden. The report concludes with an analysis of extensive surveys of students regarding their potential interest in participating with the proposed SI program.

Sommerfeld, M. (1995). Who's responsible? Taking sides on remedial classes. *Education Week, 14*(29), 1, 14.
This article discusses alternatives to traditional remedial and developmental education programs. Included in the article is a short interview with David Arendale concerning the use of Supplemental Instruction (SI) and Video-based Supplemental Instruction (VSI). One of the difficulties for first-time students is that they concentrate on the wrong things as they prepare for their first examinations.

Sowa-Jamrok, C. (1994, July 24). Smaller classes attract students. *Chicago Tribune Newspaper*, Chicago, IL, p. 17.
This newspaper article mentions that Supplemental Instruction (SI) is one of the strategies used at National-Louis University (Chicago, IL) to help students be more active when they are enrolled in large classes. Ofra Peled, who teaches biology and microbiology mentioned that one of the activities used in SI sessions is to have students write about the class lecture material. They write about a lecture concept, discuss it with a few students in a small group, and then after practicing they share about the concept in the next class lecture.

Spencer, C., & Loh, H. (1994). *Improving the learning style of first year Aboriginal & Torres Strait Islander nursing students studying anatomy*. Paper presented at the Conference of Science in Nurse Education, Ballarat, Australia. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This report describes the use in 1994 of Supplemental Instruction (SI) at Queensland University of Technology (Australia) with first year Aboriginal and Torres Strait Islander

(A&TSI) students. The local institutional name for the program is Peer Assisted Study Sessions (PASS). Many of these A&TSI students began postsecondary education with high anxiety (79% student response), low to medium confidence in passing their courses, limited knowledge of study skills, and high to moderate difficulty levels within their respective subjects. Based on qualitative research interviews with the A&TSI students, the majority reported they were more confident in passing anatomy after attending the SI sessions. Further, they reported that they were more motivated to perform better and most felt that the SI sessions helped them in developing study skills as their anxiety for the subject decreased.

Spencer, G. (1994). *Supplemental Instruction: Adapt or die?* Paper presented at the South African Association for Academic Development Conference, University of Natal, Durban, Republic of South Africa. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This unpublished manuscript describes the use of Supplemental Instruction (SI) at the University of Natal in South Africa. The SI model has been modified increasing the curriculum development focus potential of the model. Academic Development (AD) and Academic Support (AS)are seen as partners in improving teaching and learning. If AD and AS are seen as opposite ends of the learning continuum, SI is shifted toward the AD end of the continuum line in some South African institutions. Several of the modifications of the SI model include that the academic department: take ownership in administration of the SI program; faculty members take additional time to work with the SI leaders; faculty members recognize that changes need to be made regarding instructional delivery and content selection; faculty members modify their course delivery based on common themes of student comments; and key senior faculty members become highly involved in the SI program an ensuring that curriculum develop occurs.

Spencer, G., & Wallace, J. (1994). Conceptualizing Supplemental Instruction. In C. Rust, & J. Wallace (Eds.), *Helping students to learn from each other: Supplemental Instruction, SEDA Paper 86* (pp. 9-14). Birmingham, England: Staff and Educational Development Association. Retrieved June 4, 2005, from http://www.lgu.ac.uk/deliberations/seda-pubs/Spencer.html
This article places Supplemental Instruction into its appropriate role within British higher education. SI is compared and contrasted with collaborative learning, tutorials, and roles of the instructor. It is emphasized that SI focuses on the student learning process.

Spofford, T. (1990, October 1). Top students pitch in to lower dropout rates: Peer-run study groups help keep freshmen in college. *The Times Union Newspaper*, Albany, NY, pp. A1, A12.
This newspaper article provides an overview of the Supplemental Instruction (SI) program at the State University of Albany (Albany, NY), Hudson Valley Community College (Troy, NY), The College of Saint Rose (Albany, NY), Rensselaer Polytechnic Institute (Troy, NY), and Skidmore College (Saratoga Spring, NY). Some data from some of the programs and interviews with SI Supervisors and SI leaders also is included. Institutions reported a variety of compensation systems for the SI leaders. At

SUNY they receive three college credits. Most others paid an hourly wage of $5.00 to $6.00. At Rensselaer the SI leaders receive $1,100 a year, free meals, and a $500 discount on a room in the freshman dormitory.

Staff writer. (1998). 1998 exemplary programs show how six campuses address pressing issues. *NASPA Forum, 20*(2), 7-10.
The National Association for Student Personnel Administrators (NASPA) conducted a national competition to identify exemplary programs located on postsecondary campuses that meet pressing issues. The Supplemental Instruction (SI) program from the University of Missouri-Kansas City was recognized through this process. This article provides a short overview of the SI program.

Staff writer. (1993, November). Academic programme at Queensland University of Technology well supported. *The Chinese Business and Professional Association of Queensland Newsletter,* 20-21.
This newsletter article describes the use of Peer Assisted Study Strategies (PASS) at Queensland University of Technology (Brisbane, Queensland, Australia). PASS is the local institutional name for Supplemental Instruction (SI). The article cites the PASS program as one of the projects that contributed to QUT being selected as Australia's University of the Year in 1993. Benefits reported for PASS participants include reduction of the failure rate and increased student motivation and confidence. PASS leaders listed the following benefits for them: developed personal character and leadership skills, improving their own learning skills, improved their facilitating techniques, acquired group management and presentation skills, and built their self-confidence and self-esteem. Ron Gardiner and Henry Loh are cited as the early leaders of the PASS project.

Staff writer. (1993, November 1). Academic programme at QUT well supported. *The Chinese Business and Professional Association of Queensland Newsletter, 47*(66).
This newsletter article describes the use of Supplemental Instruction (SI) at the Queensland University of Technology (Brisbane, Australia).

Staff writer. (1992, July 29). College 'mini-grants' awarded. *San Jose Mercury News*, San Jose, CA, p. 3.
This newspaper article describes 14 grants that were awarded by the San Jose/Evergreen Community College District to teachers for projects to help improve classroom instruction and student services at their colleges. The grants were created to stimulate innovation and creativity, especially in the areas of staff diversity, recruitment of underrepresented groups, retention, and new technologies and enrollment reduction caused by budget restraints. Susan L. Smith received a special grant for Supplemental Instruction.

Staff writer. (1990, November 19). Education student gets SCUP of reality at Westport High. *University News (Student Newspaper of the University of Missouri-Kansas City)*, Kansas City, MO, p. 4.
The newspaper article describes the use of Supplemental Instruction (SI) with high school students enrolled in English and history classes at an urban high school in Kansas City, MO. Students from the UMKC School of Education were some of persons

who served as SI leaders. The article contains an interview with an education major who commented on the positive impact of the experience of working with high school students early in the education degree program rather until the field teaching experience in a school as an upper classman.

Staff writer. (1997, August 19). Engineering course lifts grades and retention rates. *Inside QUT (Queensland University of Technology, Australia)*, p. 2. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
Dr. Martin Murray from Queensland University of Technology in Australia is using Peer-Assisted Study Sessions (PASS) to improve student performance in engineering courses. PASS is the locally used name for the Supplemental Instruction (SI) program. PASS was one of several new additions to the course delivery system that both increased student academic achievement but also lowered the cost of instruction.

Staff writer. (1996). Georgia's HOPE: A system in transition. *Black Issues in Higher Education, 13*(15), 10-13, 16.
This article describes Georgia's HOPE (Helping Outstanding Pupils Educationally) program to improve academic success of its college students. Dr. Stephen Portch serves as Chancellor of the University of Georgia System and Atty. Juanita Baranco is Regent with the University of Georgia System. Both are interviewed in this article. Portch suggests that Supplemental Instruction (SI), with its focus on at-risk courses rather than at-risk students, allows student to earn higher grades without labeling them in the process or continuing the previous system of remedial education that retaught material from high school.

Staff writer. (1991, March 12). Making the grade: Supplemental Instruction program lets students help other students learn. *The Oscoda County Herald*, Roscommon, MI, p. 14.
This newspaper article provides an overview of the Supplemental Instruction (SI) program at Kirtland Community College (MI). Data from SI sessions in biology and chemistry during Fall 1990 suggest that SI participants earned higher mean final course grades than non-SI participants (chemistry: 2.25 vs. 1.22; biology: 2.56 vs. 1.22).

Staff writer. (1995, July 18). New learning process to help first-year University of Southern Queensland students. *The Chronicle Newspaper*, Toowoomba, Queensland, Australia, p. 8.
The newspaper article describes the use of Supplemental Instruction (SI) at the nursing department at the University of Southern Queensland in Australia. In the article Deanna Martin, creator of the SI model, provided an overview of the SI program while she was visiting the university.

Staff writer. (1989). New Mexico program targets at-risk classes. *National On-Campus Report, 17*(2), 3.
The newsletter article provides an overview of the Supplemental Instruction (SI) program as it is being implemented at the University of New Mexico in introductory chemistry and biology classes during 1988. Data suggests a half a letter grade higher final course grades for SI participants.

Staff writer. (1987). Redefining an attrition risk. *Recruitment and Retention in Higher Education Newsletter, 1*(3), 6-7.
This newsletter article provides an overview of the Supplemental Instruction (SI) program. It contains interviews with Deanna Martin, creator of the SI program, and May Garland who directs SI training workshops. Garland suggests that SI can help bridge students from developmental education into the regular courses in the curriculum.

Staff writer. (1994, June 4). SAU's tutoring gets high ratings. *Banner-News*, Magnolia, AR, p. 15.
The newspaper article mentions that Supplemental Instruction (SI) program is an important part of academic support services at Southern Arkansas University. Preliminary results from the Noel-Levitz Student Satisfaction Inventory suggested that students were very high in comparison with other institutions in the U.S. SAU was one of the institutions that participated in the national survey.

Staff writer. (1995, August 17). Sessions help students conquer classes with high failure rates. *Omaha World-Herald Newspaper*, Omaha, NE, p. 28.
This newspaper article describes the use of Supplemental Instruction (SI) at the University of Nebraska-Lincoln.

Staff writer. (1995, August 2). Students helping boost pass rates. *The University of Southern Queensland Newspaper*, Toowoomba, Queensland, Australia, p. 5.
This newspaper articles describes the implementation of Supplemental Instruction (SI) at the University of Southern Queensland at Toowoomba in the Nursing Department during Fall 1995. In addition to describing the academic benefits to the SI participants, the USQ SI coordinator, David Anderson, reports that a value for SI leaders is that the experience provides leadership development and increases their post-graduate opportunities.

Staff writer. (1994, Fall). Supplemental Instruction. *South Carolina Association of Developmental Educators Newsletter,* 3.
The newsletter article provides an overview of the Supplemental Instruction (SI) program.

Staff writer. (1997). Supplemental Instruction and minority students. *Journal of Developmental Education, 20*(3), 38.
This article describes a national research study of Supplemental Instruction (SI) with students of color. Students of color participated in SI at rates equal or exceeding those for White students (White, 33.3%; African-American, 42.0%; Hispanic-American, 50.9%; Asian-American, 33.3%; and Native-American, 42.9%). Students of color who participated in SI earned higher mean final course grades (2.02 vs. 1.55) and lower rates of D, F and withdrawal rates (36% vs. 43%) than similar students who did not.

Staff writer. (1995). Supplemental Instruction equals science success. *Recruitment and Retention in Higher Education Newsletter, 9*(8), 9.
This newsletter article describes the use of Supplemental Instruction (SI) at the University of Wisconsin. The researchers from UW studied why the teaching of science

discouraged women from pursuing academic degrees in the area. SI was cited as a supportive learning environment that was different than the one experienced in the classroom. Several suggestions for faculty members: build a comfortable classroom culture; provide collaborative learning activities; accept students' uncertainties about the content material; confirm the capacity of students to learn; and personalize science so that students see the connections between the content and their personal lives.

Staff writer. (1991, February 14). Supplemental Instruction program aims to help students earn better grades. *The Blue and White Flash: Jackson State University Newspaper*, Jackson, MS, p. 4.
The newspaper article provided an overview of the Supplemental Instruction (SI) program that is being implemented at Jackson State University (MS) in the following academic areas: art, English, history, mass communication, music, and urban affairs.

Staff writer. (1998, January 16). Supplemental Instruction program at UMKC leads the way. *Inside UMKC Newsletter*, Kansas City, MO, p. 1.
This newsletter article describes how the Supplemental Instruction program was featured at a conference hosted by the U.S. Department of Education called "Replacing Remediation in Higher Education" that was hosted at Stanford University on January 26-27, 1998. SI was one of only five programs to be presented at the invitation-only conference.

Staff writer. (1995, July 7). Survey shows many study hours wasted. *Campus Review*, Australia,
This newspaper article describes the use of Supplemental Instruction (SI). It mentions that the SI program has been adopted for use in several Australian institutions: University of Southern Queensland in Toowoomba, University of Queensland, and the Queensland University of Technology.

Staff writer. (1990, August 16). UMKC program improves grades, retention of students in college. *Kirksville Daily Express*, Kirksville, MO, p. 1.
This newspaper article provides a basic overview of the Supplemental Instruction (SI) program.

Staff writer. (1993, September 28). US experts focus on teaching strategies. *Inside QUT (Queensland University of Technology Newspaper)*, Brisbane, Queensland, Australia, p. 2. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This newspaper article describes the upcoming arrival of Deanna Martin and Robert Blanc from the University of Missouri-Kansas City to conduct a Supplemental Instruction (SI) Supervisor training workshop at Queensland University of Technology (Brisbane, Australia). The visit to QUT will be supported by the Higher Education Research and Development Society of Australasia. SI is recognized at QUT as one of the teaching strategies which helped the university win the national Good Universities Guide 1993 University of the Year award.

Staff writer. (1996, September 24). Wayne State University retention efforts help students stay in school. *Michigan Chronicle Newspaper*, Detroit, MI, p. 10A.
This newspaper article describes the use of Supplemental Instruction (SI) at Wayne State University (Detroit, MI).Wayne Excel, the university's comprehensive retention program model was implemented in fall 1991. Excel provides a high level of advising and academic support services for at-risk students during their first two years at WSU. SI is one of the components of the Excel program. Institutional research shows that student retention has increased since the Excel program was started.

Stansbury, S. L. (2001). Accelerated Learning Groups enhance Supplemental Instruction for at-risk students. *Journal of Developmental Education, 24*(3), 20-22, 24, 26, 28, 40.
In order to increase Supplemental Instruction (SI) attendance, Accelerated Learning Groups (ALGs) were developed. A pilot study investigated whether at-risk students who participated in an ALG/SI combination demonstrated higher self-efficacy and SI attendance than those who participated in only SI. Results suggested that at-risk students were more likely to participated in 12 or more SI sessions if they attended an ALG/SI combination than if they attended only SI. In addition, the range of final grades was higher for those who attended an ALG/SI combination than for those who attended only SI. The development of prerequisite skills was essential for the efficacy of SI to serve academically underprepared students who may shun the very academic intervention that would be of most help to them. Additional research is warranted to investigate this area.

Stansbury, S. L. (2001). *How to turn Supplemental Instruction nonparticipants into participants*. Unpublished manuscript, University of Missouri-Kansas City. Available from the author at Sydbury@Yahoo.com
This study investigated the outcomes of the Supplemental Instruction (SI) model with 215 students enrolled in General Biology and 200 students in General Chemistry at the University of Missouri-Kansas City. A variety of preentry attributes were collected from the students including self-reported grade in a previous course of the same academic sequence, mastery goal orientation, performance-approach goal orientation, performance-avoidance goal orientation, self-efficacy, and interest in group study. While the findings were complex, several general statements include: higher SI attendance was correlated with higher final course grades, academically weaker students were less likely to attend SI sessions, academically weaker students reported higher levels of self-efficacy suggesting that they were less likely to accurately assess their strengths and weaknesses. This may also partly explain why these students were less likely to participate in SI sessions. The author recommends that the course professor administer a content-valid pretest during the first class period to provide feedback to all students and hopefully motivate the low scoring students to attend SI sessions. The paper concludes with an overview of Accelerated Learning Groups (ALGs), an intervention designed by the author at the University of Southern California to increase the academic success of at-risk students. The objective of ALGs is to identify students who have below average prerequisite skills for a course and assist them in strengthening these skills while they attend SI. ALGs were designed to work simultaneously with the campus

SI program. Procedures for implementing ALGs is provided with data from a study of the effectiveness of ALGs in a chemistry course.

Stephens, J. E. (1995). A study of the effectiveness of Supplemental Instruction on developmental math students in higher education [Dissertation, University of North Texas, 1995]. *Dissertation Abstracts International, 56*(05), 1697A. (University Microfilms, No. 9529947).
This quasi-experimental doctoral dissertation research study examined the effects of participation in a Supplemental Instruction (SI) program on student test performance in a second-level developmental mathematics class in a four-year university setting (rural North Central Texas, 6300 FTE) during Spring 1994. The research design followed Campbell and Stanley's Nonequivalent Control group Model (1963) with repeated measures. This research deviated from past research on SI in that it examined effects of the SI program at the end of each of six test blocks rather than at the end of the course only. Test data were analyzed using analysis of variance; final course grades were analyzed using chi-square. Interview notes combined with notes on classroom behavior patterns and SI study session behaviors added to the ethnographic aspect of the study. Results showed that the SI students scored higher on unit tests throughout the semester, and this difference in scores became significant as the semester progressed (Score range: 0 to 100; Exam #1: 67.8 vs. 66.3; Exam #2: 78.97 vs. 74.34; Exam #3: 69.0 vs. 59.03; Exam #4: 84.13 vs. 54.02; Exam #5: 83.03 vs. 68.34; Final Exam: 68.77 vs. 51.35. Exams beginning with #3 were statistically significant ($p < .01$). The rate of A or B final course grades was higher for the SI group (36.6% vs. 6.7%). The rate of D and F grades (24.1% vs. 52.0%), course withdrawals (11.0% vs. 28.0%), and combined rate of D or F final course grades and withdrawals (35.4% vs. 80.0%) was lower for SI participants. Additional analysis examined the impact of low, medium and high attendance at SI sessions. These categories are defined as attending one-third, two-thirds, or all SI sessions during the examination period. Only in two of the six examination blocks was attendance found to be statistically significant (Exam #3 mean scores of SI participants: low, 62.7; medium, 75.33; high, 83.0. Exam #4: low, 78.33; medium, 88.42; high, 96.0). Overall percentage of SI participation grew throughout the academic term: exam #1, 18.7%; exam #2, 36.2%; exam #3, 46.7%; exam #4, 42.3%; and exam #5, 53.2%. Observations regarding behaviors during the SI sessions included: it took time before students became active and verbal participants; students began to understand error patterns revealed during unit examinations; problem solving skills increased; increased ability to explain thinking process regarding problem-solving; discovery of multiple approaches to problem-solving; the group developed camaraderie; and the emergence of several SI participants as subgroup leaders. Observations regarding behaviors during class lectures by SI participants found that after several weeks they began to ask more questions to the instructor concerning lecture material.

Stephens, J. E. (1994, Fall). Supplemental Instruction in developmental mathematics. *Supplemental Instruction Update,* 1-2.
Based on a research study concerning the use of Supplemental Instruction (SI) with developmental mathematics courses at Tarleton State University (Forth Worth, TX), the data suggests the following: attendance at SI sessions is correlated with the perceived level of academic challenge in the course; academic achievement of SI participants is

correlated with the level of activity in the SI sessions; if there is extensive verbalizations of the thinking process by SI session attendees, females will tend to have higher achievement than males; and if there is low levels by SI participants of vocalizing the thinking process the academic achievement is similar for males and females.

Stephens, J. E. (1995). Supplemental Instruction in developmental mathematics: Inquiring minds want to know. *Journal of Developmental Education, 19*(2), 38

Based on the author's dissertation research concerning Supplemental Instruction (SI), the following observations concerning SI in math were made: (1) the developmental math student participants in SI in relationship to their perceived level of difficulty of the course instructor; (2) SI program success is dependent upon the level that students are active in SI sessions; (3) when the variable of repetition is applied to SI and non-SI participant, higher academic success is associated with first-time course students; (4) when the variable of gender is applied to SI and non-SI participant when there has been a high level of vocalization during SI sessions, females tend to increase more highly in academic terms than males; (5) when the variable of gender is applied to SI and non-SI participant when there has been a low level of vocalization during SI sessions, academic achievement will be fairly equal among the genders.

Stiles, T. (1985, November 6). Study guides help freshmen take note of differences in learning at college. *Chicago Tribune Newspaper*, Chicago, IL, p. 2.

This newspaper article provides an overview of the Supplemental Instruction (SI) program. The article discusses the transition shock experienced by many former high school students who were academically successful at the secondary level but are now facing academic difficulty in the more rigorous college environment. Deanna Martin, creator of the SI program, is quoted in the article.

Stockly, S. K. (1996, March). *Closing the gap in technical skills: Supplemental Instruction and Mexican-American undergraduate women*. Paper presented at the Annual Meeting of the Southwestern Sociological Association, Houston, TX.

This quasi-experimental study in Spring 1994 examines the performance of Mexican American women in an Introductory Economics course (Economics 302, Principals of Macroeconomics) at the University of Texas at Austin. Supplemental Instruction (SI) was offered as an academic enrichment program for students. SI participation rates were higher for women than men and students of color when compared with White students. The data suggest that SI participation had a positive correlation with increased mean final course grades in all comparison groups except Asian American women (White: men, 2.84 vs. 2.37 and women, 2.77 vs. 2.06; African American: men, 1.60 vs. 1.50 and women, 3.00 vs. 1.25; Asian American: men, 3.20 vs. 2.46 and women, 2.78 vs. 3.00; Hispanic: men, 2.10 vs. 1.60 and women, 2.38 vs. 1.46; and all students: 2.68 vs. 2.19).

Stockly, S. K. (2000). Performance of minority students in economics: An econometric evaluation of Supplemental Instruction [Dissertation, University of Texas at Austin, 1999]. *Dissertation Abstracts International, 60*(12), 4541.

The scarcity of minority scholars in Economics is well-recognized, though few studies have addressed the issue. This dissertation identifies the introductory coursework in economics as a significant stumbling block for African American and Hispanic students

and analyzes the effects of an extensive Supplemental Instruction (SI) program initiated to improve minority student achievement in these courses. Data were collected for over 9,000 students enrolled during two academic years, 1990-1991 (prior to the inception of SI) and 1993-1994 (after the program was fully operational). The data include independent variables that measure or proxy student-specific characteristics, academic maturity, relative high school quality, and institutional characteristics. Econometric testing of probit and ordered logit models indicate that minority students earn average grades that are significantly lower than those earned by their non-minority counterparts. Decomposition methodology, derived from analysis of wage differentials in Labor Economics, is used to quantify the gap in average grades into proportions that are explained and unexplained by the data. The analysis of the effects of SI on student performance reveals that women and minority students attend the adjunct sessions at higher rates than other students and that students who chose to participate in the program earn average grades that are significantly higher than those earned by students who either chose not to participate or were in course sections where SI was not available. Use of the decomposition methodology to control for the effects of self-selection indicates the SI program offers real value added. Students in the data set were followed for up to four years after the targeted semesters, allowing for an analysis of the long-term effects of participation in SI. Probit and ordered logit models tested whether SI enhanced student interest in taking additional coursework in economics, whether students who participated in SI were then able to achieve significantly higher scores in subsequent coursework, and whether the skills gained through participation in SI helped students achieve higher retention and graduation rates. Overall, the effects of SI in the longer term are positive and statistically significant.

Stout, B., & Wiatr, J. (2001, June). Getting started with Supplemental Instruction (SI). *The Learning Center Newsletter.* Retrieved July 1, 2004, from http://www.learningassistance.com/2001/Jun01/index.htm
This article begins a series in this newsletter devoted to establishing an Supplemental Instruction (SI) program on a campus. The authors directed the SI program at the University of Pittsburgh (PA). A variety of administrative issues are explored concerning the establishment and smooth running of the SI program.

Stout, B., & Wiatr, J. (2002, March). Supplemental Instruction: Developing an SI proposal. *The Learning Center Newsletter.* Retrieved July 1, 2004, from http://www.learningassistance.com/2002/Mar02/SI.htm
This article describes some strategies for gaining and managing financial support for a Supplemental Instruction (SI) program. The authors cite the need to develop a comprehensive funding plan to support all aspects of an SI program.

Stout, B., & Wiatr, J. (2001, July). Supplemental Instruction (SI): Department to SI program dynamics. *The Learning Center Newsletter.* Retrieved July 1, 2004, from http://www.learningassistance.com/2001/Jul01/index.htm
This article describes the efforts by the campus Supplemental Instruction (SI) coordinators at the University of Pittsburgh (PA) to develop their program and gain

campus support. Recommendations are made how to effectively approach academic departments and their faculty members regarding the introduction of SI to the courses.

Stout, B., & Wiatr, J. (2002, February). Supplemental Instruction (SI): Evaluating the SI program. *The Learning Center Newsletter,* Retrieved July 1, 2004, from http://www. learningassistance.com/2002/Feb02/SI.htm
This article suggests some simple quantitative research procedures to collect data and provide a rudimentary evaluation system for Supplemental Instruction (SI).

Stout, B., & Wiatr, J. (2002, January). Supplemental Instruction (SI): Faculty support and the SI program. *The Learning Center Newsletter.* Retrieved July 1, 2004, from http://www. learningassistance.com/2002/Jan02/SI.htm
This article explores the relationship between the Supplemental Instruction (SI) program and the faculty member that sponsors it with their class. The authors provide a history of the development of SI at the University of Pittsburgh (PA). Also the authors describe the use of SI as a faculty development strategy for faculty members who request the feedback from the SI leader.

Stout, B., & Wiatr, J. (2001, December). Supplemental Instruction (SI): More on recruiting SI leaders. *The Learning Center Newsletter.* Retrieved July 1, 2004, from http://www.learningassistance.com/2001/Dec01/index.htm
This article describes the strategies used at the University of Pittsburgh to attract and retain group leaders to work with their Supplemental Instruction (SI) program.

Stout, B., & Wiatr, J. (2001, August). Supplemental Instruction (SI): Recruiting SI leaders. *The Learning Center Newsletter.* Retrieved July 1, 2004, from http://www. learningassistance.com/2001/Aug01/index.htm
The authors from the University of Pittsburgh make a number of recommendation on strategies for recruiting Supplemental Instruction (SI) leaders. The process for selection is a rigorous one to identify the most appropriate student for the role due to the high demands placed upon the position.

Stout, B., & Wiatr, J. (2001, November). Supplemental Instruction (SI): Training SI leaders. *The Learning Center Newsletter.* Retrieved July 1, 2004, from http://www. learningassistance.com/2001/Nov01/index.htm
The authors describe the procedures that they followed at the University of Pittsburgh in training the Supplemental Instruction (SI) leaders. The training program included both an intensive workshop before the beginning of the academic term, but also follow-up sessions. These included clinical supervision observations by the campus SI coordinator as well as requiring SI leaders to view sessions run by fellow student leaders to gain more perspectives on how to facilitate their own groups.

Stratton, C. B. (1998). Transitions in Developmental Education: Interviews with Hunter Boylan and David Arendale. In P. L. Dwinell, & J. L. Higbee (Eds.), *The Role of Developmental Education in Preparing Successful College Students* (pp. 25-36). Columbia, SC: The National Association for Developmental Education and the National Center for the Study of the Freshmen Year Experience and Students in Transition.

In this book chapter the author interviews two leaders in the field of developmental education. Hunter Boylan directs the National Center for Developmental Education. David Arendale directs national dissemination of Supplemental Instruction. Both have served as past presidents of NADE. Arendale talks about how developmental education must be "mainstreamed" into the college curriculum rather than continuing with the current model of separate tracks of courses and support for students who need academic assistance. Supplemental Instruction and Video-Based Supplemental Instruction are cited as examples for embedding academic assistance into college-level courses. Brief overviews are provided for both programs. He suggests that SI and VSI present an acceptable way for accomplishing the mission of developmental education which is politically acceptable to policy makers at the institution, state, and national level.

Stratton, C. B., Commander, N. E., Callahan, C. A., & Smith, B. D. (2001). A model to provide learning assistance for all students. In V. L. Farmer, & W. A. Barham (Eds.), *Selected models of developmental education programs in higher education* (pp. 63-88). Lanham, NY: University Press of America.
Supplemental Instruction (SI) ed at Georgia State University, an urban institution with 25,000 students. Due to changing institutional policies, the emphasis was shifted from a traditional developmental education program that focused on the lowest academically prepared students to a campus program that served students from all academic ability levels. SI was a key component of the new mission. Academic achievement data is reported in classes where SI was offered to all students: accounting, biology, history, and political science between 1994 and 1997 and the results favored SI participants. The book chapter reports on a variety of other adjunct instructional approaches to providing academic enrichment for a broader scope of students and the administrative issues that guided the decision making with this change.

Stratton, C. B., Commander, N. E., Callahan, C. A., & Smith, B. D. (1997). From DS to LS: The expansion of an academic preparation program from developmental studies to learning support. *Selected Conference Papers of the National Association for Developmental Education, Volume 2* (pp. 42-44). Mobile, AL: University of South Alabama.
With increased emphasis on student retention, a model for expanding academic support through Supplemental Instruction was developed to provide a comprehensive program for a larger population at Georgia State University (Atlanta, GA). Research studies suggested that SI participants earned higher mean final course grades. In addition, students whose predicted success (based on SAT scores and a formula predicting GPA) was low outperformed their peers predicted to be more successful.

Sulski, J. (1991, January 6). Keeping minorities in college. Schools growing more sensitive to students' needs. *Chicago Tribune Newspaper*, Chicago, IL, p. 4.
This newspaper article mentions that Supplemental Instruction (SI) is one of the activities that is used to improve student achievement of Hispanic students. The Latin American Recruitment and Educational Services (LARES) program is directed by Leonard Ramirez at the University of Illinois at Chicago. SI is a component of the LARES program to help students develop their study strategies and writing skills.

Sutton, K. (1994, February 5). Deanna Martin aids University of Port Elizabeth to chop failure rate. *Eastern Providence Herald Newspaper*, Port Elizabeth, South Africa, p. 7.
This newspaper article contains an interview of Deanna Martin who is creator of the Supplemental Instruction (SI) model. The interview describes the development of the SI model in the United States and its implementation at institutions worldwide. Included is a description of the role of Dr. Andre Havenga in developing the program at the University of Port Elizabeth in South Africa.

Taksa, I., & Goldberg, R. (2004). Web-delivered Supplemental Instruction: Dynamic customizing of search algorithms to enhance independent learning for developmental mathematics students. *Mathematics and Computer Education, 38*(2), 152-164.
Supplemental Instruction (SI) was modified for web delivery to increase its use and effectiveness of results for students. The focus was on serving developmental math students at the City University of New York.

Tanaka, C. (1995). *Peer Assisted Study Sessions in HUB 661 Japanese*. Unpublished manuscript, Queensland University of Technology, Brisbane, Queensland, Australia. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This research report documents the use of Peer Assisted Study Sessions (PASS) at Queensland University of Technology (Brisbane, Queensland, Australia) in HUB 661 Japanese language course. This course is often chosen as a second-semester, first year subject for International Business students. PASS is the local institutional name for the Supplemental Instruction (SI) program. Benefits of the PASS program for participants included slightly higher mean final course grades and lower rates of withdrawal. The professor who had PASS attached to his class reported receiving helpful feedback from the PASS leader concerning the comprehension level of the students. This afforded them an opportunity to revise lectures and review upcoming examinations. PASS leaders reported the following behavioral changes: learned how to give feedback to the course lecturer in an appropriate fashion; learned to work in harmony with other students and leaders; improved their own communication skills; improved their content knowledge and skill; and gained valuable insight into the learning process.

Taylor, G. T., Healy, C. E., & Macdonald, M. (1994). Engineering educational development: Raising the quality through partnerships. In J. Wallace (Eds.), *Kingston University HEFCE Supplemental Instruction Project* (pp. 225-230). London, England: Kingston University.
The changes which face education today make it essential that quality is raised by moving from a teaching to a learning culture. Supplemental Instruction (SI) was used to create a partnerships between student, staff and employers working together to develop a learning environment in the Department of Energy and Environmental Technology at Glasgow Caledonian University in Glasgow, England. Students indicated the following reasons for SI participation: students want to work in peer groups; students recognize the academic difficulty of their courses; and students believe that peer groups are a source of information and help for them. In an evaluation of the SI program, SI leaders indicated growth in the following areas: verbal and nonverbal communications, learning

techniques, interpersonal communication skills, consideration of college major change to a teaching career, and gaining employment skills that makes them more attractive to potential employers.

Thomas, L., Quinn, J., Slack, K., & Casey, L. (2003). *Effective approaches to retaining students in higher education: Directory of practice*. Stoke-on-Trent, United Kingdom: Institute for Access Studies, Staffordshire University. Retrieved March 15, 2005, from http://www.staffs.ac.uk/institutes/access/docs/Directory1.pdf
Bournemouth University in the United Kingdom describes its Peer Assisted Learning (PAL) program which is based upon Supplemental Instruction (SI) on page 51 of this directory of programs used at postsecondary institutions in England to meet needs of students to support their persistence towards graduation.

Thomas, L., Quinn, J., Slack, K., & Casey, L. (2002). *Student services: Effective approaches to retaining students in higher education*. Stoke-on-Trent, United Kingdom: Institute for Access Studies, Staffordshire University. Retrieved March 15, 2005, from http://www.staffs.ac.uk/institutes/access/docs/ssreport.pdf
Bournemouth University in the United Kingdom describes its Peer Assisted Learning (PAL) program which is based upon Supplemental Instruction (SI) on page 51 of this directory of programs used at postsecondary institutions in England to meet needs of students to support their persistence towards graduation.

Thompkins, C. D. (2001). Learning to facilitate construction of understanding: A case study of Supplemental Instruction leaders [Dissertation, North Carolina State University, 2001]. *Dissertation Abstracts International, 62*(01), 70.
The purpose of this study was to investigate the verbal interactions between Supplemental Instruction leaders and students within the context of Supplemental Instructions sessions to acquire an understanding of how dialogue exchanges were established and maintained over the course of a semester. Three novice Supplemental Instruction leaders were selected for this study. Their classes were observed and recorded throughout the semester through the use of audio and video recordings and observer field notes. Their beliefs about teaching and learning, their rationale for making instructional decisions and their perceptions about their students' learning were identified through the use of interviews. A socio-constructivist perspective was used to frame and interpret the findings of the study. This perspective embraces the idea that students not only construct knowledge individually, they construct knowledge socially through interactions with others by establishing a sociocultural system. This system establishes the norm for how classroom interactions will occur. Analysis of verbal interchanges that took place over the semester in each of the SI leaders' classrooms indicated that the type of talk that occurred in two SI leaders' sessions changed, resulting in an increase in student involvement. No differences in exchanges over the semester were found for the third SI leader. The factors that seemed to most strongly influence how SI leaders led sessions were their initial beliefs about teaching and learning and their perceptions of students' needs. The factors found to affect implementation of instructional strategies were the numbers of students attending the session, the immediate stated and observed needs of the students and the pedagogical inexperience of the SI leaders. The findings of this study indicated that the three SI

leaders respective belief systems ultimately determined what went on in SI sessions. Although all three had the same SI training and initially indicated that they would actively involve students, only two SI leaders were eventually able to do this.

Timmermans, S. R., & Heerspink, J. B. (1996). Intensive developmental instruction in a pre-college summer program. *The Learning Assistance Review: The Journal of the Midwest College Learning Center Association, 1*(2), 32-44.
This article describes a modification of the Supplemental Instruction (SI) model at Calvin College (Grand Rapids, MI) to take into account the cognitive and developmental factors of high school students. This instructional component was placed in a pre-college summer program called Intensive Developmental Instruction (IDI). Unique features of IDI include: high school students are placed in college-level classes beyond their current level of academic ability; the SI leader is a certified K-12 teacher from outside the course area who takes the class along with the high school students; and explicit instruction is provided by the IDI leader in learning strategies. A comparison was made between the IDI high school students and the college students in the same classes who did not participate in IDI. It was assumed that the college students were stronger academically than the high school students since their mean ACT score was higher (24 vs. 20 for IDI students). IDI students received a grade of C or higher 88.7 percent of time compared with 80.6 percent for the college students. Results from the Learning and Study Strategies Inventory suggest that their involvement in IDI improved their use of learning strategies.

Tonsetic, R., & Warren, B. Z. (1997). *Assisting faculty and students in adjusting to large class environments*. Unpublished manuscript, The University of Central Florida, Orlando, FL. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper discusses the use of Supplemental Instruction (SI) at the University of Central Florida (27,000 students) as one component in dealing with helping faculty and students deal with large classes. In Spring 1997 39 classes had an enrollment of 200 or more students. During Fall 1996 SI was provided for four large class sections including a chemistry course for non-science majors. SI participants earned a higher mean final course grade (3.39 vs. 1.72). When adjusted for differences in SAT scores, the SI group still received higher grades (2.54 vs. 1.71). The percent of A and B final course grades was higher for the SI group (47% vs. 20%) as well as lower rates of D, F or course withdrawals (18% vs. 56%). Positive results were also reported for the SI in general biology and American national government. There were no significant differences in the calculus course. While there was high satisfaction with the SI participants, the grade differences were not significant. The authors suggest that the SI sessions in math need modification for more effective use. In addition, the authors administered several personality instruments for additional research. The Student Behavior Checklist (Long, 1985) examined the Long Reactive Personality Types with the SI participants and generated the following results: aggressive-independent (16%); aggressive-dependent (48%); passive-independent (8%); and passive-dependent (16%). Using the Long Personality Traits instrument the following results were generated concerning the SI participants: phobic (31%); compulsive (69%); impulsive (15%); and hysteric (32%).

Topping, K. J. (1996). The effectiveness of peer tutoring in further and higher education: A typology and review of the literature. *Higher Education, 32*(3), 321-345. Retrieved July 1, 2004, from http://www.lgu.ac.uk/deliberations/seda-pubs/Topping.html
The increasing use of peer tutoring in British higher education necessitates a clear definition and typology. Through an extensive review of the literature, the author discusses peer tutoring in general with a short review of and the Supplemental Instruction (SI) program. Research studies from both the U.S. and U.K. suggest that participation in SI is positively correlated with higher mean final course grades. Other UK studies suggested improved communication skills and deeper understanding of the curriculum occurred for SI participants and higher grades for the SI leaders themselves.

UNC Charlotte. (1999). *Supplemental Instruction in engineering courses: An analysis of student participation*. Unpublished manuscript, University of North Carolina Charlotte. Retrieved July 1, 2004, from http://www.succeed.ufl.edu/papers/00/SI.pdf
This report is an excerpt from the final report of a 1998-1999 study conducted on Supplemental Instruction (SI) in a high-attrition "gateway" engineering course at the University of North Carolina-Charlotte. After SI was introduced to UNC in 1985 within the College of Arts and Sciences, it quickly spread throughout the institution. Preentry attributes of the students in the study included ethnicity, gender, Grade Point Average, Predicted Grade Index, SAT scores, class, and academic major. SI participants were defined as those who attended five or more SI sessions during the academic term. There was no significant differences between SI and non-SI participants except for a slightly higher Predicted Grade Index for the SI participants. This was attributed to the possible impact of higher student motivation of the SI participants.

United Press International. (1990, August 16). UMKC program improves grades, retention of students in college. *Kirksville Daily News*, Kirksville, MO, pp. 1-2.
The newspaper article carried by United Press International (UPI) provides a short overview of the Supplemental Instruction (SI) program.

University of Missouri-Kansas City. (1999). *Supplemental Instruction: Empowering student learning.* [Videotape]. Patterson, K., & K. Wilcox (Producers) Kansas City, MO: Center for Supplemental Instruction, The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This videotape provides an overview of Supplemental Instruction (SI) through short interviews with SI leaders, SI participants, campus administrators, and Deanna Martin, creator of the SI model.

University of Toledo. (2003). *Components of the First Year Experience Program at The University of Toledo*. Unpublished manuscript, The University of Toledo, Ohio. Retrieved July 1, 2004, from http://provost.utoledo.edu/FYE/components.pdf
This short report describes the components of the first year experience program at the University of Toledo (OH). It is composed of six components: living-learning communities; focused first-year advising (early intervention); Supplemental Instruction and tutoring; peer mentoring; orientation; and enhanced first-year classroom experience.

Van Der Karr, C. A. (2001). Becoming a cooperative learner: Supplemental Instruction experiences at a community college [Dissertation, Syracuse University, 2000]. *Dissertation Abstracts International, 62*(04), 1347.
This study is an exploration of the Supplemental Instruction experience at a community college. The study was designed to gain a better understanding of these peer lead study groups grounded in the perspectives of students. The community college was located in the northeast and served 8000 full time, part time, and continuing education students. The qualitative design included data collection via participant observation, individual interviews, group interviews, and review of related materials over the course of a semester. The students described a cooperative environment built upon shared values, goals, and expectations. This environment included norms around appropriate behavior, creating a safe environment, and protecting the group culture. Within this group environment and culture, students described perceptions and patterns of shares authority framed through the role of the leader. Authority was a fluid point on a continuum between high leader authority and high shared authority in group. Authority was presented through three domains of leadership: social leadership, administrative leadership, and content leadership and students and group leaders both resisted and promoted shared authority. The students engaged in this negotiated authority in different ways related to their personal perspectives and experiences. They described critical perspectives that relate to their patterns of participation in the groups. As students described higher levels of participation in group, they also described shifts in their perceptions of themselves as learner, peers, relationship to content, and locus of control. The participants of this study explained how Supplemental Instruction served as an opportunity to engage in content within a social context. The social engagement not related to higher content understanding; it provided a form of involvement for students whose involvement was often limited by other life roles and responsibilities. The findings support the critical role peers and cooperative learning have in student learning, satisfaction, integration, and persistence. The findings also suggest dimensions to cooperation that may yield design that is more effective, implementation, and assessment of group learning.

van Hamburg, E. (1998). Leerfasilitering in kontakonderrig. *Didaktikom, 19*(1), 1-4. Retrieved July 1, 2004, from http://www.puk.ac.za/baswww/DIDAK/apr98/Win98.doc

Van Lanen, R. J., & Lockie, N. M. (1992). *Addressing the challenge of student diversity: Impact of Supplemental Instruction on performance in a freshman level chemistry course*. Unpublished manuscript, Saint Xavier University, Chicago, IL.
The paper is based on the results of a pilot research study designed to determine the effect of Supplemental Instruction (SI) attendance on the performance and retention of a diverse student population in Chemistry 108 for various levels of SI attendance and to determine relationships between demographic and academic variables of the sample and participation in SI. The sample consisted of Saint Xavier University (Chicago, IL) students enrolled in Chemistry 108 (N=61) in Fall, 1990 and Spring, 1991. Significant differences in performance in Chemistry for the SI group and the non-SI group, as measured by final course grades, were observed when the SI group was defined as students attending six or more SI sessions and the non-SI group was defined as

students attending five or fewer SI sessions. Both academic variables and the demographic variables were compared for the SI group and for the non-SI group.

Van Lanen, R. J., & Lockie, N. M. (1997). Using Supplemental Instruction to assist nursing student in chemistry: A mentoring program's support network protects high-risk students at Saint Xavier University. *Journal of College Science Teaching, 26*(6), 419-423.
This article discusses the use of Supplemental Instruction (SI) with nursing students in Principles of Organic and Biochemistry (Chemistry 108) at Saint Xavier University (IL). Chemistry 108 is the second class in a two-semester introductory chemistry course designed for freshman nursing students. After a basic overview of the SI model, the article discusses a research study to examine the effectiveness of the SI program. The Chemistry 108 class was composed mainly of women (94.5%), transfer students (75.8%), and nursing majors (95.1%). It was equally distributed between students above and below age 23. In this study SI participants were defined as students who attended six or more times. The SI group received a higher mean final course grade (2.52 vs. 2.21) and a lower rate of D, F and course withdrawals (14.3% vs. 29.1%). The authors postulate that due to the variety and complexity of skills needed to understand chemistry -- complex content mastery, language, and problem solving -- higher levels of SI attendance are needed to show more consistent positive academic results. Three themes emerged from SI participants concerning why they felt SI was helpful: (1) working out problems on the black board; (2) opportunity to share information; and (3) chance to help each other.

Van Lanen, R. J., Lockie, N. M., & McGannon, T. (2000). Predictors of nursing students' performance in a one-semester organic and biochemistry course. *Journal of Chemical Education, 77*(6), 767-770.
Saint Xavier University, Illinois, has identified predictors of nursing students' performance in a one-semester organic and biochemistry course. Early identification of predictors of performance would allow for intensive academic advising and implementation of specific academic support strategies appropriate to the student's needs. Data were collected over 7 semesters from 308 undergraduate students enrolled in Chemistry 108, about half of whom were traditional students and half were continuing education students. Three predictor variables were identified for the traditional group: mathematics placement test score, total number of supplemental instruction sessions attended, and Chemistry 107 grade. Two predictor variables were identified for the continuing education group: Chemistry 107 grade and Nelson Denny reading test score, which assesses understanding of written vocabulary and mastery of reading comprehension.

Vasquez, S. (2000, Spring). How to structure a Supplemental Instruction session: Daily agendas and semester goals. *NCLCA Newsletter,* 8-8.
Supplemental Instruction (SI) programs typically employ undergraduate students to serve as SI leaders. Sometimes their inexperience leads to less productive SI sessions for the participants. Adding structure to the SI sessions can assist novice SI leaders until they gain experience and confidence to respond more quickly to needs presented by students attending the SI sessions. A suggested agenda is: identify common questions of the students; engage students in a preplanned collaborative learning

activity; focus on the most important concepts covered in the class lecture and textbook; and answer questions that have not been answered by the aforementioned Si session activities.

Villén, V. (2002). *How to prevent student drop outs? An example from Lund University*. Unpublished manuscript, Master Thesis in Pedagogic, Pedagogical Institution, Lund University, Sweden. Retrieved July 1, 2004, from http://www.socbetbib.lu.se/epubl/pedpdf/PED02016.pdf
This Master Thesis (written in Swedish) describes how Lund University in Sweden is implementing a variety of programs to deal with student drop outs. Two programs featured in the manuscript are Supplemental Instruction and Video-based Supplemental Instruction.

Visor, J. N., Johnson, J. J., Schollaet, A. M., Good-Majah, C. A., & Davenport, O. (1995). Supplemental Instruction's impact on affect: A follow-up and expansion. *Proceedings from the 20th Annual Conference on Developmental Education* (pp. 36-37). Chicago, IL: National Association for Developmental Education.
Following up a previous study (Visor, Johnson, and Cole, 1992), the authors sought to determine whether positive change in certain affective variables was associated with participation in Supplemental Instruction (SI): locus of control, the feeling of being in charge of one's own destiny; self-efficacy, beliefs about one's ability to succeed at a given task; and self-esteem. Students from an introductory psychology course at Illinois State University (Normal, IL) were studied in fall of 1994. Students were divided into three categories of participation: regular participants (4 or more times during the term); occasional participants (1 to 3 times); and nonparticipants. The data suggested the following trends. Among freshmen, regular participants tended to have (a) higher self-esteem than nonparticipants, (b) greater self-efficacy than nonparticipants, and (c) greater internal locus of control than nonparticipants and occasional participants. Among upperclassmen, regular participants tended to have (a) higher self-esteem, (b) greater self-efficacy, and (c) greater internal locus of control than nonparticipants and occasional participants. A causal relationship between SI participation and these affective changes is difficult to empirically establish due to confounding demographic variables.

Visor, J. N., Johnson, J. J., & Cole, L. N. (1992). The relationship of Supplemental Instruction to affect. *Journal of Developmental Education, 16*(2), 12-14, 16-18.
This Supplemental Instruction study that examined college students enrolled in an introductory psychology course conducted at Illinois State University (Normal, IL) addressed the following questions: a) Are students who elect to participate in SI affectively different from those who choose not to do so? b) does SI affect a positive change in noncognitive factors for participants? The noncognitive factors examined were locus of control, self-efficacy, and self-esteem. Results suggested that those who participated regularly in SI were affectively different from those who participated only occasionally or not at all. SI participants tended to have a higher internal locus of control and higher self-esteem than others. The researchers suggested that this may have been due to the manner in which the SI program was promoted to students. Self-efficacy actually decreased for the more frequent SI participants. The researchers

suggested that these students may have developed a more accurate understanding of their strengths and weaknesses while the others were "blissfully ignorant of what it takes to succeed." Increased sensitivity by the SI leader may be needed to effectively meet the needs of "at-risk" students (external locus of control, low self-efficacy, and low self-esteem). The authors suggest additional research is needed regarding non-cognitive variables.

Waimon, D. A. (1999). *The impact of Supplemental Instruction on student graduation records*. Unpublished Master's of Science (M.S.) thesis, Illinois State University, Normal, IL. Available: Interlibrary loan from Illinois State University, Normal, IL.
This study investigated Supplemental Instruction (SI) at Illinois State University (Normal, IL) for first time students who enrolled during Fall 1993 regarding its impact on student graduation records (graduation rates at the end of the fourth and fifth year of college and grade point averages upon graduation from the university). The students were enrolled in the following classes: psychology, economics, communication, science, history, and problem solving. Preentry attributes studied were ACT composite score and high school percentile rank standing. The three findings of the study were: SI participants have better graduation records than their non-SI participants; students who attend more SI sessions during their first year have better graduation records than students who attend fewer; and students who start SI first semester of the first year fare no better in their graduation records than students who do not participate in the program until second semester of their first year (though first semester SI participants earned higher grade pint averages upon graduation than those who did not participate until the second semester).

Wallace, J. (1994). *Kingston University HEFCE Supplemental Instruction Project: 1993-94*. London, England: Kingston University. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This report review four years of development and research into the use of Supplemental Instruction at Kingston University in the United Kingdom. An additional emphasis area for the SI model has been with staff and faculty development. Included are reports from Kingston University, Glasgow Caledonian University, University of Central Lancashire, Luton University, University of Brighton, and Oxford Brookes University.

Wallace, J. (1996). Peer tutoring: A collaborative approach. In S. Wolfendale, & J. Corbett (Eds.), *Opening doors: Learning support in higher education* (pp. 101-116). London, England: Cassell Publishers. Retrieved July 1, 2004, from: http://www.umkc.edu/cad/si/sidocs/jwpeer97.htm
This chapter is a description of how the Supplemental Instruction program was customized for use in the United Kingdom. The key to the success of the program was effective awareness raising for academic staff, the training of the student leaders and the effective management of the scheme. Quotations from SI leaders and faculty members cite a variety of reasons for support for the SI program.

Wallace, J. (1994). Provoking the teaching and learning debate. In J. Wallace (Eds.), *Kingston University HEFCE Supplemental Instruction Project* (pp. 99-117). London, England: Kingston University.
This chapter contains responses from several educators regarding the impact of Supplemental Instruction (SI) with improving the learning environment for college students in the United Kingdom. The SI program has attracted considerable attention from student unions and unionized teacher trade unions since it has become another partner in the learning process. UK educators who have implemented the SI program have been very careful to position SI as an enhancement to the learning process rather than an alternative to traditional means of delivering instruction to students. Teaching and learning are carefully separated with the UK system.

Wallace, J. (1999). SI supporting quality in higher education in the United Kingdom. In *Proceedings of the First National Conference on Supplemental Instruction and Video-based Supplemental Instruction* Kansas City, MO: Center for Supplemental Instruction, University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, Kansas City, MO 64110.
This article examined how the American SI model has been modified to work with the United Kingdom postsecondary education system in more than thirty institutions. In addition to traditional measures of effectiveness of the SI program regarding student academic performance, the UK SI model is seen as a contributor to supporting educational quality. A government agency called the Quality Assurance Agency reviews institutions much in the same way as American regional accrediting agencies. SI is seen as contributing to high achievement of all six performance measures: curriculum design, content, and organization; teaching, learning, and assessment; student progression and achievement; student support and guidance; learning resources; and quality management and enhancement.

Wallace, J. (1992). Students helping students to learn. *The New Academic, 1*(2), 8-9.
This article describes the use of Supplemental Instruction (SI) at Kingston University in London, England. In addition to reports of improved academic performance by SI participants, interviews with SI leaders suggest they had the following results: higher final course grades in other subjects, increased leadership skills, higher confidence levels, and increased contact with faculty members.

Wallace, J. (1996). *Supplemental Instruction: A profile of the scheme.* [Videotape]. Mair, G. (Producer)Glasgow, Scotland: Glasgow Caledonia University. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This videotape provides an overview of the implementation of Supplemental Instruction (SI) in the United Kingdom. Jenni Wallace, Certified Trainer for the United Kingdom, provides a historic perspective of SI's use in the United Kingdom. Following is an interview with two SI leaders (Paul Irwin and Mel Dobie) concerning benefits of the SI program to the SI leaders: increased leadership skills, improved use of study strategies, higher confidence level, and increased content knowledge.

Wallace, J. (1995). Supplemental Instruction: Students helping each other with their learning. *UCoSDA Briefing Papers, 20*, 1-4. Available: UCoSDA, Level Six, University House, Sheffield, England S10 2TN.
This paper provides an overview of the Supplemental Instruction (SI) model as it is implemented in the United Kingdom. In addition to the traditional purposes of the SI program, there are two additional emphasis areas for the SI program. First, SI leaders are expected to feed back to the course professor students comments (e.g., relevance of instructional pace, understanding of the lecture material, relevance of support materials such as handouts). SI leaders receive special training to delicately share this information with the faculty members. The second emphasis area is on staff and educational development. Faculty members are encouraged to make adjustments of their teaching behaviors to accommodate the needs of the students.

Wallace, J. (1996). *Supplemental Instruction: The challenging way forward.* [Videotape]. Mair, G. (Producer) Glasgow, Scotland: Glasgow Caledonia University. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This videotape provides an overview of the implementation of Supplemental Instruction (SI) in the United Kingdom. It contains an interview with two SI leaders (Paul Irwin and Mel Dobie) concerning benefits of the SI program to the SI leaders: increased leadership skills, improved use of study strategies, higher confidence level, and increased content knowledge.

Wallace, J. (1993). *The use of Supplemental Instruction in sub-degree vocational courses*. London, England: Unpublished manuscript, Kingston University at Surrey, England.
This report describes the use of Supplemental Instruction (SI) with sub-degree vocational courses at Kingston University (London, UK). Kingston runs a number of sub-degree courses leading to the Higher National Diploma (HND) in Electronic Engineering which is obtained from the Business and Technology Education Council (BTEC) through the university. In October, 1990 SI was introduced into several courses in the Faculty of Technology at Kingston. Data from 1990 to 1991 suggests that SI participants received statistically ($p < .05$) higher final course grades (Mathematics: 60.9 percentile vs. 48.1 percentile; Circuits & Systems: 64.0 vs. 49.9; Electronic Principles: 60.0 vs. 49.4; Software Principles: 55.3 vs. 41.5; and Management Studies: 69.4 vs. 53.5). and had lower rates of withdrawal. In addition, interviews with SI participants suggest that they also develop "transferable skills" that help them in other courses.

Wallace, J., & Rye, P. D. (1994). What is Supplemental Instruction? In C. Rust, & J. Wallace (Eds.), *Helping students to learn from each other: Supplemental Instruction, SEDA Paper 86* (pp. 7-8). Birmingham, England: Staff and Educational Development Association.
This article provides a short overview for how the Supplemental Instruction program is most often implemented in the British higher education system.

Wambach, C. A., Brothen, T., & Dikel, T. N. (2000). Toward a developmental theory for developmental education. *Journal of Developmental Education, 24*(1), 2-10, 29.

The writers propose a developmental theory to help categorize what developmental educators have been doing for years to assist in student improvement. The theory rests on developmental psychology research that examines developmental outcomes and that encompasses research on schools as caring communities and on students' adjustment to college. In order to explain how developmental students came to be as they are and the things that they may need to succeed, concepts of self-regulation, demandingness, and responsiveness are used. These concepts can also be useful in predicting the results of employing certain institutional structures, educational practices, and teacher behaviors. The writers discuss the efficacy of techniques like Supplemental Instruction, cooperative learning, and the personalized system of instruction.

Warren, B. Z. (1999). *Assessing the impact of college teacher's learning style on student outcomes: A pilot study at the University of Central Florida*. (ERIC Document Reproduction Service No. ED434083).
This paper investigates the effects of faculty learning style on students grades in five different class sections at the University of Central Florida: Chemistry I, Chemistry for Non-Majors, General Biology, and Law and the Legal System. Kolb's Learning Style Inventory was used. The research recognized that other variables impacted upon this study including participating in Supplemental Instruction.

Warren, B. Z. (1997). *Personality, learning style, gender, and ethnic characteristics of students attending Supplemental Instruction*. Paper presented at the Annual Teaching/Learning Conference, October 10-11, 1997, Ashland, KY. (ERIC Document Reproduction Service No. ED413019). Retrieved July 1, 2004, from http://www.reach.ucf.edu/~fctl/fac_support/personality.htm
A study was conducted to gather information on students participating in Supplemental Instruction (SI) at the University of Central Florida in Spring 1997. Using Long's Personality Checklist, 163 students classified themselves as aggressive-dependent, aggressive-dependent, passive-independent, or passive-dependent. Kolb's Learning Style Inventory was administered to the group. Findings included: (1) Although the majority of SI students were White and female with aggressive-dependent personality styles, science students displayed assimilator and converger learning styles, while non-science students displayed accommodator learning styles. (2) Hispanics most commonly identified their learning style as assimilator. (3) Black and Hispanic students showed the least inclination toward the converger learning style, while it was one of the main styles displayed by White students.

Warren, B. Z., & Tonsetic, R. (1997). Supporting large classes with Supplemental Instruction (SI). *Journal of Staff, Program, and Organization Development, 15*(2), 47-54.
This paper discusses the use of Supplemental Instruction (SI) at the University of Central Florida (27,000 students) as one component in dealing with helping faculty and students deal with large classes. In Spring 1997 39 classes had an enrollment of 200 or more students. During Fall 1996 SI was provided for four large class sections including a chemistry course for non-science majors. SI participants earned a higher mean final course grade (3.39 vs. 1.72). When adjusted for differences in SAT scores, the SI group still received higher grades (2.54 vs. 1.71). The percent of A and B final course grades was higher for the SI group (47% vs. 20%) as well as lower rates of D, F or course

withdrawals (18% vs. 56%). Positive results were also reported for the SI in general biology and American national government. There were no significant differences in the calculus course. While there was high satisfaction with the SI participants, the grade differences were not significant. The authors suggest that the SI sessions in math need modification for more effective use.

Watson, J. (2000). *A Peer Assistance Support Scheme (PASS) for first year core subjects*. Unpublished manuscript, School of Economics, University of New South Wales, Australia. Retrieved July 1, 2004, from http://www.qut.edu.au/talss/fye/papers/WatsonPaper.doc
This paper examines a peer assisted study program that has been offered to three core first year subjects in the School of Economics at the University of New South Wales in Australia. While the paper refers to the program as PASS, it is adapted from Supplemental Instruction (SI) originally developed in the United States. Several variations of the SI model include: not requiring the SI leaders to attend class along with the rest of the students and employing faculty members or academic staff members to supervise the program rather than staff from the campus learning center. Common classes supported through PASS were microeconomics and accounting. The PASS program was evaluated through both student questionnaires as well as evaluating their final course grades. The questionnaire data suggested that PASS contributed to higher satisfaction and deeper learning of the course content material. Evaluation of the final grades suggested a statistically significant relationship between attending six or more PASS sessions and higher grades. PASS leaders reported benefits of the program as well with development of personal communication skills as well as deeper understanding of the course material.

Watters, J. J., & Ginns, I. S. (1997). *Peer assisted learning: Impact on self-efficacy and achievement*. Paper presented at the American Educational Research Association Conference, March 24-28, 1997, Chicago, IL. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper describes the use of program modeled after Supplemental Instruction (SI) in a teacher education course at Queensland University of Technology (Brisbane, Australia). The institutional name for the program is Peer Assisted Study Sessions (PASS). The class had 124 students enrolled in a course designed for first-year Bachelor of Education students. Program outcomes were that SI participants earned higher final course grades (4.88 vs. 4.15 on a scale of 0 to 7) and self-reported development regarding confidence and improved attitudes to learning and science. There was a trend for higher grade achievement with higher levels of attendance at the SI sessions. The SI leaders reported improved confidence, facilitatory skills, and insight into adult education.

Webster, T., & Dee, K. C. (1997). Supplemental Instruction benefits students in an introductory engineering course. *Proceedings of the Conference on Frontiers in Education* (pp. 101-108). Pittsburgh, PA: International Electrical Engineers in Education. Retrieved July 1, 2004, from http://fie.engrng.pitt.edu/fie97/papers/1012.pdf.
This paper describes the use of Supplemental Instruction (SI) during Fall 1996 in

Introduction to Engineering Analysis at Rensselaer Polytechnic Institute (Troy, NY). The course is generally taken in the first semester of the freshman year and covers vector mechanics (statics), linear algebra, and computer-based matrix methods for solving engineering problems. Of the students in the class, 23 percent participated in SI sessions. Students who participated in SI earned higher mean final course grades (3.13 vs. 2.67, $p < .025$), higher rate of A & B final course grades (77% vs. 62%, $p < .01$) and received a lower rate of D, F or withdrawals (0% vs. 18%, $p < .01$). There was a positive correlation between higher levels of SI attendance and higher final course grades. All students who attended at least four SI sessions throughout the semester received a final course grade of A or B. A subpopulation of students who were designated as "at-risk" or "high risk" were studied. SI participants earned higher grades their counterparts who did not attend SI sessions (At-risk: 2.60 vs. 2.18; High-risk: 2.38 vs. 1.58; $p < .01$). The researchers reported that unfortunately half of these students did not participate in any SI sessions. Surveys of students suggested the following improvements for the SI program: hold more sessions during the academic term to help reduce SI session size (mean size = 13); hold SI sessions longer than one hour to provide sufficient time to deal with material; and consider more than one SI leader to allow smaller SI session size. SI leaders provided feedback to the course instructor concerning the comprehension level of students concerning the course material. Instructors used the feedback to modify future course lectures. SI leaders the following benefits of the SI program for themselves: deeper understanding of course material, excelled in other courses since they were reviewing basic concepts in the SI course, developed communication skills, improved teaching skills, and enhanced leadership skills.

Webster, T., & Dee, K. C. (1998). Supplemental Instruction integrated into an introductory engineering course. *Journal of Engineering Education, 87*(4), 377-383. This article describes the use of Supplemental Instruction (SI) during Fall 1996 in Introduction to Engineering Analysis at Rensselaer Polytechnic Institute (Troy, NY). The course is generally taken in the first semester of the freshman year and covers vector mechanics (statics), linear algebra, and computer-based matrix methods for solving engineering problems. Of the students in the class, 23 percent participated in SI sessions. Students who participated in SI earned higher mean final course grades (3.13 vs. 2.67, $p < .025$), higher rate of A & B final course grades (77% vs. 62%, $p < .01$) and received a lower rate of D, F or withdrawals (0% vs. 18%, $p < .01$). There was a positive correlation between higher levels of SI attendance and higher final course grades. All students who attended at least four SI sessions throughout the semester received a final course grade of A or B. A subpopulation of students who were designated as "at-risk" or "high risk" were studied. SI participants earned higher grades their counterparts who did not attend SI sessions (At-risk: 2.60 vs. 2.18; High-risk: 2.38 vs. 1.58; $p < .01$). The researchers reported that unfortunately half of these students did not participate in any SI sessions. Surveys of students suggested the following improvements for the SI program: hold more sessions during the academic term to help reduce SI session size (mean size = 13); hold SI sessions longer than one hour to provide sufficient time to deal with material; and consider more than one SI leader to allow smaller SI session size. SI leaders provided feedback to the course instructor concerning the comprehension level of students concerning the course material. Instructors used the feedback to modify future course lectures. SI leaders the following benefits of the SI

program for themselves: deeper understanding of course material, excelled in other courses since they were reviewing basic concepts in the SI course, developed communication skills, improved teaching skills, and enhanced leadership skills.

Webster, T., & Hooper, L. (1998). Supplemental Instruction for introductory chemistry courses: A preliminary investigation. *Journal of Chemical Education, 75*(3), 328-331. Available: Thomas Webster, The Advising and Learning Assistance Center, Rensselaer Polytechnic Institute, Troy, NY 12180.
This article describes the use of Supplemental Instruction (SI) between Spring 1995 and Fall 1995 at the University of Pittsburgh (PA) for two semesters in General Chemistry I and for one semester in Organic Chemistry I. After a review of the literature concerning academic needs in science, the researchers describe the results of their study. The percentage of students that participated in SI ranged from 37 to 45 percent. Students uniformly rated the SI sessions very helpful (0 to 5 point scale: ranged from 4.1 to 4.5). The results uniformly favored the SI participants: Gen Chem S95: A & B grades, 39% vs. 30%; D, F & W, 10% vs. 34%; mean final grade, 2.34 vs. 1.95. Gen Chem F95: A & B grades, 43% vs. 33%; D, F & W, 15% vs. 31%; mean final grade, 2.46 vs. 2.19. Org Chem F95: A & B grades, 54% vs. 33%; D, F & W, 6% vs. 26%; mean final grade, 2.59 vs. 2.17. The researchers suggested that SI has helpful in chemistry since it helped in the following areas: mathematics, problem solving, conceptualization, theoretical, and familiarization with the chemical language.

Webster, T., & Malloch, C. (1997). *Supplemental Instruction benefits students in a traditional and non-traditional introductory physics course: A two semester study*. Unpublished manuscript, Rensselaer Polytechnic Institute. Available: Thomas Webster, The Advising and Learning Assistance Center, Rensselaer Polytechnic Institute, Troy, NY 12180.
After a review of the literature concerning physics education, this paper describes the use of Supplemental Instruction (SI) at Rensselaer Polytechnic Institute (Troy, NY). An introductory physics course (Physics 2) was studied during Fall 1996 and Spring 1997. The fall course was taught in the traditional method. The spring section of the course used the CUPLE Studio Physics Project and was much smaller the fall course. Students who received a D or F on the second exam were classified as "high-risk" and students who received a C on the same exam were designated as "at-risk." Students who attended SI received significantly ($p < .01$) higher mean final course grade (3.37 and 3.08 for the traditional and non-traditional learning environments, respectively) than those students who did not attend SI (3.09 and 2.44, respectively). Students who attended SI received a significantly ($p < .01$) lower rate of D and F final grades (1% and 5%, respectively) than the students who did not attend (8% and 37%, respectively). The data suggests that students who began to attend SI early and frequently (at least 6 times throughout the semester) benefitted more than SI than students who attended SI late in the semester or infrequently. Students who were classified as at-risk or high-risk and attended SI earned higher grades than their counterparts who did not attend SI sessions.

Weil, D. (1996, April 23). New program focuses on high-risk courses. *The Alestle Newspaper*, Edwardsville, IL, pp. 1, 4.

This newspaper article describes the use of Supplemental Instruction (SI) program at Southern Illinois University at Edwardsville in the biology department. Dr. Gertraude Wittig, coordinator of the SI program in the biology department, said that SI is different from traditional tutoring since students are actively involved in the sessions and focus is placed on development of both learning skills and content mastery.

Weiner, R. (1995, November 30). College officials tout new program. Students having trouble in class can get extra instruction. *St. Louis Post Dispatch Newspaper*, St. Louis, MO, p. 2.
This newspaper article describes the use of Supplemental Instruction (SI) at two area community colleges in the St. Louis, MO area (St. Louis Community College-Meramec and St. Louis Community College-Florissant Valley). Meramec's president, Richard Black, said that the SI program was tied to the State of Missouri's Funding for Results program that rewards colleges for achieving results.

Weiner, R. (1995, December 4). Community college students get help from 'old pros' people who have already passed classes give newcomers a boost. *St. Louis Post Dispatch Newspaper*, St. Louis, MO, p. 1.
This newspaper article describes the use of Supplemental Instruction (SI) at two area community colleges in the St. Louis, MO area (St. Louis Community College-Meramec and St. Louis Community College-Florissant Valley). Meramec's president, Richard Black, said that the SI program was part of a program to ensure accountability in education to improve its effectiveness in serving students.

Weiner, R. (1995, December 7). Community colleges' program helps students help each other. *St. Louis Post-Dispatch Newspaper*, St. Louis, MO, p. 3.
This newspaper articles describes the use of Supplemental Instruction (SI) at two community colleges in the St. Louis, MO area (St. Louis Community College-Meramec and St. Louis Community College-Florissant Valley). Gwen Nixon, who administers academic support programs at Florissant Valley said that success rates rose by ten percent in Spring 1995 in courses where SI was offered. SI is offered in the following courses at Florissant Valley: American history, economics, accounting, college algebra, chemistry, and biology. Willis Loy, Associate Dean for Mathematics and Communications at Meramec stated that the SI program is cost effective since it only takes the retention of one student who would have withdrawn from a course to pay for the salary of the SI leader.

Westin, L. K., & Nordström, M. (2002). *Supplemental Instruction (SI) - Applied on the course Object-Oriented Programming Methodology*. Unpublished manuscript, Department of Computing Science, Umeå University, Sweden. Retrieved July 1, 2004, from http://www.cs.umu.se/research/reports/2003/001/part1.pdf
Supplemental Instruction (SI) was started in the introductory computer programming course at Umea University (Sweden) due to the low pass rate of the students in recent years. The SI program was started in Fall 2002 and the report describes the SI program results. After the introductory section of the report devoted to an overview of SI and identifying the need for academic assistance with the Swedish students, the report provides a detailed narrative for how SI was implemented with recommendations for

program modifications. The final section of the report is devoted to an analysis of the impact of SI with students regarding test scores and course withdrawal. If students attended three of more times during the academic term, academic results were favorable for the SI participants.

Whatman, S. (1995). *Peer assisted study sessions with Aboriginal and Tores Strait Islander students during semester two, 1995*. Unpublished manuscript, Queensland University of Technology at Brisbane, Queensland, Australia.
This report describes the use in semester 2, 1995 of Peer Assisted Study Sessions (PASS) at Queensland University of Technology (Australia) with first year Aboriginal and Torres Strait Islander (A&TSI) students who were attending class at the Gardens Point Campus. PASS is the locally used name for Supplemental Instruction (SI). A&TSI students had typically experienced considerable difficulty in courses such as Information Technology and Business. These courses historically had low Indigenous student enrollments, and consequently, had very few successful graduates. Eight courses were selected for PASS support: Computer Applications, Software Development 1 & 2, Technology of Information Systems, Business Communication & Application Development, Theoretical Perspectives on Communication, Microeconomics, and Reporting Principles. Before introduction of the PASS program in the second semester, the A&TSI students as a group earned fairly low grades. At the end of the semester with PASS support, the students earned higher final course grades. PASS leaders reported the following benefits for themselves: more opportunity to talk with faculty members, greater understanding of course content which helped in other classes, and developed friendships with more students that they would normally would have not met.

White, B. (1996). The student peer mentor program in its trial year: A mentor's perspective. *Queensland University of Technology Law Journal, 12*(1), 221-228. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
In 1994 the Student Peer Mentor program was piloted in the Bachelor of Laws program of study (two individual classes: Torts and Law of Contract) at Queensland University of Technology in Australia. The program was based upon Supplemental Instruction (SI). This article describes the program from the perspective of one of the student mentors. Strengths of the program included: less private time needed to study; non-threatening environment; identified academic skills needed for success; and expanded social circles. Benefits of the program for the mentors included: improved interpersonal communication skills; increased content comprehension; provided personal satisfaction of helping others; and improved confidence in leadership and group situations.

Wiatr, J., & Stout, B. (1999). Get creative: Working with SI data. In *Proceedings of the First National Conference on Supplemental Instruction and Video-based Supplemental Instruction* (pp. 11-12). Kansas City, MO: Center for Supplemental Instruction, University of Missouri-Kansas City.
This article examined possibilities of developing graphic visuals that help relate necessary information to a variety of audiences interested in the SI model. Starting with data routinely collected in the term end report, the authors moved to considering other

resources needed to answer a diverse range of questions about the value of SI in the post secondary setting.

Widhaim, S. (2004, April 12). Meeting of minds: Studying in groups pays off in learning. *The Washington Times Newspaper*, Washington, D.C., p. B1.
This newspaper article describes the Supplemental Instruction (SI) program at George Mason University. The article contains numerous quotations by SI leaders as well as SI participants.

Widmar, G. E. (1994). Supplemental Instruction: From small beginnings to a national program. In D. C. Martin, & D. Arendale (Eds.), *Supplemental Instruction: Increasing achievement and retention* (pp. 3-10). New Directions for Teaching and Learning No. 60. San Francisco: Jossey Bass.
The chief student affairs officer at the University of Missouri-Kansas City offers a historical review of the development and implementation of Supplemental Instruction (SI). The SI program was first implemented with the Dental, Medical, and Pharmacy schools since an unacceptable rate of students were leaving the institution. Later the SI program was expanded to the College of Arts and Sciences. The author describes the administrative and political issues that must be addressed to meet issues important to administrators and faculty members. Since the Division of Student Affairs views its programs as cocurricular rather than extracurricular, administrative placement of the SI program with Student Affairs was a natural fit for the campus. Faculty and administrative support for SI remains for the following reasons: SI supports cultural diversity; SI supports critical thinking; SI supports student retention and academic performance; and SI is both replicable and adaptable.

Widmar, G. E., & DeBuhr, L. (1987). Supplemental Instruction: Meeting the academic development needs of students at urban universities. In A. Artibise, & W. Fraser (Eds.), *New Directions for Urban Universities: International Perspectives* . Winnipeg, Canada: Institute of Urban Studies.
This book chapter discusses the use of Supplemental Instruction (SI) as a strategy to support the academic success of students.

Wiethop, C. (1985, March 15). Supplemental Instruction planned. *Current (University of Missouri-St. Louis Student Newspaper),* 1-3.
This newspaper article describes the implementation of the Supplemental Instruction (SI) program on the campus of the University of Missouri-St. Louis.

Wilcox, F. K. (Ed.). *Supplemental Instruction Update*. Available: Center for Supplemental Instruction, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110. Retrieved July 1, 2004, from http://www.umkc.edu/cad/si/
The Supplemental Instruction Update newsletter is published by the National Center for Supplemental Instruction (SI) at the University of Missouri-Kansas City. Topics in the newsletter include: interviews with SI programs in programs around the world; articles discussing adaptions of the SI model; reports of SI research studies; information regarding upcoming training workshops for SI Supervisors and conferences for SI

program managers; and other topics. Subscriptions are complimentary for anyone regardless of whether they have currently active SI programs.

Wilcox, F. K. (1999). Killer course survival: Supplemental Instruction. *The College Parent Advisor, 3*(1), 2-3.
This article provides a general overview of the Supplemental Instruction (SI) model.

Wilcox, F. K. (1993). Reasons educators and students choose Supplemental Instruction. In D. C. Martin, & D. Arendale (Eds.), *Supplemental Instruction: Improving first-year student success in high-risk courses* 2nd ed., (pp. 27-30). Monograph Series No. 7. Columbia, SC: National Resource Center for The Freshman Year Experience and Students in Transition. (ERIC Document Reproduction Service No. ED354839).
In this chapter a variety of factors are identified that have been reported as significant in generating interest by educators and students with Supplemental Instruction. These factors include: SI supports high academic standards; cost-effectiveness of the SI program; meets immediate pragmatic needs of students; SI avoids a remedial/developmental image; SI sessions are non-threatening for students; SI sessions develop a community of supportive learners; and SI helps students to develop transferable study strategies..

Wilcox, F. K. (1998, Winter). Supplemental Instruction. *NASPA IV West Newsletter,* 4. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This short newsletter article provides a basic overview of the Supplemental Instruction (SI) program. The article three of the reasons that are commonly cited by institutions regarding why they have selected SI: (1) high risk courses are easy to identify; (2) SI meets the perceived needs of students; and (3) SI avoids a remedial image and is non-threatening.

Wilcox, F. K. (1996, Fall). Supplemental Instruction: Academic support in high-risk courses. *Midwest Regional Association for Developmental Education Newsletter,* 10-11.
This newsletter article provides an overview of the Supplemental Instruction (SI) program.

Wilcox, F. K. (1995). Supplemental Instruction and efficiency in learning. In M. T. Keeton, B. Mayo-Wells, J. Porosky, & B. Sheckley (Eds.), *Efficiency in adult higher education: A practitioner' handbook* (pp. 102-107). College Park, MD: The University of Maryland University College, Institute for Research on Adults in Higher Education.
This chapter provides an overview of the Supplemental Instruction (SI) program. The SI program is efficient since it provides a highly effective academic support program (higher grades, lower course withdrawals, higher reenrollment and graduation rates) for a moderate cost by employing student facilitators. Since the SI sessions occur outside of class, it preserves the time available for the course professor and allows them to more efficiently use their class time addressing the course material rather than using a portion of the time to address issues best addressed during the SI sessions.

Wilcox, F. K. (1993). *Supplemental Instruction: Improving academic success in historically-difficult courses* [Audio cassette]. Iowa City, IA: National Center for Student Retention. Available: Interlibrary loan from Valencia Community College in Florida. Taped at the 1993 National Conference on Higher Education in New Orleans, LA, Dr. Kim Wilcox from UMKC discusses his experience with Supplemental Instruction (SI), a nonremedial model of student academic assistance that targets historically-difficult courses rather than high-risk students.

Wilcox, F. K. (1997, Spring). Supplemental Instruction in Australia: An interview with Ron Gardiner. *Supplemental Instruction Update,* 1-2.
This interview with Ron Gardiner provides an overview of the development of Supplemental Instruction (SI) at institutions in Australia. Gardiner, a physicist, is an SI Certified Trainer and is Emeritus Professor and Coordinator of the SI program at Queensland University of Technology in Brisbane. An additional feature of the SI program is that the classroom instructor requests feedback from the SI leader concerning the comprehension level of the students. This provides an opportunity for the instructor to clarify or provide more information at the next class period.

Wilcox, F. K. (1996, Summer). Supplemental Instruction in South Africa: An interview with Andre Havenga. *Supplemental Instruction Update,* 1, 3.
This interview describes the development of the Supplemental Instruction (SI) program at institutions in the Republic of South Africa. Andre Havenga is an SI Certified Trainer for South Africa and is also the Director of Instructional and Organizational Development at the University of Port Elizabeth (UPE). UPE provides SI support for 77 courses in 21 academic departments. Havenga reports the following benefits of the SI program: provides academic support for the new student subpopulations that were formerly excluded by government policy; academic support is mainstreamed with academic courses; provides faculty development through feedback that allows the instructor to clarify and provide additional information at the next class session; and provide another forum for social integration. SI leaders report a number of benefits for themselves: enhanced academic skills; improved self-confidence; additional work experience that may help with job interviews; and additional contact with key faculty members from their discipline.

Wilcox, F. K. (1996, Summer). Supplemental Instruction in Sweden: An interview with Marita Bruzell-Nilsson and Leif Bryngfors. *Supplemental Instruction Update,* 1, 3.
This interview describes the development of the Supplemental Instruction (SI) program in Sweden. Academic assistance at postsecondary institutions in Sweden is a new movement. The interviewees are SI Supervisors at Lund University (Lund, Sweden) and are also Certified Trainers for SI. Nearly a dozen institutions in Sweden have established SI programs. SI leaders report that they like serving in the program since they have an opportunity to: develop their presentation skills; practice putting forth a point of view; and developing group management skills that will be useful when they become employed.

Wilcox, F. K. (1992, February 17). *Supplemental Instruction: Interview with Deanna Martin and Robert Blanc.* [Videotape]. Connett, J. (Producer) Kansas City, MO: National

Diffusion Network, United States Department of Education. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This videotape interview provides a historic overview of the Supplemental Instruction (SI) program. The creator of the SI program -- Deanna Martin -- and her husband Robert Blanc who customized the use of SI with medical students are interviewed in this program. Topics included: overview of the SI program; historical background of SI; typical activities in SI sessions; training of SI leaders; and suggested methods of evaluating the SI program.

Wilcox, F. K. (1996). *Supplemental Instruction session demonstration.* [Videotape]. Wilcox, F. K. (Producer) Kansas City, MO: Center for Supplemental Instruction, The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This videotape provides a simulation of a Supplemental Instruction (SI) session in an introductory Physical Science course. Students who are participating in SI during the current academic term simulate a SI session for a recent class lecture. Common SI session activities are illustrated: vocabulary development, identification of main ideas, connecting ideas, creating visual matrixes, lecture note review, and test question prediction. SI participants and the SI leader for the course share benefits of SI participation. The moderator then provides a debrief of the SI session.

Wilcox, F. K. (1992, Winter). Twenty years of Supplemental Instruction: An interview with Deanna Martin. *Supplemental Instruction Update,* 1, 6.
This newsletter interview of Deanna Martin, creator of the Supplemental Instruction (SI) program, discusses the historical development of the model and its part in the development of collaborative learning in higher education. Martin believes that the next stage of development for SI is its mainstreaming of academic support and integration of learning strategies into the classroom. She reports of how SI is being used for faculty development.

Wilcox, F. K., & Koehler, C. (1996). Supplemental Instruction: Critical thinking and academic assistance. *Metropolitan Universities: An International Forum, 6*(4), 87-99.
This article provides a basic overview of the Supplemental Instruction (SI) including data from the University of Missouri-Kansas City. A UMKC study reviewed data from a geographically and institutionally diverse group of 146 institutions that used SI in 2,875 courses of diverse academic areas with an enrollment of 298,629 students. The data suggests that SI participants earned higher mean final course grades (2.30 vs. 1.85); higher percent of A and B final course grades (47.5% vs. 35.8%) and a lower rate of D, F and course withdrawals (23.7% vs. 38.0-%). A 1989 study at UMKC found that SI participants reenrolled the following semester at a higher rate than non-SI participants (90.0% vs. 81.5%). A study of SI and non-SI participants during their first academic term at UMKC in Fall 1983 found that by Fall 1989 the SI participants had graduated at a higher rate (30.6% vs. 18.2%). A comparison is made between the traditional paradigm of learning that is the current pedagogy of most classroom instructors and the new

reflective learning paradigm. SI sessions help students to use both paradigms to maximize learning and academic achievement.

Williams, O., Jeffries, M., & Fortier, P. (1990). *Minority student retention: A successful partnership* [Audio cassette]. Madison, WI: Topitzes & Associates.
Taped at the 1990 National Conference on Student Retention in Washington, D.C., three experts provide a general administrative overview of minority student retention programs at the University of Illinois (Urbana); discuss the linkages of minority students to academic support services such as tutoring, study skills, and Supplemental Instruction; and explain the academic monitoring process of counseling students. Finally the three discuss the success rate that the combined program has promoted. A question and answer period follows.

Wittig, G., North, S., & Thomerson, J. E. (1996). Supplemental Instruction improves student retention and performance in biology. *Transactions, 89*(65), 79.
This article reports the use of Supplemental Instruction (SI) in a biology course at Southern Illinois University at Edwardsville. Success in Biology 120, which introduces into the majors core, is a strong predictor of academic survival. Because 50 percent of students earned D, E and withdrawal grades, SI was introduced. Undergraduate SI leaders were placed in both lectures and laboratories, and they offered weekly, out-of-class SI sessions. Of 171 Fall 1995 and 88 Spring 1996 students, 56 and 67 percent respectively participated in SI. Students attending from 4 up to 37 sessions per semester averaged a full grade point better course grades than non-SI students and hardly any (4 and 0 respectively) D, E, and withdrawal grades. Differences were significant at the 1 and 5 percent level respectively.

Wolfe, R. F. (1988). A model retention program for the community college. *Maryland Association for Higher Education Journal, 11*, 18-20.
This article describes the implementation of the Supplemental Instruction (SI) program at Anne Arundel Community College (Arnold, MD). In addition to a descriptive overview of the SI program, data from a 1987 research study suggests that SI participants received higher mean final course grades (2.6 vs. 1.9) and lower rates of D, F and withdrawals (24% vs. 44%). Using the same data set, when developmental education students and students of color were studied regarding the impact of SI attendance, the results were more pronounced than when examining the entire class of students. SI participants earned higher mean final course grades (3.1 vs. 1.8).

Wolfe, R. F. (1990). Professional development through peer interaction. *The Journal of Professional Studies, 14*(1), 50-57.
The Supplemental Instruction (SI) program at Anne Arundel Community College (Arnold, MD) was modified to use faculty members as SI supervisors. While this was the initial focus for the faculty members, the mentor role evolved into an opportunity for them to observe colleagues and to grow as teachers. Mentors are placed in classes outside their own discipline. Faculty mentors were placed in classes outside their own discipline. The classroom instructor and faculty mentor would meet periodically to provide feedback to each other and discuss strategies to improve instructional effectiveness. Faculty mentor roles included: 1) attending a three-day pre-semester

training seminar (e.g., examined learning strategies, examined their own teaching and learning styles, learned questioning techniques, and practiced group management); 2) attending all classes and study sessions as a student in the target class for the first four weeks of the semester; 3) working with student leaders to prepare strategies for the study session; 4) working with student leaders to create supplemental materials such as graphic representation of abstract concepts; 5) formally evaluating student leaders during the second half of the semester, and 6) keeping a daily journal to record their observations and reflections about classes and SI sessions.

Wolfe, R. F. (1987). The Supplemental Instruction program: Developing learning and thinking skills. *Journal of Reading, 31*(3), 228-232.
The author describes implementation of the Supplemental Instruction at Anne Arundel Community College in Arnold, Maryland. A Fall 1986 research study concerning the impact of the SI program with a History 211 course suggested that SI participation contributed to higher final course grades (2.5 vs. 1.6) and lower rates of D, F and withdrawal (16% vs. 55%) even though the SI participants had a lower mean SAT score. SI participants self-reported high satisfaction with their experience in the SI program (4.5 on a 5 point scale). Some professors at the college reported using the SI program for faculty development in the following ways: sometimes the course instructor incorporated SI leader developed materials initially used during SI sessions; used the SI leader as a feedback forum for evaluating the comprehension level of students of key concepts.

Wolfe, R. F. (1987, Spring). The Supplemental Instruction program: Developing learning and thinking skills across the curriculum. *Issues in College Learning Centers, 5*, 5-12.
The author describes implementation of the Supplemental Instruction (SI) at Anne Arundel Community College in Arnold, Maryland. A Fall 1986 research study concerning the impact of the SI program with a History 211 course suggested that SI participation contributed to higher final course grades (2.5 vs. 1.6) and lower rates of D, F and withdrawal (16% vs. 55%) even though the SI participants had a lower mean SAT score (370 vs. 430). Another indication of the influence of the SI program was a shift of the overall rate of D, F and course withdrawals from 45 percent down to 33 percent for the History 211 course. Some professors at the college reported using the SI program for faculty development in the following ways: sometimes the course instructor incorporated SI leader developed materials initially used during SI sessions; used the SI leader as a feedback forum for evaluating the comprehension level of students of key concepts.

Wolfe, R. F. (1988). Supplemental Instruction with mentoring support at Anne Arundel Community College. *Proceedings from the 1988 Midwest College Learning Center Association Conference.* (pp. 106-108). Midwest College Learning Center Association. (ERIC Document Reproduction Service No. ED413942).
The Supplemental Instruction (SI) program at Anne Arundel Community College (Arnold, MD) was modified to use faculty members as SI supervisors. While this was the initial focus for the faculty members, the mentor role evolved into an opportunity for them to observe colleagues and to grow as teachers. Faculty mentors were placed in classes outside their own discipline. The classroom instructor and faculty mentor would

meet periodically to provide feedback to each other and discuss strategies to improve instructional effectiveness.

Wolfe, R. F. (1991). *Supplemental Instruction with mentoring support at Anne Arundel Community College*. Arnold, MD: Anne Arundel Community College. (ERIC Document Reproduction Service No. ED413942).
Anne Arundel Community College's Supplemental Instruction (SI) with Mentoring Support provides a program of academic support for students enrolled in difficult required courses, while also creating valuable opportunities for faculty professional development and community interaction. By adapting the SI model for the community college, this program has trained students and faculty to work together to facilitate learning and thinking skills through a learner-centered approach of peer group study and community and faculty mentoring support. Student SI leaders are trained through a three-credit hour practicum in education course. Faculty who are trained in study skills and learning strategies through a three day pre-term training seminar: attend classes and study sessions in courses outside their discipline for the first four weeks of the academic term; work as mentors to student SI leaders to prepare strategies for SI sessions; work with SI leaders to create supplemental materials; formally evaluate SI leaders during the second half of the academic term; and maintain a daily journal. In evaluating the project, faculty mentors stated the program provided an opportunity to broaden their professional expertise and their perspectives on student learning. They had developed new teaching approaches, an awareness of their teaching styles, and an understanding of students' needs. A second modification to the SI program provided local community leaders in their career fields to provide mentoring support in small group sessions and on-site visits. On the day of the community leader's visit, SI leaders conduct an abbreviated SI session, giving the community mentor the opportunity to observe and participate in an SI session. Then, the community mentor speaks informally with students, discussing career related topics and answering students' questions.

Wolfe, R. F. (1987). Writing across the curriculum through Supplemental Instruction. *Maryland English Journal, 21*(2), 43-48.
At Anne Arundel Community College (Arnold, MD), the Supplemental Instruction (SI) program is also used to improve students' writing skills. In SI sessions for a history class during Fall 1986 additional activities were directed to developing writing skills. Research suggests that SI participants demonstrated improved performance in written essay examinations. The activity had four steps: 1) overview all material from notes and text that could be used to answer the question; 2) organize the information; 3) develop a summary statement; and 4) develop an outline for the answer. SI participants earned a higher mean final course grade (2.5 vs. 1.6) and a lower rate of D, F and course withdrawals (16% vs. 55%).

Wolfe, R. F., & Wells, E. (1990, Winter). Community mentors for Supplemental Instruction. *National Association for Developmental Education Newsletter,* 12.
Anne Arundel Community College (Arnold, MD) has made an adaption of the Supplemental Instruction (SI) to provide additional information concerning personal and career options related to the courses that have SI attached to them. A community

person (mentor) is invited to attend one SI session for a course that is applicable to the mentor's field. A mentor may be a personal friend of the course instructor, or may be active in the vocational trade council, cooperative education, or advisory boards serving career programs at the college. The SI leader helps prepare the SI participants to generate questions for the mentor's visit. The mentors become another partner in encouraging academic success and the meaningfulness of the course for future jobs. Upon mutual interest, the mentors and students may continue discussions outside of class and SI sessions that might result in job site visits or additional career discussions.

Wood, T. (1984, September 10). Plan aims at making students better thinkers. *The Kansas City Star Newspaper*, Kansas City, MO, pp. 1A, 5A.
The newspaper article provides an overview of the Supplemental Instruction (SI) program. The article contains an interview with several SI personnel -- including Deanna Martin, creator of the SI program -- and faculty members who have SI attached to their class. Faculty report support for the program for the following reasons: do not have to spend time in class repeating content material since it can be discussed more fully in SI sessions; improves academic performance of students; and does not infringe upon the tradition of the professor's role in the learning process. In the Foundations of Philosophy course the SI participants received a mean final course grade of 2.3 (out of 4.0) as compared with 1.4 for non-SI participants.

Worthington, A., Hansen, J., Nightingale, J., & Vine, K. (1995). Peer teaching and introductory economics: An application using the Peer Assisted Study Scheme (PASS) at the University of New England. *Conference Proceedings of the Australian Economics Education Symposium in conjunction with the 24th Conference of Economists* (pp. 22-38). Adelaide, South Australia, Australia: Australian Economics Education Symposium. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper discusses the use of Peer Assisted Study Scheme (PASS) with approximately 300 students in an Introductory Microeconomics class at the University of New England (Australia) in 1995. PASS is an Australian contextualization of the Supplemental Instruction (SI) program. After an overview of peer collaborative learning and challenges with student learning in economics courses, the paper shares the results of qualitative and quantitative research. Quantitative data included assessment scores, the final exam results and the responses to a 34 item survey administered to all students in the class. The survey included questions about their experience in the PASS sessions, reasons they did or did not participate in PASS, usefulness of the tests, possible reasons for academic difficulty in the class, and to predict their final grade in the class. Data were analyzed using Item Response Theory and multiple linear regression techniques. Qualitative data were collected by the PASS coordinator from weekly written reports of the PASS facilitators, PASS session observations, and in-depth interviews. About one-third of the students participated in SI. Of these students, more than 50 percent attended more than half of the available sessions during the academic term. The PASS participants listed either "to improve understanding" or "to gain additional information" as the top reason for attending the sessions. Only five percent listed "to learn study skills" as the top reason. Only 22 percent of the nonparticipants said that they had no desire to attend or thought they were

unnecessary. The most common reason not to attend related to insufficient time. It appears that the SI programs is directly beneficial to the SI participants and indirectly beneficial to non-SI participants since the program influenced the teaching staff to increase student learning. Before introduction of PASS, the failure rate in the course was 33 percent. Following the introduction of PASS, the failure rates have dropped to 18 percent. Through weekly feedback from the PASS facilitator, the class lecturer reported that he intentionally modified the lecture content and his lecturing style. One change was that the lecturer reduced the volume of information delivered so that more time could be spent on improving student understanding of critical concepts.

Worthington, A., Hansen, J., Nightingale, J., & Vine, K. (1997, September). Supplemental Instruction in introductory economics: An evaluation of the University of New England's Peer Assisted Study Scheme (PASS). *Australian Economic Papers,* 69-80 Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This articles discusses the use of Peer Assisted Study Scheme (PASS) with approximately 300 students in an Introductory Microeconomics class at the University of New England (Australia) in 1995. PASS is an Australian contextualization of the Supplemental Instruction (SI) program. After an overview of peer collaborative learning and challenges with student learning in economics courses, the paper shares the results of qualitative and quantitative research. Quantitative data included assessment scores, the final exam results and the responses to a 34 item survey administered to all students in the class. The survey included questions about their experience in the PASS sessions, reasons they did or did not participate in PASS, usefulness of the tests, possible reasons for academic difficulty in the class, and to predict their final grade in the class. Data were analyzed using Item Response Theory and multiple linear regression techniques. Qualitative data were collected by the PASS coordinator from weekly written reports of the PASS facilitators, PASS session observations, and in-depth interviews. About one-third of the students participated in SI. Of these students, more than 50 percent attended more than half of the available sessions during the academic term. The PASS participants listed either "to improve understanding" or "to gain additional information" as the top reason for attending the sessions. Only five percent listed "to learn study skills" as the top reason. Only 22 percent of the nonparticipants said that they had no desire to attend or thought they were unnecessary. The most common reason not to attend related to insufficient time. It appears that the SI programs is directly beneficial to the SI participants and indirectly beneficial to non-SI participants since the program influenced the teaching staff to increase student learning. Before introduction of PASS, the failure rate in the course was 33 percent. Following the introduction of PASS, the failure rates have dropped to 18 percent. Through weekly feedback from the PASS facilitator, the class lecturer reported that he intentionally modified the lecture content and his lecturing style. One change was that the lecturer reduced the volume of information delivered so that more time could be spent on improving student understanding of critical concepts.

Wright, G. L., Wright, R. R., & Lamb, C. E. (2002). Developmental mathematics education and Supplemental Instruction: Pondering the potential. *Journal of Developmental Education, 26*(1), 30-35.

During the Spring, Summer, and Fall 2000 semesters, data were gathered and analyzed concerning the effective use of Supplemental Instruction (SI) in 90 developmental mathematics courses. The study monitored student outcomes in a small pilot program conducted at a southern state university with about 11,000 students. The student outcomes suggested that Supplemental Instruction may have made a positive difference in the performance and retention rates of developmental mathematics students when the instructor was actively involved in promoting the SI group and certain modifications were made to the traditional role of the SI leader in the classroom.

Yates, J., Gill, F., & Webb, C. (1995). Peer mentoring to facilitate learning in economics. In *Australian Economics Education Symposium Proceedings: Addendum* (pp. 40-56). Adelaide, South Australia, Australia: Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper describes and provides a preliminary evaluation of Supplemental Instruction (SI) used at the University of Sydney (Australia) in an economics course during 1995. Three quarters of the SI leaders listed the following benefits of involvement with the program: improved teaching skills; improved leadership skills; increased confidence; and/or a change in the way they thought about economics.

Yockey, F. A., & George, A. A. (2000). The effects of a freshman seminar paired with Supplemental Instruction. *Journal of the First-Year Experience and Students in Transition, 10*(2), 57-76.
This study examines the impact on student performance of one section of a new model of first-year seminar, which is paired with an introductory-level core social science course. The freshman transition seminar instructor attends the core course, takes notes and exams, does class projects, models good student behaviors, and leads a weekly review of the core course material which is presented in a model similar to Supplemental Instruction (SI). The authors collected data over three semesters on core course grade and semester grade point average for students in the first-year seminar and students in a control group selected from a matched sample. Their results indicate that students in the first-year seminar paired with SI achieved significantly higher grades in the paired core course, attained significantly higher semester grade point averages for the semester of intervention, and had significantly better retention rates after two years than students in the control group.

Zaritsky, J. S. (1989). *Peer tutoring: Issues and concerns, results of a survey*. Long Island City, NY: La Guardia Community College. (ERIC Document Reproduction Service No. ED315134).
In 1988, a survey was conducted to determine the characteristics and extend of peer tutoring program at two- and four-year colleges in New York. Findings included: 95 percent of institutions had at least one peer tutoring program; 2) 41 percent had centralized tutoring labs; 3) institutions most commonly provided Supplemental Instruction in mathematics, biology, business, chemistry, and English; and 4) 96 percent provided peer tutors with training.

Zaritsky, J. S. (1994). *Supplemental Instruction: A peer tutoring program at La Guardia Community College*. Unpublished manuscript, Long Island City, NY: La Guardia Community College. (ERIC Document Reproduction Service No. ED373859).
This report describes the use of Supplemental Instruction (SI) at La Guardia Community College (NY). In spring 1993, an SI program was pilot tested in Principles of Accounting I, Introduction to Economics I and Fundamentals of Human Biology I courses. In Economics I the SI participants received a higher percent of A, B, and C final course grades (37% vs. 27%) and a lower rate of D, F, and course withdrawals (63% vs. 73%). In Economics I the SI participants received a higher percent of A, B and C final course grades (51.7% vs. 43.6%) and a lower rate of D, F and course withdrawals (48.3% vs. 56.4%). In Human Biology I the SI participants received a higher rate of A, B, and C final course grades (63.2% vs. 48.3%) and a lower rate of D, F, and course withdrawals (36.7% vs. 51.7%). Some SI leaders reported personal improvement in the following areas: higher self confidence since they helped other students to do better; increased content knowledge through second review of the course; improved interpersonal communication skills; accelerated emotional and intellectual growth.

Zaritsky, J. S. (2001). Supplemental Instruction at an urban community college. In J. E. Miller, J. E. Groccia, & M. S. Miller (Eds.), *Student-assisted teaching: A guide to faculty-student teamwork* (pp. 103-108). Bolton, MA: Anker Publishing Company. (ERIC Document Reproduction Service No. ED449713).
Supplemental Instruction (SI) is used at LaGuardia Community College in New York to serve an ethnically-diverse student body. After providing a general overview of the SI model, a 1997-98 research study was shared that analyzed the impact of the program with courses in accounting, computer science, biology, and chemistry. Overall mean final course grades favored the SI participants (2.75 vs. 1.65) and higher percentage of successful grades (82% vs. 53%).

Zaritsky, J. S. (1999). Supplemental Instruction and collaborative learning. In *Selected conference papers: National Association for Developmental Education* (pp. 38-42). Detroit, MI: National Association for Developmental Education.
This abstract describes the use of Supplemental Instruction (SI) at an urban two-year college (LaGuardia Community College, Long Island, NY). LaGuardia. This paper explores the use of collaborative learning to improve SI: positive interdependence, face-to-face promotive interaction, individual accountability, interpersonal and small group skills, and group processing.

Zaritsky, J. S. (1998). Supplemental Instruction: What works, what doesn't. In *Selected conference papers: National Association for Developmental Education* (pp. 54-56). Mobile, AL: University of South Alabama. Retrieved July 1, 2004, from http://www.umkc.edu/cad/nade/nadedocs/98conpap/jzcpap98.htm and http://www.nade.net/documents/SCP98/SCP98.9.pdf.
This conference abstract describes the use of Supplemental Instruction (SI) at an urban two-year college (LaGuardia Community College, Long Island, NY). LaGuardia piloted SI in three course in 1993. It now has grown to support more than 20 courses. The average final course grade of SI participants exceeds that of non-participants by approximately a full letter grade. Six key factors were identified for SI programs with

positive outcomes for students: SI program supervisor handles multiple roles; college administration is supportive of the program; faculty enthusiasm and support; talented SI leaders; courses selected for SI support have high rates of D, F, or withdrawals; and highly involved SI participants.

Zerger, S. (1999). Discipline-specific SI strategies for writing. In *Proceedings of the First National Conference on Supplemental Instruction and Video-based Supplemental Instruction* (pp. 54-65). Kansas City, MO: Center for Supplemental Instruction, University of Missouri-Kansas City.
Research and scholarship in composition theory investigates differences in reading and writing across the academic disciplines. Some of these differences are reflected in vocabulary; patterns of organization; kinds of evidence; documentation; and research methodologies. Due to the unique requirements of the disciplines, some of the following activities might be quite useful for students: preparatory writing, focused timed writings, brainstorming ideas for upcoming papers or reports, peer response to other student writing samples, and summarizing reading assignments.

Zerger, S. (1994). Supplemental Instruction in the humanities. In D. C. Martin, & D. Arendale (Eds.), *Supplemental Instruction: Increasing achievement and retention* (pp. 41-52). New Directions for Teaching and Learning No. 60. San Francisco, CA: Jossey-Bass.
Supplemental Instruction sessions in the humanities must differ from those in other disciplines because the epistemology and the axiology differ: a) prior knowledge; b) audience expectations; c) the nature of claims or evidence. Some of the issues important for many SI sessions: need to focus on the big picture; expansion of information rather than data reduction (common in science); careful use of language; importance of writing activities; and role of authority and evidence.

Zerger, S. (1990). *Supplemental Instruction: Learning through modeling*. Unpublished manuscript, Bethel College, North Newton, KS.
This unpublished manuscript describes the use of Supplemental Instruction (SI) to improve student learning. The paper focuses on explaining how learning occurs in SI, using the social learning theory described in Bandura to do so. According to Bandura, humans can and do learn most things through watching others. This capacity to learn by observation enables humans to acquire large integrated patterns more quickly than if they had to learn all via direct trial and error.

Zulu, C. (2003). A pilot study of Supplemental Instruction for at-risk students at an Historically Black University (HBU) in South Africa. *Association Internationals De Linguistique Appliqu Review, 16*(1), 52-61.
This article discusses a pilot study during 2002 that sought to evaluate the effectiveness of Supplemental Instruction (SI) at the University of North-West, an historically black university in South Africa. The course under investigation was “Introduction to South African Legal Method and Theory" which first-year law students enrolled. Two questions were investigated: does SI have an effect on students' mastery of content? and does SI have an effect on students' perceptions of their mastery of skills? Three measures were used to evaluate SIL pre and posttests of content knowledge, student perceptions, and

final course grades. There was a correlation of higher SI attendance and higher final course grades. The study also revealed barriers and challenges that students experience at the institution. Si was most effective for students who were better prepared academically and for whom English was their first language. These students had more capacity to engage in the SI sessions and gain the most benefit. The author also noted the disadvantage of voluntary SI attendance. Often the students who most needed to be there chose not to attend due to self-reported reluctance to expose their weakness and discomfort due to lacking the skills of the most prepared students. The author recommends that SI attendance be made voluntary and that SI be combined with other academic interventions such as Accelerated Learning Groups developed by Dr. Sydney Stansbury.

Video-based Supplemental Instruction (VSI)

VSI was developed at the University of Missouri-Kansas City in the late 1980s and has been implemented by dozens of institutions in the U.S. and abroad. VSI differs from SI in several respects. The students enroll in required, core curriculum courses. The course professor records all didactic presentations on videotape for use with underprepared students as well as other students who opt for this highly interactive way of learning. Instead of attending the professor's regular lecture classes, students enroll in the *video section* of the professor's course. Students in both sections are held to the same performance standards. Specially designed facilitator and student manuals support the video sections.

VSI students, led by a trained facilitator, start and stop the videotaped presentation at pre-determined times and, in addition, whenever they have a question or want clarification. Professors design the video presentations to include periodic small group assignments to insure mastery of one concept before the next is introduced. Students complete these tasks under the supervision and with the guidance of the facilitator. When the taped lecture resumes, the professor models how he/she thinks about the assigned tasks. In this way, the students have time to construct and verify their understanding as well as compare their own thinking to that of the expert.

Arendale, D. (2001). Introduction. In *Proceedings of the First National Conference on Supplemental Instruction/VSI* (pp. 6-7). Kansas City, MO: Center for Academic Development, University of Missouri-Kansas City.
The author provides an introduction to the conference proceedings of the First National Conference on Supplemental Instruction/VSI held in Kansas City, MO during May 1999.

Arendale, D. (2004). Pathways of persistence: A review of postsecondary peer cooperative learning programs. In I. M. Duranczyk, J. L. Higbee, & D. B. Lundell (Eds.), *Best practices for access and retention in higher education* (pp. 27-42). Minneapolis, MN: Center for Research on Developmental Education, General College, University of Minnesota. Retrieved March 15, 2005, from http://www.gen.umn.edu/research/crdeul/monographs.htm
This chapter focused intentionally on a subset of the educational practice that share a common focus with increasing student persistence towards graduation. Rather than a meta-analysis of all published research studies, this chapter is a preliminary review and a description of six models. At the end of the chapter several suggestions are made for differentiating the models from each other and the level of institutional resources and resolve with implementing them. The six student peer learning programs included in this chapter meet the following characteristics: (a) the program must have been implemented at the postsecondary or tertiary level, (b) the program has a clear set of systematic procedures for its implementation at an institution, (c) program evaluation studies have been conducted and are available for review, (d) the program intentionally embeds learning strategy practice along with review of the academic content material, (e) the program outcomes include both increased content knowledge with higher persistence rates, and (f) the program has been replicated at another institution with similar positive student outcomes. From a review of the professional literature six programs emerged: Accelerated Learning Groups (ALGs), Emerging Scholars Program (ESP), Peer-Led Team Learning (PLTL), Structured Learning Assistance (SLA),

Supplemental Instruction (SI), and Video-based Supplemental Instruction (VSI). As will be described in the following narrative, some of the programs share common history and seek to improve upon previous practices. Other programs were developed independently.

Arendale, D., & McLaren, A. (1999). Supplemental Instruction: Variations on the basic theme. In *Selected Proceedings of the 16th (1997) & 17th (1998) Annual Conferences of the Pennsylvania Association of Developmental Educators* (pp. 40-44). Pittsburgh, PA: The Community College of Allegheny County. (ERIC Document Reproduction Service No. ED 428632). Retrieved July 1, 2004, from http://www.iup.edu/lc/pade/McLaren.htmlx
This paper describes some of the successful variations of Supplemental Instruction (SI). After an initial overview of SI, descriptions about innovations of the model. The first concerns Video-based Supplemental Instruction (VSI). VSI is described as an information delivery system. College students enroll in telecourses that are identical to credit courses delivered live on campus by the same professor. Students enrolled in these VSI course sections attend class eight hours a week rather than three hours since the videotape lectures are frequently stopped to engage in SI session activities. Developmental level students enrolled in VSI course sections earn higher final course grades than the traditional students enrolled in the live course sections. The second variation of the SI model is to use it for faculty development and renewal. Successful models include Salem State College and Anne Arundel Community College. Common activities include: SI leader providing anonymous feedback to the course lecturer; lecturer incorporating SI session activities inside of class sessions; lecturers serving as assistant SI supervisors and expanding their instructional/learning skills by observing other professors; and other associated activities.

Austrell, P.-E., Barmen, G., Bryngfors, L., & Gustavsson, P. (2001). VSI och "collaborative learning" for att minska variathionen I forkunskaper I mekanik bland nyborjarstudenter. *Proceedings of the Conference at Norrkoping, Sweden* Norrkoping, Sweden: Retrieved July 1, 2004, from http://www.si-mentor.lth.se/SI%20ref_webb/pdf/GerhardBarmen.pdf

Blanc, R. A., & Martin, D. C. (1994). Supplemental Instruction: Increasing student performance and persistence in difficult academic courses. *Academic Medicine: Journal of the Association of American Medical Colleges, 69*(6), 452-454.
The authors describe the use of Supplemental Instruction (SI) with medical students to earn higher final course grades in historically difficult courses. The SI process has been used successfully with students who are preparing for the USMLE Step I examination. The authors state that SI can strengthen a prematriculation program for students whose MCAT scores place them in the high-risk category for completing the medical school curriculum. To maximize learning efficiency for students in the prematriculation program, the authors suggest that a small-group preview session precedes each lecture and a small-group review follows. The article concludes with a short overview of Video-based Supplemental Instruction (VSI).

Burmeister, S. L. (1996). Supplemental Instruction: An interview with Deanna Martin. *Journal of Developmental Education, 20*(1), 22-24, 26.
This is the transcript of an interview with Dr. Deanna Martin, creator of the Supplemental Instruction (SI) model. Issues discussed in the interview include: new innovations in the SI model; cost effectiveness of the model; use of SI in other countries; current educational climate in higher education; disagreement with mandatory testing and placement of students into tracked developmental education programs; challenges with lecture-based educational delivery systems with increasing student learning mastery; and future opportunities for use of SI and Video-based Supplemental Instruction.

Du Plooy, P. (1999). VSI partnerships, and the transformation of Education in South Africa. In *Proceedings of the First National Conference on Supplemental Instruction and Video-based Supplemental Instruction* (pp. 66-86). Kansas City, MO: Center for Supplemental Instruction, University of Missouri-Kansas City.
The issue of partnerships between public and private institutions has been generating a great deal of interest in recent years in South Africa. One example of the development of a private-public partnership in higher education is that of the academic development program, Video-based Supplemental Instruction (VSI). This paper examines the introduction of VSI to South African institutions, in particulate the establishment of a partnership which has evolved to drive this project, and how the VSI program has proved successful as an alternative route into higher education for severely underprepared students. Rather than requiring students to take additional time and spend limited tuition dollars to enroll in remedial courses, students are able to concurrently develop learning strategies while enrolled in rigorous college-level courses.

English, B. J. (1999). *Effects of social integration on the academic performance of international students*. Unpublished manuscript, The University of Southern California, Los Angeles, CA. Retrieved July 1, 2004, from http://www-rcf.usc.edu/~brianeng/508.htm
This manuscript describes the use of Supplemental Instruction (SI) with postsecondary international students. A comparison is made between SI and the English Language Fellows Program at the University of Rhode Island which has similar purposes. The focus of the sessions is placed more on the use of language as the means for communicating and understanding the course material. The pairing of the native and nonnative speakers of English provides a rich atmosphere for language acquisition and fostering higher comprehension of the course content. The author then explores adapted use of Video-based Supplemental Instruction (VSI) for nonnative speakers as a supplement to challenging courses to aid in language development and mastery.

Fitzgerald, N. (1997). The dropout dilemma. *Careers and Colleges Magazine, 18*(2), 14-17, 26.
This article reviews the causes and cures for the high rate of college drop outs. The author interviewed a number of people for the article. One of those interviewed and quoted in the article is David Arendale, National Project Director for Supplemental Instruction (SI). Arendale describes how SI and its newest variation, Video-based Supplemental Instruction help students to integrate "what to learn" with "how to learn it".

Hester, B. (1992). Course teaches new skills with video. *Arctic College Dialogue Newsletter, 6*(2), 11.
This newsletter article provides an overview of the use of Video-based Supplemental Instruction (VSI) at Arctic College, Iqaluit, Northwest Territories.

Hurley, M. A. (2000). Video-based Supplemental Instruction (VSI): An interactive delivery system that facilitates student learning [Dissertation, University of Missouri-Kansas City, 1999]. *Dissertation Abstracts International, 61*(04), 1317.
The study focuses on the cognitive and affective results of a small-group learning model called Video-based Supplemental Instruction. There are two hypotheses examined in this study: Students who participate in a Video-based Supplemental Instruction history class will have higher final course grades than a comparable group of students in the same course in a lecture-format class with the same professor. Students who participate in the Video-based Supplemental Instruction class will have greater self-efficacy, self-confidence and mastery of learning strategies than they had before taking the class. Video-based Supplemental Instruction is an interactive informational delivery system that helps students master course content as they develop and refine reasoning and learning skills. Instructors record their lectures on video tape and enroll students in a video section of the course. A trained facilitator uses the taped lectures to regulate the flow of information to the learner. The lectures are stopped and started as needed, allowing the facilitator to verify that students have comprehended one idea before moving on to the next. Students develop essential reading, learning, and study skills while they master content. The major conclusions from the study were the following: A group of 185 Video-based Supplemental Instruction students received a higher percentage of A's and B's than a comparable group of 185 Non-Video-based Supplemental Instruction students in the same history class over 14 semesters. A group of 185 Video-based Supplemental students received a lower percentage of D's and F's than a comparable group of 185 Non-Video-based Supplemental Instruction students in the same history class over 14 semesters. A larger number of first-year students and African-American students were enrolled in the Video-based Supplemental Instruction history class than was expected. Video-based Supplemental Instruction students learned a variety of strategies which provided them with the academic tools to be successful on their history exams in that class. Video-based Supplemental Instruction students developed a greater sense of self-efficacy in the class. Students developed greater personal confidence because of the Video-based Supplemental Instruction experience. Some Video-based Supplemental Instruction students were unable to sufficiently articulate mastery of course concepts after completing the class.
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Koch, E., & Snyders, M. (1998). *The effect of Video Supplemental Instruction on performance in mathematics in the second semester mathematics special course*. Unpublished manuscript, University of Port Elizabeth, South Africa. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper examines the effect of Video-based Supplemental Instruction (VSI) in the second semester mathematics course which enrolled students from Ethembeni Community College in Port Elizabeth which serves as a preparation before admission to the University of Port Elizabeth (South Africa). Students who enrolled in VSI math were

matched with students enrolled in a similar math course that required attendance at Supplemental Instruction (SI) sessions. Research suggests that VSI was a more useful instructional delivery system for students with a minimum level of pre-knowledge in mathematics and who study in a consistent and responsible manner.

Koch, E., & Snyders, M. (1997). *The effect of Video Supplemental Instruction on the academic performance in mathematics of disadvantaged students*. Unpublished manuscript, University of Port Elizabeth, South Africa. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper examines the effect of Video-based Supplemental Instruction (VSI) on the mathematics performance of students whose matric marks did not enable them to be directly admitted to the Science Faculty at the University Port Elizabeth (South Africa). These students were enrolled in Ethembeni Community College in Port Elizabeth which serves as a preparation area before admission to UPE. Fifteen students who enrolled in VSI math were matched with 14 students enrolled in a similar math course that required attendance at Supplemental Instruction (SI) sessions. Research suggests that VSI was a more useful instructional delivery system for students with a minimum level of pre-knowledge in mathematics and who study in a consistent and responsible manner. In addition, the researchers suggested the usefulness of VSI in distance learning venues where experienced and trained faculty members are unavailable to deliver live instruction.

Landwehr, R. (1995, July 21). Age of reason: Older students propel universities to shift boundaries. *Kansas City Business Journal*, Kansas City, MO, pp. 21-22.
This newspaper article discusses how a variety of universities are adjusting to the needs and requirements of older students. In an interview with Dr. Kay Blair of the University of Missouri-Kansas City, a short overview of the Video-based Supplemental Instruction (VSI) program is given. Blair listed the following benefits of the VSI program for students: bridges the gap between lectures and learning; helps students to prepare for the rigor of traditional undergraduate courses; fosters collaboration and team-building which are critical skills for the world of work; and taps the individual expertise of the students.

Martin, D. C. (1994). Video-based Supplemental Instruction: An alternative to remedial courses. *The national forum on new student athletes. Proceedings of the Freshman Year Experience Conference on the First-Year Experience, Columbia, SC* (pp. 33-34). Columbia, SC: The National Resource Center for the Freshman Year Experience and Students in Transition. (ERIC Document Reproduction Service No. ED370895).
This article describes the use of Video-Based Supplemental Instruction (VSI) at the University of Missouri-Kansas City. Both a basic overview of the VSI model and a data study of the pilot study at UMKC. Though the VSI students are less prepared academically than the students in the large lecture class, the VSI group received higher mean final course grades (3.64 vs. 2.41), higher overall reenrollment rates (94 percent vs. 85 percent), and higher reenrollment rates for academic probationary students (100 percent vs. 45 percent).

Martin, D. C. (1994). *Video-based Supplemental Instruction panel discussion.* [Videotape]. Blair, K. (Producer)Kansas City, MO: Center for Supplemental Instruction, The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This videotape panel discussion provides an overview of the Video-based Supplemental Instruction (VSI) program. Moderated by the creator of SI and VSI, Deanna Martin, the panel was composed of an administrator, faculty member who placed his course on video, former VSI student, and academic advisor who places students in VSI.

Martin, D. C., & Arendale, D. (1997). *Mainstreaming of developmental education: Supplemental Instruction and Video-based Supplemental Instruction*. Unpublished Manuscript, The University of Missouri-Kansas City. Retrieved June 12, 2005, from http://www.tc.umn.edu/~arend011/mainstreamDE97.pdf
This paper describes the development of Supplemental Instruction (SI) and Video-based Supplemental Instruction (VSI) to serve an effective way to mainstream the best features of developmental education into traditional college-level courses. The historical development and modern day implementation of both programs are described.

Martin, D. C., & Arendale, D. (Eds.). (1994). *Supplemental Instruction: Increasing achievement and retention*. New Directions for Teaching and Learning No. 60. San Francisco, CA: Jossey-Bass
This monograph features nine chapters concerning: overview and foundation of the Supplemental Instruction (SI) program; use of SI for faculty development; SI in the content areas (humanities, mathematics, chemistry); research studies concerning SI; and the newest innovation of SI called Video-based Supplemental Instruction (VSI).

Martin, D. C., & Arendale, D. (1997). *Video-based Supplemental Instruction: Interactive video courses*. Unpublished manuscript, The University of Missouri-Kansas City. Retrieved June 12, 2005, from http://www.tc.umn.edu/~arend011/VSIanrpt.htm
This report reviews the Video-based Supplemental Instruction (VSI) program initiated at the University of Missouri-Kansas City. The report provides a descriptive overview of VSI as well as numerous data studies concerning its use with high school and college students. Data studies suggest that among college students the VSI participants receive higher final course grades and reenroll at higher rates than the non-participants. VSI at the college level is targeted for students who have a history of academic difficulty (e.g., probation or dismissal) and have lower academic predictors (e.g., lower standardized entrance scores, lower high school percentile rank). As measured by the Learning and Study Strategies Inventory (LASSI), VSI participants show positive gains at the end of the academic term. Data studies of high school students who enroll in VSI courses suggest that they earn higher mean final course grades than college students who do not participate in VSI but enroll in the live section of the same class.

Martin, D. C., Arendale, D., & Blanc, R. A. (1997). *Mainstreaming of developmental education: Supplemental Instruction and Video-based Supplemental Instruction*. Unpublished manuscript, The University of Missouri-Kansas City. Retrieved June 12, 2005, from http://www.tc.umn.edu/~arend011/mainstreamDE97.pdf

This manuscript was originally delivered as a paper at a special conference in January 1998 on "Alternatives to Developmental Education" that was sponsored by the U.S. Department of Education funded National Center for Lifelong Learning based at Stanford University (CA). The conference was convened to deal with the growing concern by some states regarding traditional developmental education credit courses. The conference was designed to identify several alternative ways of accomplishing the same purposes as developmental courses (e.g., linked courses, critical thinking courses, SI, VSI). This chapter first provides an overview of SI and VSI. Then it concludes with the pedagogical basis for both. In developmental education, research scholars embrace the reductionist approach by seeking first to identify the separate and distinct skills required for academic success, then to measure the degree to which these are present or absent in the individual, and finally to isolate and teach those skills that are in deficit. Practitioners assume that mastery of a series of independent skills lead to academic competency. SI and VSI break with this view and provide a holistic approach to education. Given sufficient efficiency on task, effective guidance, and the time and opportunity to do so, any serious student can learn.

Martin, D. C., & Blanc, R. (2001). Video-based Supplemental Instruction (VSI). *Journal of Developmental Education, 24*(3), 12-14, 16 , 18, 45.
Developed at the University of Missouri-Kansas City, Video-based Supplemental Instruction© is an interactive information processing and delivery system that helps academically at-risk students master rigorous course content as they concurrently develop and refine reasoning and learning skills. Rather than requiring prerequisite enrollment in a traditional developmental course, VSI is a learning system that mainstreams the best practices of developmental education into historically-difficult core curriculum courses. Research suggests the efficacy of VSI for improving academic achievement for students of diverse levels – from elementary school for children studying mathematics through professional school for future doctors studying to pass the first step of their medical license examination boards. VSI is presented as a holistic alternative to traditional approaches of developmental education.

Martin, D. C., & Blanc, R. A. (1994). Video-Based Supplemental Instruction: A pathway to mastery and persistence. In D. C. Martin, & D. Arendale (Eds.), *Supplemental Instruction: Increasing achievement and retention* (pp. 83-92). New Directions for Teaching and Learning No. 60. San Francisco, CA: Jossey-Bass.
The Video-Based Supplemental Instruction (VSI) delivery system using Supplemental Instruction that is described here combines developmental studies with core curriculum courses, offering an alternative to remedial/developmental instruction. Students that are least prepared at the institution need a more powerful academic support service. The difference between the VSI approach and those traditionally used in postsecondary education lies in the centrality of students to the process as opposed to the centrality of the material to be learned: students conduct the preview; students determine the pace of the lecture; students assure their own mastery as the lecture progresses; students select the key points for immediate review; and students identify misconceptions and modify and adapt their conceptions to achieve, eventually, more complete understanding. VSI was designed to allow such students to both earn credit for core curriculum courses while they develop the requisite learning strategies needed for

academic success. This provides an alternative way to provide developmental education.

Martin, D. C., & Hurley, M. (2005). Supplemental Instruction. In M. L. Upcraft, J. N. Gardner, & B. O. Barefoot (Eds.), *Challenging & supporting the first-year student: A handbook for improving the first year of college* (pp. 308-319). San Francisco, CA: Jossey-Bass.
This chapter provides an overview of Supplemental Instruction (SI). After providing guiding principles of SI, evidence of effectiveness is cited from the original developing site, University of Missouri-Kansas City as well as several other representative institutions. Two adaptations of the SI model are cited: Video-based SI and the Advanced Preparation Program. The chapter closes with recommendations for increasing the effectiveness of SI.

Maxwell, M. (1997). *Improving student learning skills: A new edition*. Clearwater, FL: H&H Publishing.
Supplemental Instruction and Video-based Supplemental Instruction are described in several sections of this comprehensive book on developmental education and learning assistance programs. Short selections are contained in Chapter 7, successful programs and strategies for teaching high-risk college students and Chapter 12, increasing science skills.

Nel, P. P. C., Beylefeld, A. A., & Nel, M. M. (1997). Video-based Supplemental Instruction as an integral part of an academic support and development program. *Conference proceedings of Medical education and assessment: Advances in medical education* (pp. 784-786). Maastricht, The Netherlands: Kluwer Academic.
Video-based Supplemental Instruction (VSI) is being used at the University of the Orange Free State (Bloemfontein, South Africa) for academic development and parallel-medium instruction. The paper provides an overview of the VSI program. A study was conducted in the Department of Anatomy and Cell Morphology, Faculty of Medicine with nursing students enrolled for a course in this department. Many of these nursing students are from educationally deprived backgrounds. Data suggests that VSI participants performed at the same level, or higher, than students who do not come from an educationally deprived background.

O'Donnell, L. E. (1996). Inclusion for learning disabilities: Technology with learning variables research and Supplemental Instruction. *International Journal of Special Education, 11*(2), 27-32.
Learning Variables Research and Supplemental Instruction (LVR/SI) provide an innovative approach to inclusion for intellectually normal and gifted students with learning disabilities. The original Supplemental Instruction (SI) model is generally used with traditional college undergraduate and graduate students. Video-based Supplemental Instruction (VSI) allows enrolled high school or college students view the videotaped lectures of a college level course (e.g., Western Civilization, General Chemistry) and allow them opportunity to control the flow of information (e.g., stop, repeat, discuss material before proceeding). SI, and especially VSI, can be very helpful for students with learning disabilities since they can be served inside the same content

class rather than requiring an additional class for the students to attend to deal with their specialized learning needs. The LVR/SI approach refines either the SI or VSI model with individualized learning variables and computer technology for application in junior high, senior high, and higher education. Rather than using video tape with VSI, computer technology might be substituted. In addition, the SI leader or VSI facilitator is provided critical information about students with disabilities. This technology-based program allows individuals with learning disabilities to succeed academically in integrated, inclusive classrooms.

O'Donnell, L. E. (1995). Inclusion for learning disabilities: Technology with learning variables research and Supplemental Instruction. *Empowering children with special needs: Practices around the world* (pp. 192-195). Whitewater, UK: International Association of Special Education.
Learning Variables Research and Supplemental Instruction (LVR/SI) provide an innovative approach to inclusion for intellectually normal and gifted students with learning disabilities. The original Supplemental Instruction (SI) model is generally used with traditional college undergraduate and graduate students. Video-based Supplemental Instruction (VSI) allows enrolled high school or college students view the videotaped lectures of a college level course (e.g., Western Civilization, General Chemistry) and allow them opportunity to control the flow of information (e.g., stop, repeat, discuss material before proceeding). SI, and especially VSI, can be very helpful for students with learning disabilities since they can be served inside the same content class rather than requiring an additional class for the students to attend to deal with their specialized learning needs. The LVR/SI approach refines either the SI or VSI model with individualized learning variables and computer technology for application in junior high, senior high, and higher education. Rather than using video tape with VSI, computer technology might be substituted. In addition, the SI leader or VSI facilitator is provided critical information about students with disabilities. This technology-based program allows individuals with learning disabilities to succeed academically in integrated, inclusive classrooms.

Phillips, K. (Ed.). (2001). *Proceedings of the First National Conference on Supplemental Instruction/VSI* Kansas City, MO: Center for Academic Development, University of Missouri-Kansas City.
This set of conference proceedings provides an overview to the First National Conference on Supplemental Instruction/VSI here in Kansas City, MO in May 1999. Articles include: SI, an effective program within student affairs, Edit Kochenour and Kenneth Roach; Get creative, working with SI data, Jeanne Wiatr and Barbara Stout; SI supporting quality in higher education in the United Kingdom, Jenni Wallace; Managing an expanding program or SI empire, Valeric Merriwether; Supplemental Instruction with math study skills templates, Paul Nolting and Kimberly Ruble; SI down under, Australian innovations, Martin Murray; Distance PALS in real and virtual classes, Judith Couchman; SI leadership and personal grown, a South African perspective, Linda Smith; Discipline-specific SI strategies for writing, Sandra Zerger; VSI, partnerships, and the transformation of education in South Africa, Paul Du Plooy and Cathy Clark; and SI leaders, the real winners, Maureen Donelan.

Rand, P. (1994). *Video Based Tutorial System for first year nursing students*. Unpublished manuscript, The University of the Orange Free State, South Africa. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper describes the use of Video-based Supplemental Instruction (VSI) with nursing students at the University of the Orange Free State in South Africa during 1994. The VSI program was implemented to assist nursing students who were severely academically underprepared. The author reports high satisfaction with the program since low grades were decreased and higher grades were increased in comparison with academic terms that did not have VSI offered.

Snyders, A. J. M. (1999). Foundation mathematics for diversity: Whose responsibility and what content? *The challenge of diversity: Proceedings of the Delta '99 symposium on undergraduate mathematics* (pp. 200-205). Whitsunday Coast, Australia: Retrieved July 1, 2004, from http://www.sci.usq.edu.au/staff/spunde/delta99/papers/snyders.pdf
This article describes the issues facing the University of Port Elizabeth in South Africa regarding instruction in foundation mathematics for an increasing diverse student body. Video-based Supplemental Instruction (VSI) and Supplemental Instruction (SI) have been implemented as part of a comprehensive approach. An extensive review of the professional literature concerning mathematics instruction composes the majority of the article.

Snyders, A. J. M. (1999). Foundation mathematics for diversity: Whose responsibility and what content? *The challenge of diversity: Proceedings of the Delta '99 symposium on undergraduate mathematics* (pp. 200-205). Whitsunday Coast, Australia: Retrieved July 1, 2004, from http://www.sci.usq.edu.au/staff/spunde/delta99/papers/snyders.pdf
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Sommerfeld, M. (1995). Who's responsible? Taking sides on remedial classes. *Education Week, 14*(29), 1, 14.
This article discusses alternatives to traditional remedial and developmental education programs. Included in the article is a short interview with David Arendale concerning the use of Supplemental Instruction (SI) and Video-based Supplemental Instruction (VSI). One of the difficulties for first-time students is that they concentrate on the wrong things as they prepare for their first examinations.

Staff writer. (1997, October 17). Jim Falls: Fun on tape and in person. *UMKC Inside (University of Missouri-Kansas City Newsletter)*, Kansas City, MO, p. 1.
This newsletter article describes a report concerning the VSI program. Dr. Jim Falls, one of the professors who has placed his course on video, is featured in the article. Dr. Falls' VSI section of his on-campus introduction to western civilization history class is also accepted for dual high-school credit as well.

Staff writer. (1996, January 18). Stet R-XV participates in VSI. *Stet Newspaper*, Stet, MO, p. 8.
This newspaper article describes the involvement of the Stet High School (MO) with the Video-based Supplemental Instruction (VSI) program. Several Missouri state congressional leaders observed the VSI program operating at the high school.

Stratton, C. B. (1998). Transitions in Developmental Education: Interviews with Hunter Boylan and David Arendale. In P. L. Dwinell, & J. L. Higbee (Eds.), *The Role of Developmental Education in Preparing Successful College Students* (pp. 25-36). Columbia, SC: The National Association for Developmental Education and the National Center for the Study of the Freshmen Year Experience and Students in Transition.
In this book chapter the author interviews two leaders in the field of developmental education. Hunter Boylan directs the National Center for Developmental Education. David Arendale directs national dissemination of Supplemental Instruction. Both have served as past presidents of NADE. Arendale talks about how developmental education must be "mainstreamed" into the college curriculum rather than continuing with the current model of separate tracks of courses and support for students who need academic assistance. Supplemental Instruction and Video-Based Supplemental Instruction are cited as examples for embedding academic assistance into college-level courses. Brief overviews are provided for both programs. He suggests that SI and VSI present an acceptable way for accomplishing the mission of developmental education which is politically acceptable to policy makers at the institution, state, and national level.

Summers, D. (1995, December 12). Video-based instruction offers alternatives. *University News (University of Missouri-Kansas City Student Newspaper)*, Kansas City, MO, p. 11.
This campus newspaper articles describes the use of Video-based Supplemental Instruction (VSI) to deliver a college introductory history course to students at the University of Missouri-Kansas City. The article provides a brief overview and a few statistics about the higher grades and lower course withdrawal rates for VSI students as compared with students who enroll in the identical course taught by the same professor who previously placed his class lectures on the VSI videotapes.

Villén, V. (2002). *How to prevent student drop outs? An example from Lund University*. Unpublished manuscript, Master Thesis in Pedagogic, Pedagogical Institution, Lund University, Sweden. Retrieved July 1, 2004, from http://www.socbetbib.lu.se/epubl/pedpdf/PED02016.pdf
This Master Thesis (written in Swedish) describes how Lund University in Sweden is implementing a variety of programs to deal with student drop outs. Two programs featured in the manuscript are Supplemental Instruction and Video-based Supplemental Instruction.

Whiteside, D. (1995, December 20). *Capitol News Release*. Jefferson City, MO.
This news release provides information about Missouri State Representative Whiteside's visit to see the Video-based Supplemental Instruction (VSI) program as was

viewed by a delegation led by him. The VSI program was reviewed at the Mendon, Norborne, and Stet high schools.