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Achat-Mendes, C., Anfuso, C., Johnson, C., & Shepler, B. (2020). Learning, leaders, and STEM skills: Adaptation of the Supplemental Instruction model to improve STEM education and build transferable skills in undergraduate courses and beyond. *Journal of STEM Education: Innovations & Research, 20*(2).

Georgia Gwinnett College, an access institution serving the most diverse student body of southeast colleges, was awarded National Science Foundation and University System of Georgia STEM-Education Improvement grants, in order to help our students meet the evolving needs of STEM education. One of the initiatives emerging from these resources is the Peer Supplemental Instruction (PSI) program, a modified model of the traditional SI program. SI is a well-documented, high-impact practice in higher education that engenders collaborative learning among students. Since SI was not available on campus, STEM faculty developed and mentored the current PSI program, with the aim to support students as they transition from high school to college. PSI is thus offered to students in the gateway courses for biology, chemistry, mathematics, and information technology majors and study sessions incorporate a variety of STEM skills, thereby increasing opportunities for students to engage in and develop STEM competencies. In the last year, PSI attendance was recorded at 4,123 interactions. Assessment of academic performance of these students suggests that participation increased course GPA, particularly in students entering college with low high school GPAs (n=1239). Moreover, student attitudes towards STEM learning improved and peer students serving as leaders also benefited, based on their reports on the development of professional skills, including flexibility, scientific communication, and organization, which are critical to success in college and STEM careers. We present an innovative adaptation of the SI program that can be adopted by STEM faculty, and may be particularly useful to institutions serving underprepared populations.

Alberte, J. L., Cruz, A., Rodriguez, N., & Pitzer, T. (2012). *The PLTL leader boost.* Conference Proceedings of the Peer-led Team Learning International Society Inaugural Conference, Brooklyn, NY. www.pltlis.org/wp-content/uploads/2012%20Proceedings/Alberte-3-2012.docx

Qualitative data has demonstrated the impact of PLTL on a Peer Leader's academic performance. In this paper we quantitatively show the presence of the Peer Leader boost at Florida International University. Just as in any apprenticeship role, Peer Leaders undergo an extensive training program and it is this experience which provides an advantage. Training includes pedagogy, classroom dynamics, science concepts, and critical thinking skills equipping Peer Leaders with the necessary skills to manage a productive active learning environment. Initial observations and feedback indicate that participation as a Peer Leader adds value such as enculturation in the discipline, increased performance in traditionally assessed learning outcomes, and increased retention within the discipline. Preliminary data demonstrates a significant difference in the academic success of Peer Leaders in their own course work. This analysis was performed on large enrollment upper-level courses which indicated up to a letter grade difference between Peer Leaders and non-Peer Leaders.

Amaral, K. E., & Vala, M. (2009). What teaching teaches: Mentoring and the performance gains of mentors. *Journal of Chemical Education, 86*(5), 630-633. www.pdfs.semanticscholar.org/2091/a11832b7ca92270be374c0bb4276889abf2c.pdf.

The benefits of mentoring were determined by comparing the mentors' performance in chemistry to the β and γ groups of students (students who were prepared for general chemistry and those who were under-prepared for general chemistry, respectively). The influence of previously acquired mathematical prowess on the grade attained in the mainstream chemistry course was determined by a linear regression analysis of the quantitative SAT scores versus course grade. Neither the average, first, or highest course grades were found to correlate with quantitative SAT scores. Both the mentors and the students in the γ group had enrolled in a minimum of one semester of chemistry prior to their enrollment in the first-semester general chemistry course, while first-semester general chemistry course was the first chemistry course for the students in the β group.

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.* Conference Proceedings of the 223rd American Chemical Society National Meeting, Orlando, FL.

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. R. (2014). Understanding the Peer Assisted Learning Model: Student study groups in challenging

college courses. *International Journal of Higher Education, 3*(2), 1-12. University of Minnesota Digital Conservancy, www.hdl.handle.net/11299/200361

The Peer Assisted Learning (PAL) program at the University of Minnesota is a primary academic support program for historically difficult, introductory college courses that serve as gatekeepers to academic degree programs. Based upon operating principles of other programs and educational theories, PAL is integrated into the courses it serves. This article provides a detailed overview of the PAL model and how variations of it are implemented at the institution. Quantitative and qualitative studies reveal not only academic benefits for participating students, but also academic and personal benefits for the students who serve as the PAL facilitators.

Arendale, D. R., & Hane, A. R. (2016). Adaptability and flexibility when conducting and planning peer study group review sessions. *The Learning Assistance Review, 21*(2), 9-37. University of Minnesota Digital Conservancy, www.hdl.handle.net/11299/200331.

While many research studies have analyzed the effectiveness of study group programs for the participants, few have examined the process that the study group leaders employ in offering effective sessions. This manuscript focuses on the decisions the study group leaders make before, during, and after these study group sessions. Connections are made between the behaviors of the study group leaders and that of novice and experienced teachers. Understanding the processes that the study group leaders employ provides insights that could be enhanced by additional training by the study group program administrators. The Peer Assisted Learning (PAL) program at the University of Minnesota is a primary academic support program for historically difficult, introductory college courses that serve as gatekeepers to academic degree programs. Based upon operating principles of other programs and educational theories, PAL is integrated into the courses it serves. This manuscript is currently under review by a journal and is not available for review.

Arendale, D. R., & Hane, A. R. (2016). Peer study groups as catalyst for vocational exploration. *Journal of Developmental Education, 39*(2), 2-4, 6, 10-11, 26-27. University of Minnesota Digital Conservancy, www.hdl.handle.net/11299/200357.

Peer assisted learning programs generate more outcomes than increasing academic achievement for participants. Studies, including this one, document impact with personal, vocational interest exploration, and job skill development for facilitators. This study explores why these programs generate these outcomes through linking leading theorists to the research outcomes. Peer learning programs present an untapped cocurricular experience that could be more powerful if it was intentional rather than serendipitous with professional development outcomes. The peer learning program occupies the intersection between student academic assistance and teacher candidate preparation. The program can serve a valuable role as a learning experience before traditional student teaching as well as generator of more students interested in pursuing a teaching career. With the highly competitive job market for today's graduates, institutions must use every opportunity to increase job readiness skills of its graduates. The Peer Assisted Learning (PAL) program at the University of Minnesota is a primary academic support program for historically difficult, introductory college courses that serve as gatekeepers to academic degree programs. Based upon operating principles of other programs and educational theories, PAL is integrated into the courses it serves.

Arendale, D. R., Hane, A. R., & Fredrickson, B. S. (2022). Leader identity emergence of study group facilitators. *Journal of Peer Learning, 14*(1), 4-20. https://ro.uow.edu.au/ajpl/vol14/iss1/2.

This qualitative study at the University of Minnesota–Twin Cities, USA, investigated leader identity emergence of study group facilitators. There is a gap in the professional literature regarding study group programs and identity emergence of the student paraprofessionals who facilitate the study sessions. This study built upon previous studies of identity formation by integrating educational theories that help explain the changes that occurred. Peer study group programs are powerful co-curricular experiences. This study provided answers to why and how identity emergence occurs. The Leader Identity Development Model for peer study group facilitators was developed based on the findings from this study and other experiences with study group leaders over the past three decades by David Arendale to help predict this change and the experiences that supported identity formation. Among those catalysts were written reflections by the study group leaders throughout the academic term on what they learned about themselves and about their conversations with other study leaders and the study group program manager. Implications are provided that explain how peer programs can become a more transformative learning ecosystem. Peer learning programs present an untapped personal and professional development opportunity for student leaders that would be even more powerful if it were intentional rather than serendipitous.

Arendale, D. R., Hane, A. R., & Fredrickson, B. S. (2023). *Academic skill and knowledge growth of PAL facilitators*. Unpublished manuscript. Department of Curriculum and Instruction. Minneapolis, MN.

This manuscript focuses on the academic skill and knowledge growth of PAL facilitators. While most peer learning

publications focus on outcomes of the study group participants, this article examines the impact of participation on the study group leaders. The Peer Assisted Learning (PAL) program at the University of Minnesota is a primary academic support program for historically difficult, introductory college courses that serve as gatekeepers to academic degree programs. Based upon operating principles of other programs and educational theories, PAL is integrated into the courses it serves.

Arendale, D. R., Hane, A. R., & Fredrickson, B. S. (2023). *College credit training and professional development course for PAL facilitators*. Unpublished manuscript. Department of Curriculum and Instruction, University of Minnesota. Minneapolis, MN.

At the University of Minnesota during fall 2006, a college-credit course was created to help group leaders apply educational theories during their study group sessions with the campus Peer Assisted Learning (PAL) program. The Peer Assisted Learning (PAL) program at the University of Minnesota is a primary academic support program for historically difficult, introductory college courses that serve as gatekeepers to academic degree programs. Based upon operating principles of other programs and educational theories, PAL is integrated into the courses it serves. This course was required of all new group leaders starting during fall semester. Rather than a didactic class format led by me as the instructor, a collaborative seminar model was employed. In the class, these students studied education theory articles and discussed how to apply this information to their weekly sessions. This understanding helped them create new learning activities not contained in the formal training program. It also made better sense of dynamics within the group and how to employ culturally-sensitive learning activities. This course was part of a larger required professional development component for the study group leaders. The course has seven learning objectives: (1) Identify and discuss the application of learning theories with peer-assisted learning groups. (2) Increase skill in small group management skills to achieve learning objectives. (3) Contextualize learning strategy modeling and instruction within the specific academic context area supported by PAL. (4) Learn to analyze the learning needs of others and make modifications to the learning environment. (5) Grow as an independent learner and build upon their current strengths through development of new learning strategies. (6) Further develop intellectual skills of analysis, synthesis, critical evaluation, and application through completion of course activities. (7) Adopt new strategic learning strategies to successfully apply with course material. The course requires students to make weekly journal entries through the course web site which is only viewable by the course instructor. The entries focus on the reflections about their academic and personal changes as a result of this experience. In addition, the PAL facilitators complete an extensive end-of-term experience survey as a capstone reflection of their experience and how they changed academically and personally.

Arendale, D. R., Hane, A. R., & Fredrickson, B. S. (2023). *Professional identity development for PAL facilitators*. Unpublished manuscript. Department of Curriculum and Instruction, University of Minnesota. Minneapolis, MN.

Research studies with study group leaders discovered that they constructed their own professional identity beyond what was contained in their official job description for work in the peer academic support program. These study group leaders developed professional identities more congruent with new teachers than with fellow student paraprofessionals. Insights from this study help explain behaviors exhibited by the study group leaders and provide opportunities for enhanced training and professional development growth in their peer study program experiences. The Peer Assisted Learning (PAL) program at the University of Minnesota is a primary academic support program for historically difficult, introductory college courses that serve as gatekeepers to academic degree programs. Based upon operating principles of other programs and educational theories, PAL is integrated into the courses it serves. This manuscript is currently under review by a journal and is not available for download at this time.

Ashwin, P. W. H. (1993). *Supplemental Instruction: Does it enhance the student experience of higher education?* (Ph.D. 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.

Barnard, R. A., Boothe, J. R., Salvatore, J., Emerson, K., Boone, A., Sandler, C., & Coppola, B. P. (2018). Course-based support for peer-led study group facilitators in a large instructional team. *Journal of College Science Teaching, 47*(4), 21-29.

An institutionalized program of peer-led study groups (PLSG) adds instructional power to our large enrollment introductory organic chemistry courses. Concomitantly, there is a challenge to keep the instructional philosophy and subject matter coherent with the faculty expectations and goals across this diverse group of undergraduate instructors. Thus, to improve communication within the instructional workforce of our large organic chemistry course, we have installed a required course for all undergraduate PLSG facilitators and peer tutors hired by the Science Learning Center at the University of Michigan. This liaison course, taught by a graduate student instructor under the direction of the faculty course coordinator, focuses on enhancing subject matter clarity and stemming the flow of misinformation that has sometimes been reported in the PLSG sessions. We examined the perceived value of the liaison course, self-assessment of course content knowledge by the facilitators, and how enrollment in the course has shaped the experience of those leading a PLSG.

Barrett, M., Sutcliffe, P., & Smith, B. (1994, 1994). *Students as mentors: The case of management education.* Conference Proceedings of the Proceedings of the Conference of the Australian and New Zealand Academy of Management, Wellington, Australia.

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 manner. Mentors reported that they improved their interpersonal communication skills, ability to manage 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.

This paper recounts the steps (and missteps) taken in beginning a 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.

Beasley, C. J. (1997). *Students as teachers: The benefits of peer tutoring.* Conference Proceedings of the 6th Annual

Teaching Learning Forum, Murdoch University.
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.

Benson, J., & Lilly, M. (2017). *Peer-Assisted Learning Program: Guide for team leaders*. Minneapolis, MN: SMART Learning Commons, University of Minnesota. University of Minnesota Digital Conservancy, www.z.umn.edu/PALleaderguide
The Guide for Team Leaders is designed to inspire personal exploration of leadership within PAL, SI, and related academic support programs. Depending on the program, there may already be an existing structure in place where an experienced facilitator/leader mentors their own team of peers functioning in a similar role. These team leaders can create opportunities for members to interact, share knowledge, and promote the professional growth of their peers. This guide was originally designed to support the growth of such team leaders within the Peer-Assisted Learning (PAL) Program at the University of Minnesota. However, as this work progressed, it became clear that the ideas were applicable to a variety of team leadership roles. This hands-on guide delves into such topics as meta-cognition, team member identity and participation, meeting/discussion topics and activities, and much more. Interactive activities encourage readers to reflect on these topics, while providing ample space for them to record their insights. It complements the Guide for Peer Learning Facilitators and utilizes activities in Tried and Tweaked, both of which are works developed by the University of Minnesota's PAL Program.

Best, G., Hajzler, D., Ivanov, T., & Limon, J. (2008). Peer mentoring as a strategy to improve paramedic students' clinical skills. *Australasian Journal of Peer Learning, 1*, 13-25. www.ro.uow.edu.au/ajpl/vol1/iss1/4
This paper documents the rationale and outcomes of a peer mentoring program based on Supplemental Instruction (SI) in which selected third year paramedic students took on the role of mentors within a second year clinical practice subject. Participating students reported an improvement with their clinical skills. At Victoria University in Australia the SI program has been customized and renamed Peer Assisted Study Sessions (PASS). This approach was designed to improve students' clinical skills and judgment and to improve their confidence and use of clinical equipment. The PASS mentors reported gains in assistance with projects, revitalized interest in work, and increased self-confidence. Mentees reported increases in their learning and development, increased personal support, and an increase in confidence. The program also provided students with a leadership role to extend their own competency with the content material. The authors suggested that the PASS program could be enhanced in the future to further improve its impact on leadership development of the mentors.

Brown, K., Naim, K., van der Meer, J., & Scott, C. (2014). "We were told we're not teachers...It gets difficult to draw the line" Negotiating roles in Peer-Assisted Study Sessions (PASS). *Mentoring & Tutoring: Partnership in Learning*. doi:10.1080/13611267.2014.902559.
Peer learning models in pre-service teacher education are in the early stages of implementation. In this article, we evaluated a pilot Peer-Assisted Study Sessions (PASS) program that supplemented a course for pre-service teachers at one New Zealand university. PASS participants discussed experiences of the program, revealing tensions between what students and facilitators felt should happen in PASS, and how they acted differently. We explained these tensions by considering how social and cognitive congruence operated between students and facilitators. The majority of our peer facilitators were pre-service teachers, suggesting these intersecting roles offered important considerations for reciprocity in near-peer relationships, and joint negotiations of roles and responsibilities. We conclude this article with implications for future training of PASS facilitators, including those training as teachers.

Bryngfors, L., & Bruzell-Nilsson, M. (1997). *Supplemental Instruction: An experimental project with the method of Supplemental Instruction*. Unpublished manuscript. The Lund Institute of Technology and The Faculty of Science. Lund, Sweden.
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.

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.

Caldwell, C. (2008). First-time feelings. Peer-Led Team Learning: The experience of leading. *Progressions: The Peer-Led Team Learning Project Newsletter, 10*(1). www.pltlis.org/wp-content/uploads/2012/10/Experience-of-Leading-Caldwell-First-Time-Feelings.pdf.

Firsts are special – a first rollercoaster ride... a first concert – and the reason these firsts are special is because the person experiencing that first thing, whatever it is, is super sensitive to that experience. She must be because she does not know what to expect so in order to react appropriately, she must be ‘on her toes.’ This higher state of awareness is valuable for the workshop leader

Capstick, S. (2004). *Benefits and shortcomings of Peer Assisted Learning (PAL) in higher education: An appraisal by students*. Unpublished manuscript. Bournemouth University. Bournemouth, United Kingdom.

The benefits and shortcomings of a Peer Assisted Learning (PAL) scheme [based upon Supplemental Instruction] are described from the perspective of its student participants. Qualitative methodology is used to investigate and describe student outcomes, together with an analysis of influence of PAL on marks in one course. A wide range of benefits are reported for students engaged in PAL, as well as for those students responsible for managing PAL discussion groups. PAL leaders improved presentation skills, group speaking, and confidence. Some PAL leaders said the experience helped them during job interviews as well as promoting interest in teaching as a career. Negative aspects of PAL as described by the PAL leaders was the rule that they are not permitted to make short lectures to clear up confusion by the participants. This rule is common among British SI-like programs to clearly define how SI is different than what professional tutors and the

course instructor does. It is argued that qualitative benefits of PAL are more pronounced and demonstrable, and more appropriately portray the scheme, than quantitative outcomes.

Carbon, D. (1995, August 1). Universities give peer program top marks, *Courier Mail Newspaper*.
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, R. A., Evans-Locke, K., Abu-Saif, H., Boucher, R., & Douglass, K. (2018). Peer-learning to employable: learnings from an evaluation of PASS attendee and facilitator perceptions of employability at Western Sydney University. *Journal of Peer Learning, 11*(1), 41-64. www.ro.uow.edu.au/cgi/viewcontent.cgi?article=1127&context=ajpl.
This study examines student experiences of Peer Assisted Study Sessions (PASS) at Western Sydney University (WSU), investigating attendee and facilitator perceptions of the relationship between peer-learning and employability. It defers to contemporary higher education scholarship and related sector definitions of employability as an objective criteria for evaluating outcomes which may result from student experiences with PASS. This investigation observes the extent to which such definitions are evident in the skills and attributes students have acquired via their participation in PASS through both quantitative and qualitative research. Quantitative and qualitative data was collected across two consecutive semesters at WSU (Autumn and Spring) in 2015. Survey responses were collected from 297 PASS attendees and 45 PASS facilitators, further incorporating data collected via focus groups with 46 PASS attendees. The evidence allowed the researchers to examine how students perceived they had gained attributes from PASS that render them more employable. The research results highlight the benefits and limitations of the methods utilised to collect data from PASS participants, and this article elaborates key insights gained as a result of the research process that may be useful to peer-learning practitioners beyond WSU. The study found that attendees and facilitators of the WSU PASS program perceive that the program contributes to student employability in a variety of ways such as improving participants' core technical skills, organisational skills, social skills, professionalism and business acumen, appreciation of mentoring, and critical thinking skills.

Cerna, O., Platania, C., & Fong, K. (2012). *Leading by example: A case study of peer leader programs at two Achieving the Dream colleges*. MDRC. Washington, D.C.
MDRC studied the use of Supplemental Instruction and another model at two Achieving the Dream community colleges: Northern Essex Community College and Bunker Hill Community College in Maryland. A qualitative study of key stakeholders at the institution found SI effective: administrators, faculty members, and participating students. Out of class and out of SI session contact between the SI leaders and the participants helped to build motivation and trust for the students to participate. The SI leaders reported personal, professional, and academic benefits. Also, gifted students selected as SI leaders received payment for services which reduced their stress and need for additional part-time jobs. The role as SI leader may have contributed to some of them considering careers in teaching. It also gave them additional opportunities to be mentored by the professors for whom they served as academic support. Institutional leaders cited the cost-effectiveness of SI, especially when compared with hiring full-time professional staff members.

Chase, A., Rao, A., Lakmala, P., & Varma-Nelson, P. (2020). Beyond content knowledge: Transferable skills connected to experience as a peer leader in a PLTL program and long-term impacts. *International Journal of STEM Education 7*(29), 1-10. doi: www. .org/10.1186/s40594-020-00228-1. www.link.springer.com/content/pdf/10.1186/s40594-020-00228-1.pdf.
Background: Being a successful peer-led team learning (PLTL) workshop leader involves developing content knowledge and workshop facilitation skills. These skills connected to being a peer leader, however, do not terminate at the end of one's undergraduate program. In fact, many former peer leaders denote having been a peer leader on their LinkedIn profile. This study examines the transferable skills that former peer leaders identified as being valuable in their current positions. We conducted semi-structured interviews with former peer leaders from varying disciplines, universities, ages, and years since being a peer leader. Results: Interview questions captured leadership experiences including successes and challenges of being peer leaders, roles and responsibilities, and specific transferable skills further developed by being peer leaders

and how they are being utilized in the leaders' current position. Conclusion: Thematic analyses of these interviews indicate that former peer leaders recognize leadership skills, coping with many challenges (including not having the right answer), collaboration/teamwork skills, self-confidence, and problem-solving skills as being relevant and frequently used in their current work.

Chilvers, L., & Waghome, J. (2018). Exploring PASS leadership beyond graduation. *Journal of Peer Learning, 11*(1), 5-26. www.ro.uow.edu.au/cgi/viewcontent.cgi?article=1137&context=ajpl.

Developing University graduates' employability is of increasing strategic institutional focus in the UK. Existing research evidences the role of Peer Assisted Study Sessions (PASS) in supporting students to develop personal, professional and employability skills. This research explores the impact of the PASS Leader role on graduates' job application experiences, their employability and effectiveness in their current roles. PASS Leader graduate survey (n=62) and interview (n=12) findings demonstrated participants referred to their PASS Leader Role significantly on their CVs, application forms and in job interviews. Respondents said that PASS Leadership, aided by reflection, enabled them to clearly evidence their development of employability skills, which they perceived as enabling them to stand out from other job candidates. Interview participants explained their PASS Leadership informed their development of a range of employability skills and attributes, including communication, confidence, teamwork, facilitation and leadership. PASS Leadership was regarded as addressing gaps in their course curriculum for developing skills they perceived as important for their current roles, highlighting the value of co and extra-curricular programmes, such as PASS.

Chini, J. J., Straub, C. L., & H, T. K. (2016). Learning from avatars: Learning assistants practice physics pedagogy in a classroom simulator. *Physical Review Physics Education Research, 12*(1), 1-15. doi: https://doi.org/10.1103/PhysRevPhysEducRes.12.010117. https://journals.aps.org/prper/pdf/10.1103/PhysRevPhysEducRes.12.010117.

[This paper is part of the Focused Collection on Preparing and Supporting University Physics Educators.] Undergraduate students are increasingly being used to support course transformations that incorporate research-based instructional strategies. While such students are typically selected based on strong content knowledge and possible interest in teaching, they often do not have previous pedagogical training. The current training models make use of real students or classmates role playing as students as the test subjects. We present a new environment for facilitating the practice of physics pedagogy skills, a highly immersive mixed-reality classroom simulator, and assess its effectiveness for undergraduate physics learning assistants (LAs). LAs prepared, taught, and reflected on a lesson about motion graphs for five highly interactive computer generated student avatars in the mixed-reality classroom simulator. To assess the effectiveness of the simulator for this population, we analyzed the pedagogical skills LAs intended to practice and exhibited during their lessons and explored LAs' descriptions of their experiences with the simulator. Our results indicate that the classroom simulator created a safe, effective environment for LAs to practice a variety of skills, such as questioning styles and wait time. Additionally, our analysis revealed areas for improvement in our preparation of LAs and use of the simulator. We conclude with a summary of research questions this environment could facilitate.

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.

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, A., & Raker, J. R. (2020). Peer leaders' perceived roles: An exploratory study in a postsecondary organic chemistry course. *International Journal of Teaching and Learning in Higher Education, 32*(2), 180-189. www.isetl.org/ijtlhe/pdf/IJTLHE3680.pdf.

Peer-led team learning (PLTL) is a pedagogical method in which former students, i.e., those who have successfully completed the course, assist current students in learning course material either through supplemental instruction or in the classroom setting. The impact on student learning for students participating in a PLTL course is widely documented; however, there have been few studies about peer leaders' experiences and the impact of PLTL on peer leaders. Fifty-two peer leaders assisting with a postsecondary organic chemistry course completed weekly journals about their experiences; the final journal entry prompted peer leaders to

describe their relationship with their students by choosing a role that best described that relationship and providing an example of how they filled that role during the term. These entries were coded and analyzed for patterns. Results suggest that when peer leaders describe their relationships, some express they are teachers, others consider themselves guides or facilitators, and some view their role as mentors. We argue that there is a progression of increasing depth in the student-leader relationship that is demonstrated by the description of the roles ascribed by the peer leaders.

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

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 Centrex for Organizational 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

Cochran, G. L., & Brookes, D. T. (2012). *Prospective teachers serving as physics learning assistants' perspectives on reflective practice.* Conference Proceedings of the 12th Annual South Florida Education Research Conference, Miami, FL. https://digitalcommons.fiu.edu/cgi/viewcontent.cgi?article=1305&context=sferc

A physics Learning Assistant (LA) program was established at Florida International University (FIU) for recruiting and preparing pre-service physics teachers. One goal of this program is to help prospective teachers to develop reflective practice. The purpose of this study is to understand these prospective teachers' perspectives on reflective practice.

Cochran, G. L., Brookes, D. T., & Kramer, L. H. (2013). *A framework for assessing learning assistants' reflective writing assignments* Conference Proceedings of the Physics Education Research Conference, Philadelphia, PA. https://pubs.aip.org/aip/acp/article-pdf/1513/1/15/12186029/15_1_online.pdf

At Florida International University we have implemented a learning assistant (LA) program based on the Colorado Learning Assistant Model. [1] As a part of this program, students take a course on science and mathematics education theory and practice in which they are required to submit written reflections. Past anecdotal evidence suggests that students in the LAP at Florida International University are using these writing assignments to reflect on their teaching experiences. The purpose of this study was to a) determine if the writing assignments submitted give evidence that our students are engaging in reflection and b) determine if our students are engaging in deep levels of reflection. In this investigation, we relied on a rubric based on Hatton and Smith's (1995) [2] "Criteria for the Recognition of Evidence for Different Types of Reflective Writing." In this paper, we document a) a system for characterizing student reflections and b) how we give them feedback.

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.

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.

Cofer, R. (2023). The peer tutor and Supplemental Instruction leader experience: Perceived gains in learning, connection to campus, and fulfillment. *Journal of College Academic Support Programs, 5*(2), 23-32. doi: https://doi.org/10.58997/5.2fa2. https://jcasp-ojs-txstate.tdl.org/jcasp/article/view/53/11.

This study explored the perceived gains of postsecondary peer educators, specifically related to their views of learning, feelings of connection to campus, and feelings of fulfillment as a result of their roles. The peer educator in the campus learning center is a critical but undervalued resource for student success. This is reflected in the literature, which has a gap in the research related to the experience of the peer educators themselves. To address this problem, a survey was sent through public listservs to college learning assistance professionals, who then distributed it to their respective peer tutors and SI leaders (N = 1217). Using three open-ended questions from the Peer Educator Experiences Survey, I analyzed responses to generate several themes for each question. I identified five distinct themes from responses to the first question, which asked participants about their views of learning. Of the five themes, “learned how/ways people learn” had the highest frequency of responses (n = 239). I discovered four themes from responses to the second question that asked about the most rewarding aspect of their jobs. For this question, the theme of “helping/witnessing growth” was the most evident response (n = 326). The final question asked about participants’ connections to campus; again, four themes identified four distinct themes. The theme of “campus people/resources” proved to be the most populous (n = 203). Institutions and learning center administrators should consider these results when recruiting, training, assessing, and requesting funds for these programs.

Cofer, R., McBrayer, J. S., Zinskie, C., Wells, P., & Fallon, K. (2022). Perceived gains of peer educators in campus learning centers: Academic performance and learning, non0academic skillsets, and self-confidence and fulfillment. *Journal of Peer Learning, 15*, 17-31. https://ro.uow.edu.au/ajpl/vol15/iss1/3.

This study explored the peer tutor and Supplemental Instruction (SI) Leader experiences in campus learning centers as seen through the perceived gains in three subcategories: 1) academic performance and learning, 2) non-academic skillsets, and 3) self-confidence and fulfillment. The peer tutors and SI Leaders surveyed in this study had experience in one or both of these roles and came from institutions across the nation and from several international institutions. In this quantitative study, participants completed a researcher-created survey. The major findings showed a significant difference in the peer educators’ perceived gains based on their roles, with tutors reporting greater perceived gains. Additionally, the study found that these peer educators perceived the most gains in non-academic skillsets, specifically related to increases in their communication and listening skills as well as skills for future careers. When examining the perceived gains in relation to the role and the length of time in that role, the peer tutor role was found to be significant in all three subcategories, whereas the length of time in that role did not present significant differences. Implications for practice support the need for increased resource allocation, showing that learning centers impact more than the students the peer educators serve.

Cole, C. S., & Blake, B. (2003). *Peer-led Team Learning: The student leader's perspective.* Conference Proceedings of the 225th American Chemical Society National Meeting, New Orleans, LA. 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.

Cole, K. (2013). PAL experience. *Journal of Pedagogic Development, 3*(2).

This journal article is the personal story of a student study group leader from the University of Bedforshire in the United Kingdom that was involved with the campus PAL program. PAL is a common name in the United Kingdom for programs based on the Supplemental Instruction (SI) model from the University of Missouri-Kansas City. The author provides a unique perspective by the person who is actually delivering the program to the students. The student PAL leader describes her nervousness in preparing for the PAL sessions, the manner in which the students interacted within them, and her perception of the overall program.

Collins, R. (2009). Reflections of a reserved workshop leader. Peer-Led Team Learning: The experience of leading. *Progressions: The Peer-Led Team Learning Project Newsletter, 10*(2). www.pltlis.org/wp-content/uploads/2012/10/Experience-of-Leading-Collins-Reflections-by-a-Reserved-Workshop-Leader.pdf.

The Workshop sessions helped me to interact with different kinds of students with various strengths, shortcomings and different attitudes, whom I wouldn’t have generally come across due to my reserved nature. It was an

opportunity for me to mix and mingle with all kinds of people, develop my interpersonal, leadership and communication skills. As time went by, I think I got better in explaining things to people and being more comfortable speaking in front of large groups of students. As time went by, I also got over the feeling that I was a minority Peer Leader with an accent that Americans students are not used to, and this boosted my confidence as a leader and consequently increased my comfort level with the students.

Congos, D. H., & Stout, B. (1997). The benefits of Supplemental Instruction (SI) leadership experience after graduation. *Research & Teaching in Developmental Education, 29*(1), 29-41.

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.

Conn, J., Close, E. W., & Close, H. G. (2014). *Learning Assistant identity development: Is one semester enough? .* Conference Proceedings of the Physics Education Research Conference, Minneapolis, MN. https://www.per-central.org/items/perc/4046.pdf

The physics department at Texas State University has completed five semesters with a Learning Assistant (LA) program and reform-based instructional changes in our introductory course sequences. We are interested in how participation in the LA program influences LAs' identity both as physics students and as physics teachers; we have previously reported trends in increased community involvement and a shift in experienced LAs' concepts of what it means to be competent. Our interview data now include first-semester LAs, and we see a significant difference in physics identity development between these LAs and those with more experience. LAs near the end of their first semester seem to be experiencing a state of unease with respect to teaching and learning. We explain this discomfort in terms of Piagetian disequilibrium: their conceptions of competence in teaching and learning have been challenged, and they have not yet constructed a new model.

Conroy, G. J. (1996, 1996, May 28). Supplemental Instruction program shows results first year, *The Observer Newspaper,* 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.

Couchman, J. A. (1997). *Supplemental Instruction: Peer mentoring and student productivity.* Conference Proceedings of the Researching education in new times, Brisbane, Toowoomba, Australia.

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. (2009). An exploration of the 'lived experiences' of one cohort of academic peer mentors at a small Australian university. *Australasian Journal of Peer Learning, 2*(1), 87-110. www.ro.uow.edu.au/ajpl/vol2/iss1/5.

While the benefits of Supplemental Instruction (SI) have been widely reported, the benefits for the SI leaders involved with the program have not. After a literature review of previous research efforts with investigating this issue, the article describes a qualitative study with 11 undergraduate SI leaders at a university in Australia. Themes

that emerged from the research include: empathy, collaborative techniques, inclusiveness, reflective practice, mutuality, increased learning, growing confidence, developing communication skills, establishing friendships, and other results.

Davenport, F., Amezcua, F., Sabella, M. S., & Van Duzer, A. G. (2017). *Exploring the underlying factors in Learning Assistant-faculty partnerships.* Conference Proceedings of the Physics Education Research Conference, Cincinnati, OH. https://par.nsf.gov/servlets/purl/10108219

An effective Learning Assistant (LA) Program provides benefits for both Learning Assistants (LAs) and faculty, in addition to benefits for students. By analyzing LA and faculty reflections, weekly preparation sessions, and interviews with LAs and faculty, we can better understand the partnerships that develop between faculty and their LAs. We leverage a combination of qualitative and quantitative data to investigate the types of LA expertise and skills faculty value and how this affects the formation of these partnerships. The Preparation Session Observation Tool (PSOT), developed from this work, can be used by LAs, LA Program Coordinators, and faculty to reflect on the types of LA partnerships that emerge, and how these partnerships can be used in constructing effective learning environments. We anticipate that this tool can then be used to help LAs, coordinators, and faculty modify their working relationship to develop the type of partnerships that are best for their particular instructional setting. PSOT provides a finer-grained analysis to three broad partnership classifications that exist along a continuum: mentor-mentee, faculty-driven collaboration, and collaborative.

Davis, E. E. (1999). *Student mentors: Experiences of being a Supplemental Instruction leader.* (Master of Science thesis), Indiana University.

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.

Dean, B. A., Harden-Thew, K., Austin, K., & Zaccagnini, M. (2015). *From the horses' mouths: Reflections on transition from peer leaders*. Unpublished manuscript. University of Wollongong. Australia. www.unistars.org/papers/STARS2015/09B.pdf

World-wide peer learning programs support students in their transition to university. Peer leader support is distinctive, being closer to the learning experience or transition encountered. This paper explores transition into the first year of university through the reflections of peer leaders. It outlines two synergetic programs at the University of Wollongong (UOW): one supporting high school students in the early stages of transition to university (In2Uni); and the second supporting enrolled university students (PASS). Focus groups were conducted to elicit the voices of leaders reflecting on their own transition and experiences of mentoring peers through transition. The findings suggest peer leaders assist transitioning students to confront change; develop strong social networks; make connections within and across curriculum; and learn how to learn in the new academic context. It was found that peer leaders valued peer support in their own transition (or wished for it) and saw its ongoing significance for others in transition.

Deaton, C. C., & Deaton, B. (2012). Using mentoring to foster professional development among undergraduate instructional leaders. *Journal of College Science Teaching, 42*(1), 58-62.

This study examines the mentoring relationships of student instructors who provide Supplemental Instruction (SI) for undergraduate science courses. Specifically, the researchers examined the relationships negotiated between mentor and protege student instructors during the first year of the mentoring program. The undergraduate student instructors in this study are part of a Supplemental Instruction (SI) program that focuses on helping undergraduate students who are enrolled in science courses that are often labeled as traditionally hard courses. To support the new undergraduate student instructors in the SI program, a mentoring model was implemented to encourage collaborations with other undergraduate student instructors in the SI program. Findings of the study found that proteges developed session plans and different activities, found strategies to get students to participate more and be more active learners, proteges became more confident about their teaching abilities. The program also benefited the mentors by providing a professional experience in working with another person, received intrinsic rewards such as feeling good in helping another, having someone follow their advice, improved their own teaching skill. The article also provides an overview of the mentoring program.

Diegelman-Parente, A. (2012). *The scholarship of Peer-led Team Learning: My progression from student leader to*

faculty. Conference Proceedings of the Peer-led Team Learning International Society Inaugural Conference, Brooklyn, NY. www.pltlis.org/wp-content/uploads/2012%20Proceedings/Parente-2012.docx

Twenty years ago, I was an undergraduate majoring in Biology and Chemistry, struggling with the desire to integrate the details I had learned in my Chemistry courses with the 'big picture' philosophy stressed in my Biology curriculum. These early educational experiences fostered my passion for curricula geared towards interdisciplinary learning and in programs designed to increase awareness of alternative learning styles and pedagogies for instruction. My Workshop journey began shortly thereafter with PLTL's inception at the University of Rochester. Now as a faculty member, I have implemented PLTL and two other pedagogies into my General Chemistry, Organic Chemistry, and Biochemistry curricula with a "full-circle" perspective that has been nearly two decades in the making. This article will examine the evolution of my educational philosophy as I progressed from student leader to faculty as well as some strategies I have found useful for its implementation and means to involve these alternative pedagogies in my scholarly activities for promotion and tenure.

Dominguez, N., Salazar, J., Narayan, M., & Becvar, J. E. (2012). *Peer leading helps more than the students being led.* Conference Proceedings of the Peer-led Team Learning International Society Inaugural Conference, Brooklyn, NY. www.pltlis.org/wp-content/uploads/2012%20Proceedings/Dominguez-2012.docx

Workshops help the peer leaders learn the content in their own STEM majors' courses by enhancing the understanding of the basic concepts taught in introductory science courses. Because each peer leader teaches at least two 2-hour workshops a week and spends a minimum of three hours preparing for those workshops, the leaders have a more in-depth understanding and command of the basic principles. Because of this better grounding in the discipline, the peer leaders have an advantage when it comes to taking standardized entrance exams for higher education such as MCAT, GRE, PCAT, and DAT. In addition, peer leaders have the further advantage that Workshops force them to continue to review the material for years after taking the course. Peer leaders improve leadership and communication skills; skills they will continue to use throughout their lifetimes in whatever career they pursue.

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. SI was implemented to support cognitive skill development and provide them experience with group work. SI leaders are generally not paid as are 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.* Conference Proceedings of the First National Conference on Supplemental Instruction and Video-based Supplemental Instruction, Kansas City, MO.

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., & 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.

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.

Dreyfuss, A. E. (2012). *Exploring the phenomenon of leading through the experiences of peer leaders.* (Ed. D. dissertation), Columbia University, New York City, NY. ERIC database. (ED548984)

The concept of leadership has been explored in many contexts, yet it is not a role that is expected as part of a college education. Peer Leaders are in a unique position because they are responsible for leading a group of students to learn. This phenomenological case study explored the experience of leading by Peer Leaders, college students who are selected and trained in adult learning theory to lead a group of students to learn the course material in an introductory science course, in a Peer-Led Team Learning program at an urban commuter public college. Seventeen of the 22 study participants served more than one semester, averaging four, over the past ten years. In-depth interviews were conducted and three emergent metaphors were identified. These are the "Older Sibling," a role based in prior learning of family with informal authority; the "Faces of the Mountain," a more traditional view of leadership combining positional authority and entity attributes; and the "Catalyst" who manages several small groups of learners, giving power back to the group members. The essence of leading by Peer Leaders is proposed as the following: Leading a workshop group is drawn from prior experience, perhaps a familial role of a sibling, or tacit assumptions and expectations of the role of a leader. It has a cognitive foundation in the task of helping students learn course material yet it is in the dynamics of interacting with the students that a relational process occurs. Emergent relational leadership roles are based in communication, discourse, emotions, diversity of learners' needs and abilities. It is through this experiential process that leading becomes a catalytic activity whereby the leader manages smaller groups to enable each group member to help others learn. Relational leadership is inclusive, challenging, and carries with it the burden of responsibilities to fellow students, fellow Peer Leaders, faculty, and the department. It can also be fun, and may flow with energy, and most importantly, it can be transformational in the ways the Peer Leader views being a follower, learning and leadership.

Dreyfuss, A. E., & Gosser, D. K. (2006). In their own words: Learning to be a peer leader. In D. B. Lundell, J. L. Higbee, I. M. Duranczyk & E. Goff (Eds.), *Student standpoints about access programs in higher education* (pp. 143-157). Minneapolis, MN: Center for Research on Developmental Education and Urban Literacy, College of Education and Human Development, University of Minnesota-Twin Cities. www.education.umn.edu/CRDEUL/monographs.html.

This chapter focuses on the experience of the student facilitators who serve in the Peer-led Team Learning (PLTL) program. The beginning of this chapter provided an overview of the PLTL program. Then the narrative focused on the training program for the student facilitators. As a continuation of the initial training, all facilitators maintain a weekly log for them to reflect upon the growth of the students as well as their own personal and professional development. Analysis of the journals identified nearly ten themes that dominated the conversation of the participating students and the inner minds of the facilitators.

Dreyfuss, A. E., Villatoro, M. L., Loui, M. C., Becvar, J., Saune, G. B., & Johnson, W. (2015). *Getting past the first year: Retaining engineering majors.* Conference Proceedings of the Frontiers in Education Conference, El Paso, TX.

Peer Led Team Learning (PLTL) is a nationally recognized curriculum enhancement strategy adopted in various forms by over 150 universities and colleges across the United States. Consistent with the outcomes and the vision of ABET Engineering Criteria 2000 and the National Academy of Engineering Engineer 2020, PLTL prepares students to work in teams; apply knowledge of mathematics, science, and engineering to solve problems; communicate effectively; engage in life-long learning; and develop leadership skills. Published PLTL program data have shown that using peer leaders in small group workshop settings boosts performance in critical first-year courses including core math, science and engineering courses. The PLTL model promotes the growth of critical workplace skills for students and peer leaders such as working in teams, listening, critical thinking and leadership. This paper will present the basics of the PLTL instructional model, including sample materials developed for engineering workshops. Consideration of the practicalities of the six critical components will be discussed: integration of the workshop component into the course structure, involvement of the teaching faculty, training and supervision of the peer leaders, creation of challenging materials, and provision of appropriate institutional resources.

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.

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.

Ediger, K.-A. (2007). *Peer Assisted Learning sessions: Building a community of learning and achievement*. Unpublished manuscript. Department of Postsecondary Teaching and Learning, University of Minnesota. Minneapolis, MN.

This study examined the first two years of the Peer Assisted Learning (PAL) program developed at the University of Minnesota. The PAL program is based on several national peer learning programs including Supplemental Instruction, Peer-led Team Learning, and the Emerging Scholars Program. The evaluation revealed benefits for both the PAL participants and the facilitators. Some of the PAL courses examined had a mandatory attendance policy and others were available to enrollees who attended voluntarily. For PAL courses where attendance was mandatory, a student was deemed a nonparticipant if they failed to attend at least half of the PAL sessions during the academic term. Both a quantitative and qualitative study was conducted. The quantitative study revealed statistical significance for the PAL participants at the $p < .05$ or lower for earning a higher percentage of A grades and lower rates of C, D, F, and course withdrawal as compared with PAL nonparticipants. The qualitative study of the PAL facilitators identified five outcome themes in their own experience in the PAL program (a) enhanced personal learning and study skills, (b) increased group facilitation and decision making skills, (c) increased confidence and enjoyment during learning, (d) positive relationships with participating students, and (e) sense of community in helping others grow and learn. The

PAL facilitators also perceived changes among their PAL participants (a) increased analytical skills; (b) increased confidence and risk taking behaviors; (c) increased importance and effectiveness of working in small groups; (d) increased comfort when engaging and sharing ideas with other students; and (e) increased academic autonomy, diversity of study strategies, and self-reliance. The Peer Assisted Learning (PAL) program at the University of Minnesota is a primary academic support program for historically difficult, introductory college courses that serve as gatekeepers to academic degree programs. Based upon operating principles of other programs and educational theories, PAL is integrated into the courses it serves.

Eller, J. L. (2016). *Investigating the Supplemental Instruction leader experience: A phenomenological study of undergraduate peer educators.* (Ph.D.), Liberty University, Lynchburg, VA. www.digitalcommons.liberty.edu/cgi/viewcontent.cgi?article=2345&context=doctoral

The purpose of this transcendental phenomenological study was to describe the experiences of undergraduate students who serve as Supplemental Instruction (SI) leaders at a mid-sized, private research university in the Midwestern United States. Using Schlossberg's transition theory as a theoretical framework, this study attempted to answer the central research question: What is the experience of students who serve as SI leaders at a mid-sized, private research university located in the Midwestern United States? Sub-questions sought to address student expectations moving into the experience, how expectations were met or not met as they moved through the SI leader experience, the expected and unexpected outcomes as they moved out of the experience, and what students perceive to be the value of their experience beyond their tenure as an SI leader. Criterion, intensity, and maximum variation sampling were used to secure 12 co-researchers who experienced the phenomenon of serving as an SI leader at the research site. Data collected through questionnaires, interviews, archival records, and focus groups revealed four themes: (a) importance of relationships, (b) engagement for self and others, (c) valuing teaching and learning, and (d) developing intrapersonal skills for life, learning, and work. The study findings and limitations, implications for practitioners, and recommendations for future research are discussed.

Eller, J. L., & Milacci, F. A. (2017). Moving in, through, and out of the Supplemental Instruction (SI) leader experience. *Supplemental Instruction Journal, 3*(1), 38-63. www.info.umkc.edu/si/wp-content/uploads/2017/12/Compressed-siJ-Volume-Three-Issue-One.pdf.

Using a phenomenological research method and Schlossberg's transition theory as a theoretical framework, this study addressed the central research question: How do students move in, through, and out of the Supplemental Instruction (SI) Leader experience at a mid-sized, private research university located in the Midwestern United States? Through questionnaires, interviews, archival records, and focus groups, data analyses revealed themes that were used to describe the participants' perceptions of their SI Leader experience in the context of their transition from students to peer educators and the lasting impact of their experience beyond their SI Leader tenure. Themes are organized within Schlossberg's stages of transition and the factors of situation, self, supports and strategies that influence how a person copes with transition. Study limitations and recommendations for future research are discussed. Appendices including data collection instruments are included.

Emenike, M. E., Cuthbert, T., & Blackwell, S. (2022). Investigating the epistemological development of academic peer leaders across STEM disciplines: Exploring changes over time, by gender, and by discipline. *The Learning Assistance Review, 27*(2), 83-130.

Academic peer leadership positions provide opportunities for undergraduate students to develop content knowledge, Twentyfirst Century Skills, and their beliefs about teaching and learning. To explore peer leaders' (PLs') epistemological development, the Epistemological Beliefs about Physical Sciences (EBAPS) survey was administered to 135 PLs three times a year, over a three-year period. This instrument was demonstrated to be valid and reliable for use with STEM PLs. Although the majority of positive shifts within instrument constructors occurred during the fall semester, responses did not regress by the end of the spring semester, demonstrating a retention of the new or altered beliefs over time. Implications for the design of PL development programs are discussed.

Evans, A., & Pham, H. (2021). San Jose City College peer leaders share peer-to-peer observation and feedback processes. *Advances in Peer-Led Learning, 1*(1), 99-109. doi: doi.org/10.54935/apll2021-01-09-99. www.doi.org/10.54935/apll2021-01-09-99.

San Jose City College offers a comprehensive Certificate of Specialization in Peer Leader Training for students who are gainfully employed in Peer-Led Team Learning (PLTL) and/or Supplemental Instruction (SI) programs. Led by veteran Peer Leaders (PLs), faculty and support staff, newly hired PLs begin their intensive training at two biannual orientations scheduled during summer and winter intersessions. PLTL & SI PLs are also expected to concurrently enroll in one of three 0.5 unit training courses over three semesters and attend monthly one-hour meetings with faculty coordinators and staff, while facilitating weekly PLTL and/or SI

workshops. Additionally, PLTL PLs enroll in a 0.5-unit directed studies course and meet weekly with their Lead Faculty PLTL Practitioner to ensure course material and workshop activities are aligned. Among their employment responsibilities, PLs are expected to also engage in Peer-to-Peer (P2P) observations, both as observees and observers. Their active participation in P2P duty plays an important role in maintaining the quality of student participants' experiences in workshops while simultaneously furthering their professional development and is the focus of this paper.

Fineus, E., & Fernandez, M. L. (2013). *An investigation of participants' perspectives about a Learning Assistant Program and their thinging about becoming a mathematics teacher.* Conference Proceedings of the 11th Annual College of Education & GSN Research Conference, Miami, FL. https://digitalcommons.fiu.edu/cgi/viewcontent.cgi?article=1203&context=sferc

A Learning Assistant program that recruits strong STEM undergraduates to become mathematics teachers was explored through a qualitative study. Three program participants were purposely selected and interviewed. The program reaffirmed one participant's choice to become a teacher and clarified for one that it might be a career for him.

Fogarty, J., Altman, R., & Lundmark, J. (2022). *Impact of peer-assisted learning and leadership development on undergraduate studentss.* Conference Proceedings of the Excellence through Diversity ASEE Annual Conference, Minneapolis, MN. https://peer.asee.org/41968.pdf

With college advisory boards and potential employers consistently voicing their desire for engineers and scientists who can communicate well, work effectively in teams, and independently problem-solve, the Colleges of Engineering & Computer Science (ECS) and Natural Sciences and Mathematics (NSM) at Sacramento State University, a large, public, primarily undergraduate institution, have deployed two programs to explicitly address these skills for undergraduate science, technology, engineering, and mathematics (STEM) students. The goals of the NSF-funded Achieving STEM Persistence through Peer-Assisted Learning and Leadership Development (ASPIRE) project are to increase retention and decrease time to graduation for STEM students, as well as increase retention of women and underrepresented minorities (URM) in the STEM workforce by implementing evidence-based practices to promote student success during two critical transitions: 1) from lower-division to upper-division coursework in engineering; and 2) from upper-division coursework to an entry-level STEM career. ASPIRE aims to achieve these goals by: 1) adapting and implementing the NSM Peer Assisted Learning (PAL) program in gateway engineering courses; and 2) developing the Hornet Leadership Program which includes scaffolded opportunities for students to explore their leadership capacity and develop leadership skills. The main research questions for this study include: (1) Will the ECS PAL model and Hornet Leadership Program result in increased persistence and workforce readiness in STEM majors at a large, diverse university? (2) What attitude changes will this project have on students and faculty and the relationships between them? The first question is addressed through pre- and post-implementation student surveys and student course/GPA data. The second question is addressed through faculty surveys, faculty focus groups/interviews, and pre- and post-data from a faculty professional development workshop. In general, preliminary results from this study indicate the new ECS PAL program successfully attracts URM students and thus has the potential to support their persistence and STEM workforce readiness. Additionally, undergraduate students across both Colleges who participated in the inaugural Hornet Leadership Program gained non-technical skills and experiences directly linked to competitiveness and preparation for workforce entry and graduate programs. Finally, faculty surveys and the faculty professional development workshop indicate that faculty value student leadership development, but identify barriers to accomplishing this work.

Ford, N., Thackeray, C., Barnes, P., & Hendricks, K. (2015). Peer learning leaders: Developing employability through facilitating the learning of others. *Journal of Learning Development in Higher Education, November*. www.aldinhe.ac.uk/ojs/index.php?journal=jldhe&page=article&op=view&path[]=373.

Employability is a key theme in higher education and attitudes towards its development have shifted from a focus on technical skills development to a broader focus on values, intellect, social engagement and performance contributing to graduate identity (Hager and Hodkinson, 2009). Peer Assisted Learning (PAL) and Language Conversation Clubs are both examples of student-led peer learning schemes at Bournemouth University (BU), and are reviewed to explore the development of students employed to lead and facilitate group learning sessions. Data from four annual evaluation surveys (n=239) is reviewed in addition to qualitative comments and reflective writing. Peer leaders were found to have developed employability attributes including: leadership, time management and organisation, communication, and cultural awareness. Above all, peer leaders identified with developing confidence in their roles. Comments provided examples of student leaders who had actively selected peer learning as an opportunity to develop their confidence and were able to transfer this to other academic and employment contexts.

Gafney, L. (2002). PLTL and secondary school teaching, Peer-Led Team Learning: leader training. *Progressions: The Peer-Led Team Learning Project Newsletter, 3*(2). www.pltlis.org/wp-content/uploads/2012/10/High-School-Implementation-Gafney-PLTL-and-Secondary-School-Teaching.pdf.

This report is an excerpt from a telephone interview conducted by Leo Gafney as part of the study of former peer leaders at St. Xavier University in Chicago. It provides a dramatic illustration of how the peer leader experience inspired Yvonne O'Connell in her work as a secondary school teacher at a private school for boys.

Gafney, L. (2004). Peer leader and Rhodes Scholar: Peer-led Team Learning, The experience of learning. *Progressions: The Peer-Led Team Learning Project Newsletter, 5*(3). www.pltlis.org/wp-content/uploads/2012/10/Experience-of-Leading-Gafney-Peer-Leader-Rhodes-Scholar.pdf .

Rick Malins, a senior at Boston University, was awarded a Rhodes Scholarship and will study for a doctoral degree in neuroscience at Oxford University. He was a workshop leader for two different courses at Boston University. The following is based on a phone interview with him, conducted by Leo Gafney in January 2004

Gafney, L., & Varma-Nelson, P. (2003). *Impact of being a peer-leader on undergraduate students.* Conference Proceedings of the 226th American Chemical Society National Meeting, New York, NY. 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.

Gafney, L., & Varma-Nelson, P. (2007). Evaluating Peer-Led Team Learning: A study of long-term effects on former workshop peer leaders. *Journal of Chemical Education, 84*(3), 535-539. www.pubs.acs.org/doi/pdf/10.1021/ed084p535.

This article describes a study that examined the impact of the Peer-led team learning (PLTL) program with the student facilitators who had direct contact with the students. With a decade of data available on 600 student leaders from 9 institutions, the PLTL facilitators were studied as they took subsequent steps into graduate work and careers. A survey was developed, piloted, revised, and placed online. There were 119 leaders who completed the survey. Respondents reported that leading the workshops reinforced the breadth and depth of their own learning, helped them develop personal qualities such as confidence and perseverance, and fostered a variety of presentation and team-related skills. The respondents offered rich insights into issues in implementing workshops.

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

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.

Garmon, L. (2012). *Why attendance is mandatory in workshops: Comparison of course grades of workshop attendees vs. non-attendees with similar GPA and SAT scores.* Conference Proceedings of the Peer-led Team Learning International Society Inaugural Conference, Brooklyn, NY. www.pltlis.org/wp-content/uploads/2012%20Proceedings/Garmon-2012.docx

Records of test scores and course grades going back over ten years are available for approximately 5400 students in first-semester general chemistry and 3300 students in second-semester general chemistry at the University of West Georgia. In this project those attending workshops regularly throughout a semester were matched in GPA (prior to taking general chemistry) and SAT scores with those not attending regularly. Most students were enrolled in sections in which workshop attendance was an integral part of the course. Those not attending fell into three categories: those in sections that included workshop but who chose not to attend and thus not to meet that requirement; those who were enrolled in an honors section, which did not include workshops; and those taking the course online, as the sections offered online have up to now not included workshops. In all cases, those with similar GPA/SAT scores who attended workshop outperformed those who did not.

Gates, A. Q., Casas, C., Servin, C., & Slattery, M. (2015). *Using Peer-Led Team Learning to build university-community college relationships.* Conference Proceedings of the Frontiers in Education Conference, El Paso, TX.

Through support from the National Center for Women & Information Technology (NCWIT), the University of Texas at El Paso (UTEP) and the El Paso Community College (EPCC) began a program to collaborate on adoption of Peer-Led Team Learning (PLTL) at EPCC. The NCWIT-funded effort aims to transfer this effective retention practice to the EPCC in order to establish early connections with female students, create community, and provide activities that improve students' problem-solving skills. PLTL provides an active learning experience for students and creates leadership roles for undergraduates. For the peer leaders, the experience of working with faculty and guiding their peers through a challenging course is rewarding, and they learn communication, teaching, leadership, and interpersonal skills. Peer leaders become more confident about their career path, and many continue to be involved in the department through undergraduate research positions. This is important for retention and advancement efforts, since the peer-leading experience influences the students' motivation to attend graduate school. This paper describes how the UTEP-EPCC partnership was structured, how the practice was transferred, and the challenges that were encountered. It also presents the evaluation results.

Ghio, C., Morris, S. A., Boyce, H. M., Priem, B. J., DiMilla, P. A., & Reisberg, R. (2020). *The impacts on peer tutors of learning group Supplemental Instrucdtion for first-year engineering students.* Conference Proceedings of the ASEE. www.peer.asee.org/35336.pdf

The purpose of this study was to investigate the impact of peer tutoring experiences on upperclass male and female tutors who provided Supplemental Instruction (SI) for first-year engineering students enrolled in required general chemistry and physics courses at Northeastern University. Our previous research has shown a correlation between regular use of SI by first-year engineering students and increased GPA, as well as gender-based differences in SI usage and effects of SI. In this study, we turned our focus to the effects of the tutoring role on the tutors and sought to elucidate 1) whether tutors perceived that they benefitted from the SI experience, and if so, in what ways, 2) how gender affected attitudes towards tutoring and the impact of serving as a peer educator, and 3) whether level of commitment to group SI correlated with tutors' perceptions of how they were impacted. Forty-one individuals who served as peer tutors at Northeastern University between 2005 and 2018 were invited to respond to online surveys. Those who completed the online survey were invited to participate in follow-up phone interviews. Subjects were asked about their experiences with SI, their motivations to provide instruction, their level of commitment to the program, and—as they reflected on their college and post-graduation endeavors—their perceptions of the value of their tutoring experience. Statistical comparisons were drawn from the responses of 20 female and 9 male tutors to the online survey, and qualitative analysis of transcripts of follow-up phone interviews with 13 women and 4 men were performed. Through the application of grounded theory to transcripts, supported by statistical analysis of data from the online survey, it was deduced that increased confidence and preparedness in future endeavors was the core category that linked individuals' tutoring experiences. Participants reported that relationships developed with tutees, fellow tutors, and faculty mentors during their tutoring experiences impacted them beyond their experiences as tutors. Participants reported improved soft skills, including communication, teamwork, and leadership, and strengthened academic abilities, which resulted from a deeper understanding of the tutored subject matter. Serving as tutors also caused tutors to be more open to receiving tutoring themselves in their coursework. Improvement in soft skills along with enhanced academic ability contributed to an increased sense of confidence and preparedness. Analysis of the role of gender showed that females were more likely than males to perceive an increase in self-confidence and to view themselves as confidence builders for tutees. Women were also more likely than

men to become a tutor to improve their communication skills and help others. Years spent as a tutor correlated positively with greater perceived benefits for both genders. This study demonstrates that peer tutoring can have a significant impact on the academic performance and professional development of tutors, particularly females, in addition to tutees.

Ghosh-Dastidar, U., Kennedy, N., Samaroo, D., & Solis, A. (2022). *Advancing student futures in STEM.* Conference Proceedings of the Exscellence through Diversity ASEE Annual Conference, Mineapolis, MN. https://peer.asee.org/advancing-student-futures-in-stem.pdf

This paper concludes the work-in-progress presented in a paper published in the ASEE proceedings in 2018 [1] and the epiSTEMe8 conference proceedings [2]. This project contributes to the national effort in recruiting, supporting, and educating future STEM professionals for the national workforce by providing scholarships and curricular support to academically promising STEM students with financial need in associate degree programs in Computer Science and Chemical Technology and baccalaureate degree programs in Applied Chemistry, Applied Mathematics, and Biomedical Informatics. Based on 2015-16 data, nationally a higher percentage of bachelor's degrees awarded to females than to males is observed (58% vs. 42%). In STEM related fields, however, female participation is disproportionately lower than their male peers: the ratio of bachelor's degrees awarded in STEM fields to males is to females is 64% to 36%. Similarly, the trend of higher percentage of all bachelor's degrees awarded to females than to the males in all fields is similar across different racial and ethnic groups. However, a different pattern emerges when the study domain is restricted to bachelor's degrees awarded only in STEM fields. This disparity is observed widest among Black students (11% women), followed by students of two or more races (21%), Asian students (21%), American Indian/Alaska Native (23%), Hispanic (25%), Pacific Islander (28%), and even in Caucasian populations (33%). Based on 2014 data, the proportion of females awarded bachelor's degrees nationally in Computer Science in particular is about 18.1% [3]. The average proportion in Mathematics and the Statistics is 41.7% [4]. Additionally, Pew research cites significant underrepresentation of Black and Hispanic population in the STEM related jobs including computing fields despite significant recent growth. Blacks and Hispanics held 9% and 8% of all STEM jobs respectively, whereas Whites represent 67% of all STEM jobs. The same research also finds underrepresentation of women in physical sciences, computing, and engineering fields although women are well-represented in the health-related workforce. While women represent 74% in health-related jobs, this representation is a quarter or lower in computing and engineering fields [5]. Because of the significant underrepresentation of women and minorities in Computer Science and in STEM fields overall, the program described here placed a heavy emphasis on recruiting and enrolling greater numbers of female students and in providing evidence-validated interventions to support their retention, graduation, and workforce entry.

Gill, D., Parker, C., Spooner, M., Thomas, M., Ambrose, K., & Richardson, J. (2006). Tomorrow's doctors and nurses: Peer assisted learning. *The Clinical Teacher, 3*(1), 13-18. www.theclinicalteacher.com.

This article describes the use of Peer Assisted Learning (PAL) in the United Kingdom to improve achievement for health science students at the Royal Free and University College London Medial School and the School of Health and Social Sciences at Middlesex University. PAL is based upon the Supplemental Instruction (SI) model. Senior nurses served as the PAL leaders for the first-year students. Outcomes for the PAL leaders included gains in confidence, knowledge of the subject material, gains in teaching and clinical examination skills, and an opportunity to enhance interprofessional relationships.

Gill, M., & McConnell, C. (2016). "What's in it for me?" - An investigation into the motivations, challenges and benefits of peer leadership in a School of Education. *Student Engagement and Experience Journal, 5*(1). doi: 10.7190/seej.v4i1.117. www.research.shu.ac.uk/SEEJ/index.php/seej/article/view/117/pdf.

This case study of practice provides an account of an academic peer-learning scheme in a university School of Education in the South of England. The significance of this case study is to provide insights specifically into the experiences of undergraduate peer leaders. The scheme is called PASS (Peer Assisted Study Sessions), and is a nationally recognized student-led mentoring scheme involving trained student volunteers from levels five and six (second and third year) facilitating weekly study sessions for level four (first year) students. Through the voices of seven student PASS leaders, this small-scale study employed a qualitative approach using a focus group to explore leaders' motivations, and to enable a discussion of the benefits and challenges they experience through leadership. The findings also reveal the leaders' awareness of their growing confidence, communication and employability skills development, particularly pertinent for Education students in relation to their future career paths in teaching and learning settings.

Gillmore, J. G. (2010). PLTL impacts a career - from peer leader to the professoriate. Peer-led Team Learning: The experience of leading. *Progressions: The Peer-Led Team Learning Project Newsletter, 12*(1). www.pltlis.org/wp-content/uploads/2012/10/Experience-of-Leading-Gilmore-PLTL-Impacts-a-Career.pdf.

In August of 1998, the author arrived at the University of Rochester fresh from a five-year BS/MS at Virginia Tech. That fifth year to complete a master's thesis convinced the student of desire to be a physical organic chemist, and consider an academic career rather than the original pharmaceutical industry trajectory. At Rochester she joined Joe Dinnocenzo's group to study photoinduced charge transfer initiated cation radical reactions in polymeric media, and realized she would not teach for at least a semester or two. The experience as a Peer Led Team Learning (PLTI) facilitator solidifed resolve to become a teacher.

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.

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.

Ginty, C., & M, H. N. (2014). The first year experience of a peer assisted learning program in two institutes of technology in Ireland. *Journal of Peer Learning, 7*(1), 36-56. www.ro.uow.edu.au/cgi/viewcontent.cgi?article=1062&context=ajpl.

This paper describes a collaborative action research study in which peer assisted learning was deployed simultaneously across a range of disciplines in two institutes of technology in Ireland. The aim of the research was to determine if peer assisted learning enhances the learning experience of first year participants. An action research approach was selected and involved three phases between 2009 and 2011. The implementation of each phase was informed by a review of the previous phase. The third phase also incorporated the rollout and evaluation of a new peer assisted learning student leadership module (an elective 5 ECTs European Credit and Accumulation Transfer System) in both institutes. This paper focuses on both quantitative and qualitative data from the first year experience student survey, which was designed and deployed in phase one and repeated in phase two. The survey is supplemented by data from focus groups with student leaders and session reviews. Qualitative data was analysed using both the constant comparison method and text analysis. Our findings illustrate the challenges associated with implementing and embedding a long-term peer assisted learning program as part of the first year student experience. In addition, we found wide ranging benefits for the two institutes of technology that collaborated on the development, rollout, and evaluation of the program. An evidence based model emerged, which involved a partnership between management, academic staff, student services, and learning and teaching advocates. These partners continue to work together to sustain the program.

Glenn, K. (1998). General chemistry teaching workshop: A student's view. *Journal of Chemical Education, 75*(2), 147-150. doi: 10.1021/ed075p147.

This article focuses on the reaction of the student facilitators who work in the Peer-led Team Learning (PLTL) program. Interviews with seven students from Saint Xavier University, Chicago, IL; The City College of CUNY; University of Kentucky; University of Montana; American University, and University of Rochester.

Glover, R., Hammond, N. B., Smith, J., & Guerra, D. (2018). Assessing peer leader skill acquisition and group dynamics in a first-year calculus course. *International Journal for the Scholarship of Teaching and Learning, 12*(1). www.digitalcommons.georgiasouthern.edu/cgi/viewcontent.cgi?article=1685&context=ij-sotl.

Peer-led team learning (PLTL), specifically the model known as 'Workshops', has been shown to contribute positively and significantly to student success in STEM courses across subjects (Gosser et al., 2001). Our research adds to the SOTL literature describing the effectiveness of Workshops by reporting on the changes in student leaders. We examine the level to which leaders acquired new skills in effective teaching and describe the pedagogical interactions in the groups they led as a result of the combination of training and experience facilitating first-year Calculus Workshop sections. This was a semester-long study on twenty-two Workshop leaders for two multi-section, introductory calculus courses at a small research university. Our method is a novel overlay of two metrics that allows, with some forethought, a robust analysis of Workshop

leader outcomes that would complement any assessment of PLTL implementation faculty might choose to undertake.

Gold, C. (2019). *Transformative learning gains in undergraduate Learning Assistants.* (Honors project), Bowling Green State University. https://scholarworks.bgsu.edu/cgi/viewcontent.cgi?article=1574&context=honorsprojects

The Learning Assistant (LA) program is utilized at Bowling Green State University (BGSU) to assist in shifting classrooms from lecture based to more interactive and groupwork based learning. LAs are employed in courses with greater than 80 students enrolled that have historically high drop, withdrawal, and failure rates. Not only are students in courses with LAs having positive experiences, but the LAs themselves are as well. Interest has grown in the development of LAs during their time in the program; this can be measured in the form of transformation. Transformative learning is defined as "learning that results in transformative changes which alter the student in a significant way, changing the state of the learner" (Springfield et al., 2015). Through their time in the program LAs have been studied through the use of survey answers, using a coding rubric developed by Springfield et al., to determine their levels of transformative learning. Involvement in the LA program has been shown to transform LAs in four categories, confidence, skills, perspective, and identity. Data has shown that a large majority of LAs experience high levels of transformative learning gains in all four categories. One way this transformation is extremely beneficial to LAs may be that they have a stronger identity within their STEM field (Close, 2016). Factors influencing this transformation in LAs is investigated, with the impact of different approaches to LA training being a focus.

Gong, H. J., Kwon, J., & Brock, M. (2022). Experimental learning through a peer Learning Assistant Model in STEM. *Educational Research and Evaluation, 64*(3), 317-333. doi: https://doi.org/10.1080/00131881.2022.2096092. https://www.tandfonline.com/doi/full/10.1080/00131881.2022.2096092?scroll=top&needAccess=true&role=tab&aria-labelledby=full-article.

Over recent years in colleges and universities, a peer-learning assistant (PLA) model has been introduced into Science, Technology, Engineering, and Mathematics (STEM) classes. Despite the significance of this alternative pedagogical approach in undergraduate education, studies of PLAs' lived experiences of the approach, and hence a deep understanding of the model and its application in higher education, are limited. Purpose The study sought to gain insight into the learning and teaching experiences of PLAs in an undergraduate STEM class. The PLAs were required to take a pedagogical class as mentors, in addition to having previously undertaken the STEM class themselves. Method A phenomenological methodology underpinned the study design, supporting the in-depth analysis of rich interview data. Interviews were conducted with five PLAs in STEM majors in a public university in the United States. Interviews were focused on identifying the PLAs' perceptions of their shared experiences, and the knowledge and skills they gained while mentoring peer STEM students and taking a peer-learning pedagogy class. Data were analysed qualitatively, using Kolb's experiential learning as an analytical framework. Findings The analysis identified how the PLAs experienced the cycle of experiential learning by a) engaging in a STEM class as a student teacher; b) interacting with other PLAs in a pedagogical course; c) developing skills and learning from a pedagogy class; and d) readapting developed peer-teaching abilities and attitudes to a STEM class. Conclusions Our study contributes to an understanding of PLAs' experiences of the PLA model. The elements we found offer a view into how the PLA students shaped their peer-learning and peer-teaching skills, through their reflections on experiences in both the STEM and pedagogical classes. Through the four elements, students were able to engage in a process that suggested transformative learning. Practical suggestions and scholarly implications for practitioners and researchers are discussed.

Goomas, D. T. (2014). The impact of Supplemental Instruction: Results from an urban community college. *Community College Journal of Research and Practice, 38*(12), 1180-1184. doi: 10.1080/10668926.2013.854182.

Supplemental Instruction (SI) is an academic support program consisting of a series of free, voluntary based weekly study sessions for students taking historically difficult courses. SI is designed to increase student retention and academic performance. Whereas Hensen and Shelley (2003) examined SI impact at a large public midwestern university, this study examined a newly implemented SI at an urban community college in downtown Dallas, Texas. General psychology students who regularly attended SI study sessions had an 83% success (final letter grade of A, B, or C) rate compared to 64% for students who did not participate. To further increase overall success, an early alert warning system within the Blackboard™ learning management system was set up to track each student's performance in the event students started to fall behind in assignment completion. In that case, the student was placed in the SI study group. Additionally, this study examined the SI leaders themselves by tracking their academic and professional activities.

Gosser, D. K., Roth, V., Gafney, L., Kampmeier, J., Strozak, V., Varma-Nelson, P., . . . Weiner, M. (1996). Workshop

chemistry: Overcoming the barriers to student success. *The Chemical Educator Online, 1*(1), Article 1. www.chemeducator.org/bibs/0001001/00010002.htm.

Prevailing modes of instruction, often passive in nature, do not address crucial issues for student success in science: the need for students to become part of an intellectual community, the differences in the ways students learn, and the powerful role that mentoring can play in involving students in science. Furthermore, students who spend most of their instructional time listening to lectures seldom learn to communicate scientific ideas and to become part of a problem-solving team, skills that industry tells us are crucial to success in the workplace. Workshop Chemistry is a peer-led team-learning model of instruction that provides an active learning experience for students, creates new leadership roles for those who have done well, and involves faculty in the process of reform. A modest reduction in lecture or recitation time is replaced by a 2-hour student-directed small group problem-solving and model-building workshop. The Workshop Chemistry Project is a coalition of faculty, learning specialists, and students from a variety of institutions organized around the theme of developing the workshop model as an integral part of the course structure. Several brief descriptions of the workshop courses offered in the Fall of 1995 are provided, along with some sample workshop problems. Surveys, focus groups, student logs, faculty interviews, and actual course results provide insight into the enhanced learning in the workshop and the progress of the project towards its goals.

Gray, K. E., & Otero, V. K. (2008). *Analysis of Learning Assistant's views of teaching and learning.* Conference Proceedings of the Physics Education Research Conference, Melville, NY. https://www.per-central.org/document/ServeFile.cfm?ID=8001&DocID=711&Attachment=1

For several years the University of Colorado has been using undergraduate Learning Assistants (LAs) in their introductory science and math courses. While the LAs have teaching duties very similar to graduate Teaching Assistants (TAs), first year LAs are also required to take an education course focused on teaching methods. The purpose of this course is to first help LAs improve their teaching in the university classrooms and to encourage some of the LAs to consider careers as K-12 science teachers. Throughout the semester LAs are asked to reflect on their learning about teaching and on the applications of these concepts to their current teaching experience. This paper will present an analysis of this learning experience from the perspective of the LAs. The paper will also present how LAs evolve as teachers and as learners throughout this experience.

Gray, K. E., & Otero, V. K. (2009). *Analysis of former Learning Assistants' views on cooperative learning.* Conference Proceedings of the AIP Conference, Ann Arbor, MI. https://pubs.aip.org/aip/acp/article-pdf/1179/1/149/11806008/149_1_online.pdf

The University of Colorado Learning Assistant (LA) program integrates a weekly education seminar, meetings with science faculty to review content, and a semester-long teaching experience that hires undergraduates to work with groups of students in university science courses. Following this three-pronged learning experience, some of the LAs continue into the teacher certification program. While previous research has shown that this model has more than doubled the number of science and math majors graduating with a teaching certification, the question remains whether these teachers are better prepared to teach. The analysis presented here addresses this question by comparing the views of former LAs to the views of comparable teachers on the issue of cooperative learning. Interviews were conducted with ten middle school and high school science teachers throughout their first year of teaching. Results suggest differences in former LAs views toward group work and their purposes for using group work.

Gray, K. E., Webb, D. C., & Otero, V. K. (2010). *Are Learning Assistants better K-12 science teachers?* Conference Proceedings of the Physics Education Research Conference, Portland, OR. https://pubs.aip.org/aip/acp/article-pdf/1289/1/157/11752816/157_1_online.pdf

This study investigates how the undergraduate Learning Assistant (LA) experience affects teachers' first year of teaching. The LA Program provides interested science majors with the opportunity to explore teaching through weekly teaching responsibilities, an introduction to physics education research, and a learning community within the university. Some of these LAs are recruited to secondary science teacher certification programs. We hypothesized that the LA experience would enhance the teaching practices of the LAs who ultimately become teachers. To test this hypothesis, LAs were compared to a matched sample of teachers who completed the same teacher certification program as the LAs but did not have the LA "treatment." LAs and "non-LAs" were compared through interviews, classroom observations, artifact packages, and observations made with Reformed Teacher Observation Protocol (RTOP) collected within the first year of teaching. Some differences were found; these findings and their implications are discussed.

Gray, K. E., Webb, D. C., & Otero, V. K. (2012). *Effects of the Learning Assistant experience on in-service teachers' practices* Conference Proceedings of the Physics Education Research Conference, Omaha, NE. https://pubs.aip.org/aip/acp/article-pdf/1413/1/199/12210590/199_1_online.pdf

The Colorado Learning Assistant (LA) Program serves as a content-specific supplement to standard teacher preparation programs. In addition to transforming undergraduate STEM courses, it recruits and prepares math and science majors for teaching careers by involving university STEM faculty. The research reported here compares the teaching practices of in-service teachers who participated in the LA experience as undergraduates to a comparison group of teachers who did not participate in the LA program as undergraduates but were certified to teach through the same program. We report on teachers' views of assessments and differences in their teaching practices. This analysis is based on interviews with approximately 30 teachers and observations of their classrooms throughout their induction years of teaching. This work considers how the LA program may help improve current teacher preparation models.

Gray, K. E., Webb, D. C., & Otero, V. K. (2016). Effects of the Learning Assistant Model on teacher practice. *Physical Review Physics Education Research, 12*(2). doi: https://doi.org/10.1103/PhysRevPhysEducRes.12.020126. https://journals.aps.org/prper/pdf/10.1103/PhysRevPhysEducRes.12.020126.

Through the transformation of undergraduate STEM courses, the Colorado Learning Assistant Program recruits and prepares talented STEM majors for careers in teaching by providing them with early, sustained teaching experiences. The research reported here compares teaching practices of K-12 teachers who served as learning assistants (LAs) as undergraduates to colleagues that were certified through the same teacher certification program but did not serve as LAs. Observations of teacher practices revealed that former LAs used significantly more reformed teaching practices than their colleagues, especially in their first year of teaching. These results suggest the LA Program serves as a valuable supplement to traditional teacher certification programs.

Guyon, A., Butterfint, Z., Lacy, A., Sanosi, A., Sheridan, K., & Unwin, J. (2015). Speech and language therapy students' experience of Peer Assisted Learning: Undergraduates investigate PAL as a means of enhancing academic and professional development. *Journal of Learning*. www.ueaeprints.uea.ac.uk/55820/1/PAL_Project_FINAL.pdf.

The implementation of Peer Assisted Learning (PAL) on healthcare courses in Higher Education Institutions has been explored in a number of studies. This paper presents research into the experience of PAL on a BSc Speech & Language Therapy (SLT) programme. The research was conducted by final year undergraduate SLT students to form the basis for their final dissertations. The focus for their research was on the effects of PAL on academic and professional development for both mentees and mentors on the same course. Data were generated from standard PAL evaluations and focus groups. Findings indicate that mentees benefit from PAL in terms of their university experience and learning. Mentors benefited from opportunities to develop and practice skills for their future employment. Engagement with PAL is attributed to its structured yet informal nature and the enthusiasm of the mentors. However, the collaborative nature of PAL take time to develop, impacting on the behaviours of both mentees and mentors. Overall PAL offers mentees and mentors opportunities which enhance their academic learning and professional development.

Hammill, J., Best, G., & Anderson, J. (2015). Developing student mentor self-regulation skills through formative feedback: Rubric development phase. *Journal of Peer Learning, 8*(1), 48-58. www.ro.uow.edu.au/ajpl/vol8/iss1/6/.

Research into Peer Assisted Study Sessions (PASS) in Higher Education has largely focused on the positive effects of PASS on student motivation, retention and engagement. Less attention has been given to the cognitive, affective and professional development of the PASS Student Mentors through their engagement with students and academic staff. At Victoria University learning and development for Student Mentors begins at training and continues during the semester, supported by several methods of formative feedback: weekly reflective posts through an online platform, weekly development workshops, observations, progress interviews, and evaluations. Despite ongoing training and development throughout the semester, PASS supervisors have observed that some Student Mentors do not have a clear understanding of the role expectations. This paper describes the processes undertaken to develop a rubric that clarifies PASS facilitation objectives for Student Mentors and their PASS supervisors.

Harrison, D., Lentz, J., Schmatz, N., Escovedo, C., & Stark, E. (2017). Peer-based anatomy tutoring for first-year medical students: An analysis of peer-tutoring from the tutors' perspective. *Medical Science Educator, 27*(1), 57-61.

In response to student demand for additional anatomy lab instructional time outside of typical teaching hours, a peer-based anatomy tutoring program was implemented at the David Geffen School of Medicine at UCLA. Peer tutoring is a well-studied form of supplemental instruction, and is known to benefit students and tutors alike. This study aims to address the effect of tutoring on the tutors themselves, specifically in the context of the gross anatomy laboratory. A one-time 12-question survey was distributed to all students who acted as tutors over a three-year period (n = 57), asking them to reflect on their experiences as tutors. Specifically, we

aimed to address their thoughts on their career plans and academic achievement as they relate to their experience as tutors, as well as their opinions on effective tutoring techniques. Based on a 100% response rate, 85.7% of tutors reported being “very interested” in incorporating a teaching component to their career, and 73.7% of respondents reported that their experience tutoring influenced this plan. In contrast to an expectation that tutors would skew their residency choices toward anatomy-focused specialties, the distribution of tutors’ anticipated specialty choices actually reflected the overall distribution of the class. The tutors believed their experience tutoring improved their academic and clinical performance. The overwhelming majority reported believing that their experience as a tutor improved their USMLE Step 1 score (90.2%, n = 46). Sixty-one percent (n = 31) reported feeling that the experience as a tutor helped with their clerkship evaluations. Finally, the most effective tutoring techniques were quizzing the students directly and using the tutors’ own notes and study materials from the prior year. This study supports the finding that tutoring provides a significant beneficial effect on the tutors based on their own perceptions, and further studies obtaining quantitative data on academic achievement and clinical performance of the tutors will be beneficial.

Hayes, C., & Fulton, J. A. (2019). A participatory action research study on the impact of Peer Assisted Student Support (PASS) and Supplemental Instruction (SI) by international PhD students. *Journal of Learning Development in Higher Education*(14). www.journal.aldinhe.ac.uk/index.php/jldhe/article/view/477.

Using a Participatory Action Research (PAR) approach, this evaluative research study gives an insight into the implementation of a pilot study of a newly implemented Peer Assisted Student Support (PASS) and Supplemental Instruction (SI) Programme. The focus of the study involved six postgraduate PhD students delivering a PASS/SI scheme to cohorts of MSc Public Health, MSc Nursing and MSc Psychosis and Complex Mental Health Interventions students, all undertaking their final dissertations. The study was used to illuminate the degree to which PASS and SI were perceived to impact on the overall student experience as part of a quality enhancement initiative. Findings of the study revealed that the programme had positively impacted on both PASS/SI leaders and participants of the scheme, who reported increased confidence and an increased sense of social inclusion and belonging to the institution respectively. Being facilitated by students who had experienced the same academic pathway was perceived to have widened networking opportunities and to have positively impacted on the capacity of the participants and leaders to build relationships and prepare skills of direct relevance to the requirements of an employer such as teamwork and initiative.

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 chapter 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.

Helde, R. (2021). Supplemental Instruction (SI): Learning leadership and leadership development. In A. Strømmen-Bakhtiar, R. Helde & E. Suzen (Eds.), *Supplemental Instruction: Organisation and leadership, volume 3* (pp. 53-73). Munster and New York: Waxmann.www.www.waxmann.com/index.php?eID=download&buchnr=4326.

The topic of this chapter is the student-active form of learning Supplemental Instruction (SI), and the students who lead the SI sessions – the SI leaders. Increased leadership competence for SI leaders is highlighted in descriptions of the SI programme (Helde & Suzen, 2019), but relatively few studies focus on SI leaders with respect to the leadership dimension. This article takes a closer look at how SI leaders learn leadership through the SI programme, and presents the results of a survey and interviews conducted among SI leaders at Nord University Business School, Road Traffic Division, in 2017. The main focus of this chapter is on whether and how SI leaders have learnt leadership, understood their role as leaders, and experienced development as leaders in the context of the SI programme. The research question is: what is SI leaders’ understanding and experience of the SI programme’s contribution to learning about leadership and leadership development?

Hoiland, S. L., Reyes, S., & Varelas, A. (2020). The impact of a Supplemental Instruction program on diverse peer leaders at a two-year institution. *Journal of Peer Learning, 13*(1), 5-20. www.ro.uow.edu.au/cgi/viewcontent.cgi?article=1161&context=ajpl.

Supplemental Instruction (SI) is a peer-led academic support program in which SI Leaders help students develop

study habits and note-taking strategies as well as facilitate test preparation. While the effects of SI on students receiving the instruction have been thoroughly investigated, there have been far fewer studies that have assessed the impact of SI on its Leaders. Furthermore, research on Leaders has yet to adequately consider community colleges or Hispanic-Serving Institutions (HSIs), or to employ qualitative methodologies. Thus, this paper details an SI program developed at a two-year HSI and the impact of the SI Leaders' experience via qualitative data analysis of structured, open-ended interviews. The majority of Leaders described shifts in long-term goals or changes in learning styles from individual learning and a desire to "look smart" to one that embraced asking for help, peer learning, and belonging. The data indicate a shift in academic mindset among Leaders, particularly among minority male and female adult learners and Latino males.

Holladay, S. R. H. (2004). *Analysis of PLTL leaders' reflections.* Conference Proceedings of the 227th American Chemical Society National Meeting, Anaheim, CA. 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.

Hooker, D. D. (2010). *A study of the effects of the implementation of small peer led collaborative group learning on students in developmental mathematics courses at a trivial community college.* (Ph.D. dissertation), Montana State University, Bozeman, Montana. www.etd.lib.montana.edu/etd/2010/hooker/HookerD0510.pdf

College students needing remediation in mathematics are a problem at nearly all colleges and universities but are immense at community colleges where large numbers of students enroll in developmental mathematics courses. This issue for Native American students at Tribal Community Colleges has an enormous effect on future opportunities in education, employment, politics and society. The overarching research question was: How does the implementation of small peer-led collaborative learning groups affect students in developmental mathematics courses at the Tribal Community College? This study focused on an application of Peer-Led Team Learning (PLTL). To answer this question five sub-questions were addressed. What impact will the treatment have on: 1) completion, 2) perseverance, 3) demonstrated procedures of mathematics, 3) personal skills for success, and 4) the leaders' perceptions of the benefits associated with acting as small peer led collaborative group leader This research study took place at a small Tribal Community College. The quasi experimental, mixed methods study involved collection and analysis of both quantitative and qualitative data. The treatment class consisted of having the students work together on a workshop activity designed to be engaging, challenging and relevant for one class period each week in small peer-led collaborative learning groups. Peer leaders were chosen according to predetermined criteria. The peer leaders were trained to help guide the group in the direction of a solution and to help the group learn how to collaborate to achieve the best results. The control class was given the same workshop activity to work on, but not encouraged to work together nor assisted by a peer leader. Results of this research study show increased completion and perseverance rates. Students participating in the small peer-led collaborative groups were more likely to attempt mathematics. The attitude toward mathematics was the most drastic change; students now look forward to attending their mathematics class and spend more time out of class doing mathematics. Group leaders gained personal, academic and leadership skills. Detailed descriptions of the results are given. In conclusion, implications of the findings and how they may be used are provided for mathematics instructors, administrators and student support personnel are offered. Recommendations for further research are also suggested.

Hug, S., Thiry, H., & Tedford, P. (2001). *Learning to love computer science: Peer leaders gain teaching skill, communicative ability and content knowledge in the CS classroom.* Conference Proceedings of the 42nd ACM Technical Symposium on Computer Science Education.

Paper presents evidence that the PLTL student leaders gain teaching skill, communicative ability, and content knowledge in teh computer science classroom

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. The purpose of this study was to determine whether student devised and delivered supplemental instruction is beneficial and acceptable to first-year medical students. A student-run Supplemental Instruction Project (SIP) was developed and delivered by second-year medical students and offered free of charge to all first-year medical students at Memorial University of Newfoundland taking the Integrated Study of Disease I course in 1999 and again in 2000. Small-group tutorials focused on subject material that second-year medical students identified as 'difficult'. Five 60- to 90-minute sessions covering topics in cardiology, nephrology and respirology were offered. Student and tutor perceptions about the project were collected using anonymous questionnaires. Students were quizzed before and after each tutorial session. Post-tutorial quiz scores were significantly greater than pre-tutorial scores. Student and tutor perceptions of SIP were positive. It is concluded that the SIP is an acceptable, practical and effective method to supplement delivery of challenging material to first-year medical students.

James, A. M. (2014). *Experiential learning theory, transformational leadership, and the Supplemental Instruction Leader: An exploration of their relationship and influence on recurring attendance to Supplemental Instruction sessions.* (Ph.D. dissertation), Texas A & M University, College Station, TX. www.oaktrust.library.tamu.edu/handle/1969.1/153476

The purpose of this study was to explore the learning preferences and leadership behaviors of Supplemental Instruction (SI) leaders at Texas A&M University, and the impact of those preferences on recurring attendance to their sessions. The Learning Style Inventory (LSI) 3.1, the Multifactor Leadership Questionnaire (MLQ), and a demographic instrument were administered to 34 SI leaders employed in the fall 2013 semester. A majority of participants preferred a diverging or accommodating learning style and perceived themselves to display transformational leadership behaviors the most. Analysis of variance and Pearson product-moment correlations revealed that learning preferences and leadership behaviors did not have a significant relationship with recurring attendance. Significant relationships for variables on the LSI and MLQ were found for transformational and transactional leadership behaviors and learning preferences. Most of these relationships were found for preference for transforming information. Literature concerning the SI leader is narrow. Supplementary studies exploring their characteristics, preferences, and personality are needed. The relationship between leadership and learning is an area that can benefit from further research.

James, A. M., & Moore, L. (2018). Understanding the Supplemental Instruction leader. *The Learning Assistance Review, 23*(1), 9-29. www.files.eric.ed.gov/fulltext/EJ1170156.pdf.

This article explored the learning styles and leadership styles of Supplemental Instruction (SI) leaders at Texas A&M University, and the impact of those preferences on recurring attendance to their sessions. The Learning Styles Inventory, the Multifactor Leadership Questionnaire, and a demographic instrument were administered to SI leaders employed in the fall 2013 semester. This study is of significance to practitioners and researchers by identifying characteristics of SI leaders, one of the key personnel of a higher eduation learning program. The majority of participants in this study preferred a diverging or accommodating learning style. On the MLQ participants had a higher mean score for transformational leadership. The highest mean score reported was for inspirational motivation.

James, C., & Templeman, E. (2015). Exploring the emotional intelligence of student leaders in the SI context. *Journal of the First-Year Experience & Students in Transition, 27*(2), 67-81. www.ingentaconnect.com/contentone/fyesit/fyesit/2015/00000027/00000002/art00004?crawler=true.

An exploratory study of the emotional intelligence (EI) of student leaders participating in a Supplemental Instruction (SI) program was conducted to determine whether a significant relationship exists between leadership effectiveness and EI as measured by the Bar-On Emotional Quotient Inventory (EQ-i) and to assess the impact of the leadership experience on EI scores through pre- and post-testing. The results revealed a statistically significant difference in the Total EQ-i of the more effective leaders as compared to the others. The more effective leaders also scored higher on all the EQ-i subscales, with the differences on Social Responsibility, Impulse Control, and Reality Testing being statistically significant. As for changes in EI, only the scores on the EQ-i Problem Solving subscale increased significantly between the pre- to post-testing sessions. Implications for practice and future research are addressed.

Jardine, H. E., & Friedman, L. A. (2017). Using undergraduate facilitators for active learning in organic chemistry: A preparation course and outcomes of the experience. *Journal of Chemical Education, 94*(6). doi: 10.1039/C5RP00102A.

In this study, we describe a course to educate and prepare undergraduate “facilitators” for small group problem solving sessions in a large, first semester, introductory undergraduate organic chemistry course. We then explore the outcomes of the facilitator experience for one cohort of facilitators through qualitative analysis of written reflections, surveys, and field notes. Our findings suggest that the course achieved its goals of

providing facilitators with effective teaching techniques and reinforcing content knowledge, and it created a forum for the facilitators to provide feedback to each other and to the course instructor. Furthermore, the course catalyzed the development of professional skills, enhanced metacognitive abilities, reinforced the benefits of active learning, and exposed facilitators to educational literature. These findings are noteworthy because they demonstrate the various potential benefits for undergraduates that facilitate active learning in large chemistry courses.

Johnson, E. C., & Loui, M. C. (2009). *How can students benefit as peer leader of learning teams?* Paper presented at the 39th ASEE/IEEE Frontiers in Education Conference, San Antonio, Texas.

In a course for freshmen in electrical and computer engineering, students may choose to attend optional supervised study sessions, which implement Peer-Led Team Learning (PLTL) workshops. In the sessions, students work on difficult problems from previous semesters' exams under the supervision of a team leader. The team leaders are graduate teaching assistants, undergraduate teaching assistants, and undergraduate volunteers. For two semesters, team leaders were asked to keep weekly reflective journals. The researchers qualitatively analyzed fourteen journals and found that leaders faced common challenges such as irregular student attendance and inadequate student preparation. Leaders reported that they increased their self-confidence, developed an appreciation for intellectual diversity, and gained an increased interest in teaching Leading PLTL workshops provides an excellent opportunity for personal development. Leaders gain important insights about other students' perspectives and learn to justify and explain their own work. Leading a PLTL workshop enhances the leaders' ability to collaborate in teams and take on leadership roles in the future.

Johnson, E. C., & Loui, M. C. (2009). *Work-in-progress: How do students benefit as peer leaders of learning teams?* Conference Proceedings of the Thirty-Ninth ASEE/IEEE Frontiers in Education Conference, San Antonio, TX.

Paper describes the personal and professional development of the PLTL student leaders

Johnson, E. C., Robbins, B. A., & Loui, M. C. (2015). What do students experience as peer leaders of learning teams? *Advances in Engineering Education, 4*(4). www.files.eric.ed.gov/fulltext/EJ1077832.pdf.

In a course for engineering freshmen, peer leaders facilitated optional study sessions, which implemented peer-led team learning workshops. Some leaders were paid teaching assistants, but most were undergraduate volunteers. To understand the experiences of the peer leaders, we asked them to keep weekly reflective journals. By performing a basic qualitative analysis of fourteen journals from two semesters, we developed a description of the experience of leading peer-led team learning workshops over the course of the semester. At the beginning of the semester, the leaders were apprehensive about teaching and concerned with correctly answering students' questions. As the semester progressed, the leaders were often frustrated with the difficulty of teaching, and the leaders tried new ways of encouraging student participation. At the end of the semester, the leaders reported that they increased self-confidence, developed an appreciation for intellectual diversity, and gained an increased interest in teaching.

Johnson, E. C., Robbins, B. A., & Loui, M. C. (2017). What do students experience as peer leaders of learning teams? *Advances in Engineering Education, 6*(1). www.advances.asee.org/wp-content/uploads/vol04/issue04/Papers/AEE-16-Loui.pdf.

In a course for engineering freshmen, peer leaders facilitated optional study sessions, which implemented peer-led team learning workshops. Some leaders were paid teaching assistants, but most were undergraduate volunteers. To understand the experiences of the peer leaders, we asked them to keep weekly reflective journals. By performing a basic qualitative analysis of fourteen journals from two semesters, we developed a description of the experience of leading peer-led team learning workshops over the course of the semester. At the beginning of the semester, the leaders were apprehensive about teaching and concerned with correctly answering students' questions. As the semester progressed, the leaders were often frustrated with the difficulty of teaching, and the leaders tried new ways of encouraging student participation. At the end of the semester, the leaders reported that they increased self-confidence, developed an appreciation for intellectual diversity, and gained an increased interest in teaching.

Kalantarian, N. K., Becvar, J. E., Narayan, M., & Saupe, G. B. (2012). *Enhancement of public speaking paved through Peer-Led Team Learning.* Conference Proceedings of the Peer-led Team Learning International Society Inaugural Conference, Brooklyn, NY. www.pltlis.org/wp-content/uploads/2012%20Proceedings/Kalantarian-2012.docx

The Department of Chemistry at the University of Texas at El Paso now uses an innovative constructivist approach to address the individualistic learning styles of students in general chemistry. Through funding from an NSF-STEP grant, UTEP has adopted a strong Peer-Led Team Learning (PLTL) curriculum in second

semester general chemistry to emphasize team-based, student-directed learning. Students in this three-credit-hour course are required to attend only two hours of lecture each week by adding a small-section two-hour Workshop overseen by a peer leader. Previously, measures of the effectiveness of PLTL Workshop have focused on evaluating the impact on the students taking the chemistry course. However, peer leaders overseeing the Workshop show significant professional growth including enhancement in their public speaking skills. Surveying current, pre and post peer leaders from our institution prompted the creation of an instrument to assess this enhancement. The researchers reported gains of the leaders in confidence and ease in speaking in front of groups. Further evaluation suggests these gains may be directly correlated with semesters spent as a peer leader.

Kampmeier, J. A. (2003). *The scholarship of teaching*. Unpublished manuscript. City University of New York. New York, NY.

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.

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.

Kemppainen, A., Hamlin, A. J., & Diment, H. (2017). *LEarning with academic partners (LEAP) Success and growing pains in the first year* Conference Proceedings of the IEEE Frontiers in Education.

Supplemental Instruction (SI) is a technique that has been shown to be successful in supporting students in historically challenging courses and improving grades and retention [1]–[3]. SI was started at the University of Missouri-Kansas City (UMKC) in 1973, but has since branched out to approximately 1500 institutions in 30 countries. The program benefits all areas of an institution: students, SI leaders, faculty, and administration. The students benefit by developing a deeper understanding of the course material as they work closely with and are mentored by an SI leader. Mentoring occurs with students who are close in age and have a working knowledge of the environment in which the mentee is meant to operate in [4]. Mentoring allows students to develop coping skills necessary for success. This technique works particularly well for students who would not normally seek assistance [5]. Successful mentoring emphasizes the student's strengths, leading to increased self-efficacy and retention. The SI Leaders develop leadership and facilitation skills as well as increased skill in the course material. Faculty benefit by using their SI leaders to connect them with students: their problems, areas of confusion, and learning challenges. Finally, the administration benefits by increased retention at the University

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*. Conference Proceedings of the American Educational Research Association 1992 Annual Conference, San Francisco, CA.

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.

Kimbrell, J. B. (2012). *Major components of successful leadership training.* Conference Proceedings of the Peer-led Team Learning International Society Inaugural Conference, Brooklyn, NY. www.pltlis.org/wp-content/uploads/2012%20Proceedings/Kimbrell-2012.docx

Undergraduate leadership training is an integral factor to incorporating the Peer-Led Team Learning (PLTL) Model into the department of an institution. The University of West Georgia's Chemistry Department utilizes the student-influenced leadership training, which involves two primary sections. The first section encompasses a three-day training section before the beginning of scheduled classes. The second section incorporates a "retreat" meeting, which usually occurs four weeks into the semester after the new leaders have had the opportunity to lead three or four workshops. The incorporation of weekly journal entries, leaders meetings, and midterm observations allows for the constant training and improvement of the student leaders throughout the semester. Our primary goal is to always have our leaders evolving and improving the way they lead a workshop and the overall success of the PLTL Model. Chemistry workshop new leader training at the University of West Georgia (UWG) begins with a three-day session prior to the start of class each semester. Other components include weekly journals submitted by new leaders, weekly pre-workshop leaders' meetings (for all leaders), a "retreat" after the third week of each semester, observations of new (and veteran) leaders as they conduct workshops, and discussions based on feedback presented by mid-semester and end-of-semester surveys completed by workshop students.

Kimmins, L. R. (2014). Meet-up for success: The story of a peer led program's journey. *Journal of Peer Learning, 6*(1), 103-117.

Technological advancements have forced space and time to evolve to present a virtual university that allows increasing numbers of students to study from a university rather than at university. This study examined the impact of a version of Supplemental Instruction (SI) with students. The best people to guide and advise students through their university journey are experienced students. As Longfellow, May, Burke, and Marks-Maran (2008, p. 95) put it, teachers may be content or subject experts, but current "students are experts at being students." Studies by Falchikov (2001) found that student leaders provide "expert scaffolding" that steps students from one level of learning to the next within the discipline area. Peer-assisted programs contribute to the development of a caring learning community as their trained leaders scaffold learning and negotiation between lecturer and student, both of which are desirable for student success and sustainable learning practices. Peer-assisted programs also provide a body of students with leadership qualities. This paper briefly explores the history and evolution of an on-campus peer led program to one that is embracing technology and online modes of peer learning. The program's endurance hints at excellence and its dynamic nature is founded on innovation. Peer led programs have been found to benefit student leaders as much as the students who attend the sessions. Recent research on student leadership is uncovering the benefits to universities, as well as to individual students, of creating a pool of student leaders who can be retained after graduation as quality lecturers and tutors. It also produces graduates who possess the leadership skills prized by employers. Engagement with leadership activities such as those provided by peer led academic programs is a means of benefitting all participating students. This area is under-researched at this point. It is an area that needs further exploration and extension.

Kirkham, R., & Ringelstein, D. (2008). Student Peer Assisted Mentoring (SPAM): A conceptual framework. *e-Journal of Business Education & Scholarship of Teaching, 2*(2), 39-49.

This paper presents a conceptual framework for the Student Peer Assisted Mentoring (SPAM) program and describes the theories that support it. SPAM is an adaptation of Supplemental Instruction (SI). SPAM was first piloted

in an accounting course in Australia. Three categories of SPAM sessions are held each academic term for the students: more formal session in which the academic lecturer for the course reviews and explains the issues and problem solving techniques related to current class topic. The second category of SPAM is a less formal session when the SPAM mentors work with the students in the class in a cooperative fashion to discuss the academic content. The third category of SPAM sessions are those that are formed by students in the class without the help of the SPAM mentors. Students take responsibility for these groups and develop more skills as a result. In addition to the academic benefit to the participating students, the SPAM Mentors also benefit: their own learning improves due to reworking the material a second time; and develop communication skills, leadership skills, and learning how to deal with the dynamics of managing a group.

Komansky, M. (2005). More than just a review session. Peer-led Team Learning: The experience of leading. *Progressions: The Peer-Led Team Learning Project Newsletter, 6*(4). www.pltlis.org/wp-content/uploads/2012/10/Experience-of-Leading-Komansky-More-than-a-Review-Session.pdf.

The authors had been involved in the Peer-Led Team Learning (PLTL) project for Anatomy & Physiology (A&P) for two semesters at Middlesex County College (NJ). In spite of this relatively short time, they generated enormous interest. The PLTL model has broken barriers, helped create friendships and most significantly build confidence of every student involved.

Koretsky, M. (2020). *Work in progress: An online journal tool with feedback for a Learning Assistant program in engineering.* Conference Proceedings of the 2020 ASEE Virtual Annual Conference Content Access, Virtual online. https://peer.asee.org/work-in-progress-an-online-journal-tool-with-feedback-for-a-learning-assistant-program-in-engineering.pdf

This work-in-progress paper presents the development and pilot implementation of a computer-based reflection tool used in a Learning Assistant (LA) Program in engineering at a large public state university. LAs are undergraduate students who return to a course that they have already completed to help instructors deliver research-based instructional practices. The LA Program at Oregon State University began in 2014 in one department as an effort to provide support for the implementation of active learning in large enrollment Biology courses. Since its start, the program has spread to include courses in five out of seven departments in the College of Science and four out of six departments in the College of Engineering. We identified logistical barriers specific to engineering curriculum and adapted the LA Program developed in the College of Science. We describe here a tool developed to facilitate reflection and instructor feedback of those reflections in one of the engineering units that use LAs.

Kreke, P. J., & Gibbon, T. C. (2003). *Organic chemistry and Supplemental Instruction*. Unpublished manuscript. Mount St. Mary's College. Maryland. 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.

Laurs, D. E. (2018). Perceived impact of PASS leadership experience on student leaders' transferable skills development *Journal of Peer Learning, 11*(1), 27-40. www.ro.uow.edu.au/cgi/viewcontent.cgi?article=1138&context=ajpl.

The PASS (Peer Assisted Study Support) program has been operating at Victoria University of Wellington, New Zealand, since 2000, and currently provides weekly study sessions in more than 50 courses each year. As well as enhancing the first-year learning experience, PASS contributes to an institution-wide award that acknowledges the impact of extra-curricular activities on students' graduate attributes and employability skills. Selected from high-caliber candidates, PASS leaders already possess strong communication and thinking skills. Nevertheless, an online survey of current and former leaders between 2009-2014 [n=185] revealed a significant majority perceived that the experience of leading a study group, in particular the associated writing of weekly reflections, enhanced their confidence, cognitive and communication skills, as well as contributing to their CVs and job application success. Such results highlight the potential for student leaders to translate their day-to-day experiences into added value for life after university.

Lazik, L., Conroy, M., Lee, A., Rocha, S., & Kirby, A. (2004). *Peer-led Team Learning: A gateway to teaching opportunities.* Conference Proceedings of the 227th American Chemical Society National Meeting, Anaheim, CA. 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.

Lilly, M. (2018). *Cultural competence*. Paper presented at the 10th International Conference on Supplemental Instruction, Seattle, WA. www.info.umkc.edu/si/wp-content/uploads/2018/06/Cultural-Competence-Mary-Lilly.pdf.

In the classroom, being culturally competent involves an understanding of how cultures differ under the surface and how cultures respond differently to similar situations

Liou-Mark, J. (2002). Leading Workshops at Brooklyn International High School. Peer-Led Team Learning: Implementation in high schools. *Progressions: The Peer-Led Team Learning Project Newsletter, 3*(3). www.pltlis.org/wp-content/uploads/2012/10/High-School-Implementation-Liou-Mark-Leading-Workshops-Brooklyn-International-HS.pdf.

New York City College of Technology (NYCCT) students who took the Peer-Led Team Learning (PLTL) leader training course at the City College of New York (CCNY) via videoconferencing have had an opportunity to tutor students in mathematics at the Brooklyn International High School. Once a week during the Spring 2002 semester, these students helped prepare 9th and 10th grade students for the Mathematics Regents A* examination. This experience gave students the opportunity to apply the Workshop model at a local high school. These NYCCT students are also enrolled in the Teacher Preparation Program at CCNY (Ellen Goldstein, Co-PI). As part of the program, they are required to take the Peer Leader Training course as an introductory course to teaching. These students are mostly associate-degree computer science majors interested in teaching mathematics. They then are encouraged to transfer to CCNY and complete their Bachelor's degree.

Lipsky, S. A., & Kapadia, M. (2013). Effects of work experiences for academic peer educators. *Synergy, 6*, Article 3. www.myatp.org/wp-content/uploads/2015/04/Synergy-Vol-6-Kapadia.pdf.

This study employed a qualitative research model to understand the potential outcomes of the Supplemental Instruction (SI) program on the SI leaders. Thirteen experienced SI leaders participated in focus groups. The study was completed as part of the program's assessment and accountability system in addition to understanding a topic not often investigated in a rigorous fashion. The study revealed several findings: (1) intellectual growth (knowledge of subject matter, learning strategies, and higher-level cognition; (2) personal growth (listening, interpersonal communication, time management, leadership, and self-confidence; and (3) professional growth (work and career-related knowledge and self-efficacy). The SI leaders saw how these skills would be useful as they began their work careers. For SI leaders who had considered a career in education, the experience of serving with the program had solidified their decision. Some SI leaders now were considering a decision or change from previous interests for a career in teaching.

Llaurado, E., Aceves-Martins, M., & Prades-Tena, J. (2022). Adolescents encouraging healthy lifestyles through a peer-led social marketing intervention: Training and key competencies learned by peer leaders. *Health Expectations, 25*(1), 455-465. doi: https://doi.org/10.1111/hex.13406. https://onlinelibrary.wiley.com/doi/epdf/10.1111/hex.13406.

Background Adolescents who participate as peer leaders can benefit and acquire competencies from their peer leadership experience. Objectives To identify the competencies gained by adolescents who participated as peer leaders in a healthy lifestyle study and to determine whether the training characteristics were related to improvement in competencies. Design The present study was part of the European Youth Tackling Obesity (EYTO) project, a multicentre social marketing intervention involving four European countries. Setting and Participants Eighteen peer leaders (aged 13–15 years, three or five leaders per country) from disadvantaged neighbourhoods received training in designing and implementing activities for their peers. Measures The peer leaders' confidence, experience and interest in 11 tasks related to lifelong learning competencies were assessed with questions rated on a colour scale at baseline and at the end of the study. Results The peer leaders demonstrated improvements in experience, confidence and interest in different tasks, such as research, website or logo design, oral presentations, social media use and collaboration with people from other countries. They increased their confidence in management tasks ($p = 0.03$) and their confidence and experience in communication tasks ($p = 0.01$). The peer leaders from Spain and Portugal had greater improvements than those from the other countries. Conclusion The peer leaders improved their confidence in management tasks and their confidence and experience in communication tasks. Slight differences were detected in improvement in competencies by country, likely due to the differences in the peer training applied. Recommendations for peer leader training are proposed, although these results should be verified with larger sample size.

Lockie, N. M., & Van Lanen, R. J. (2008). Impact of the Supplemental Instruction experience on science SI leaders.

Journal of Developmental Education, 31(3), 2-4, 6, 8, 12, 14.
This article reports on a qualitative study describing the experiences of Supplemental Instruction (SI) leaders in science courses at Saint Xavier University (Chicago, IL). Themes that emerged from this analysis for the SI leaders included: (a) greater appreciation of the diversity of student learning styles; (b) increased understanding of the subject matter; (c) greater self-confidence as learners; (d) development of closer relationships with faculty members; (e) application of the strategies and skills learned as an SI leader in other courses, (f) realization of the importance and values of collaborative learning, leadership and communication skills

Loh, H. (1993). *Strategies to overcome the high failure rate in a subject.* Conference Proceedings of the 6th International Conference on the First Year Experience, Boston, MA.
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. (1993). *Peer Assisted Study Sessions in anatomy for nursing students.* Conference Proceedings of the Peer tutoring: Learning by teaching, Auckland, New Zealand.
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.* Conference Proceedings of the 7th International Conference on the First-Year Experience, Dublin, Ireland.
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. (1996). *Supplemental Instruction: A peer collaborative learning program applied within anatomy for first year nursing students.* Conference Proceedings of the 2nd Pacific Rim Conference on the First Year in Higher Education, Melbourne, Queensland, Australia.

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. (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.

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., & Kelly, B. A. (1994). *Supplemental Instruction (SI) in anatomy for first year nursing students*. Unpublished manuscript. The Queensland University of Technology. Brisbane, Australia.

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.

Love, K. J., & Becvar, J. E. (2021). Peer leader essays from the desert Southwest: The practice of leading learning. *Advances in Peer-Led Learning, 1*(1), 68-91. doi: doi.org/10.54935/apll2021-01-07-68. www.doi.org/10.54935/apll2021-01-07-68.

At semester's end at the University of Texas at El Paso and at the University of Texas of the Permian Basin, faculty members directing the PLTL Programs invite Peer Leaders to reflect on their experience, to describe their challenges, and to offer their personal advice. For the benefit of future Peer Leaders, here are their stories, reflections, observations, and advice about leadership and the practice of leading.

Lozada, N. (2017). *How Supplemental Instruction (SI) leaders experience transformative learning and the nature of civic engagement as a result of serving in a peer leadership role in higher education.* (Doctoral dissertation), Rowan University. www.rdw.rowan.edu/etd/2478/ after November 2, 2019

To empower students to become influential social change agents, institutions of higher education must move away from traditional academic models of civic engagement and toward alternative approaches of engaging students outside of the classroom. Providing students an opportunity to serve in a leadership role can lead to the actualization of transformative learning experiences, which may materialize in a heightened development of skills that are transferable to future academic, professional, and civic aspirations. While the majority of research on peer-facilitated academic assistance programs, such as Supplemental Instruction (SI), examines positive effects on participants, few studies set out to examine the additional impact that the program has on undergraduate student leaders (Lockie & Van Lanen, 2008; Malm, Bryngfors, & Morner, 2012; Skalicky & Caney, 2010; Stout & McDaniel, 2006). This case study assists in filling the void in research on how undergraduate students benefit, both by experiencing transformative learning and the nature of civic engagement, as a result of serving in a leadership role within a peer-facilitated academic assistance program in higher education.

Lozada, N. (2017). The benefits of Supplemental Instruction (SI) for the SI leader. *Supplemental Instruction Journal, 3*(1), 64-79. www.info.umkc.edu/si/wp-content/uploads/2017/12/Compressed-siJ-Volume-Three-Issue-One.pdf.

The majority of research on peer assistance programs explores benefits for student participants, such as increased retention and course grades; however, benefits gained by the programs' student leaders are often overlooked. This qualitative research study describes how undergraduate students benefit from their experience serving as leaders in a Supplemental Instruction (SI) program at a four-year, private university. The SI Leaders who participated in the study expressed throughout their interview responses and within their graphic elicitations various ways in which they benefit personally by serving as an SI Leader. These benefits were categorized into the following six emergent themes: academic improvement, increased leadership attributes, more effective communication skills, fulfillment in helping others, effective time

management, and relationship-building opportunities, all of which translate into higher levels of overall institutional engagement.

Lozada, N., & Johnson, A. T. (2018). Bridging the Supplemental Instruction leader experience and post-graduation life. *The Learning Assistance Review, 23*(1), 95-114. www.files.eric.ed.gov/fulltext/EJ1170143.pdf.

This qualitative study explores the experience of former Supplemental Instruction (SI) leaders who worked at a four-year, private university while completing their undergraduate degrees. Serving as an SI leader prepared them for their post-graduation lives through the transferability of skills to post-graduate studies and employment: knowledge skills, interpersonal skills, communication skills, collaboration skills, and future vocational plans.

Lutz, B., & Rios, L. (2022). Impactful experiences and their effect on Learning Assistant epistemological development. *Physical Review Physics Education Research, 18*(2). doi: https://doi.org/10.1103/PhysRevPhysEducRes.18.020133. https://journals.aps.org/prper/pdf/10.1103/PhysRevPhysEducRes.18.020133.

Learning assistants (LAs) are peer educators who work alongside faculty to facilitate active learning activities and help students develop conceptual understanding. LAs and LA training programs are becoming increasingly prevalent in science, technology, engineering, and mathematics (STEM) gateway courses in the United States, and research continues to document the positive impacts on students and LAs in LA-facilitated classrooms. While evidence accumulates regarding positive student impact, relatively less work has investigated the ways LAs themselves might also be impacted by their participation in these programs. To improve LA training and student learning in STEM, it is vital that educators better understand the ways the experiences of LAs can promote personal and professional growth as members of the STEM community. To address this gap, we explored the epistemological development of LAs who participated in an LA program (i.e., pedagogy training and classroom practice) at a large, public, teaching-focused university. LAs participated in semi-structured interviews at the beginning and end of the academic term and completed bi-weekly reflections where they described impactful events and challenges. Using qualitative coding, we operationalized Baxter Magolda's epistemological reflection model to identify the impactful experiences that provoke epistemological development or reorientation. Our findings highlight three impactful experiences that help promote epistemological development for LAs: (i) recognizing the importance of language and listening; (ii) observing more knowledgeable others struggle with content; and (iii) providing students with the "wrong" answer to a question. We argue that these experiences can promote epistemological development in ways that help LAs become more effective in facilitating student learning and, ultimately, more thoughtful members of STEM disciplines. By working to create spaces for LAs to have these impactful experiences in training and preparation, educators can promote epistemological growth in ways that benefit both LAs and the students they serve.

Malm, J. (2021). Enhancing employability skills through being an SI-PASS leader. In A. Strømmen-Bakhtiar, R. Helde & E. Suzen (Eds.), *Supplemental Instruction: Organisation and leadership, volume 3* (pp. 75-84). Munster and New York: Waxmann.www.www.waxmann.com/index.php?eID=download&buchnr=4326.

The present study focuses on the potential benefits of the SI-PASS experience for former leaders in their professional life after graduating from higher education. This topic has received little attention, with the few studies being limited by the small number of participants and the approaches used and questions asked. The present survey was sent to 279 former SI-PASS leaders who graduated from the School of Engineering at Lund University, Sweden, during the period 2010–2019. A total of 91 (33%) responded. The results show that the main qualities developed through SI-PASS leadership are leadership confidence and facilitation and presentation skills. These are qualities that are appreciated by many former leaders in their professional life. Almost all of the respondents report that they have had at least a little use of SI-PASS trained qualities in their job, and half report good to very good use. More than 80% of the respondents believe that being an SIPASS leader helped them in getting hired for a job, at least to some extent.

Malm, J., Bryngfors, L., & Morner, L.-L. (2012). Benefits of guiding Supplemental Instruction sessions for SI leaders: A case study for engineering education at a Swedish University. *Journal of Peer Learning, 5*(1). www.si-mentor.lth.se/fileadmin/lth/omlth/pedagogiskaprojekt/simentor/Benefits_of_guiding_JPL.pdf.

The study indicates that students who work as Supplemental Instruction (SI) leaders gain several benefits from their SI experience. The benefits can be divided into the following main themes: Improved communication skills; Improved interpersonal skills (including abilities to listen to other people's thoughts and reasoning; creating trust between yourself and your group members; to meet and inspire different individuals; to make a group of individuals enthusiastic about performing a task; and to get students to help each other); Improved leadership skills (including being a leader of a group, talking in front of others, leading a discussion, organizing the work for a group, and creating an easy-going, positive, and supportive atmosphere at the

learning sessions); Improved self-confidence; and deeper understanding of course content

Malm, J., Collins, J., Nel, C., Smith, L., Carey, W., Miller, H., . . . Zaccagnini, M. (2022). Transferable skills gained by student leaders in international SI-PASS programs. *The International Journal of Learning in Higher Education, 29*(1). doi: doi.org/10.18848/2327-7955/CGP/v29i01/65-82. www.cgscholar.com/bookstore/works/serve_pdf?adv=false&category_id=179&version_id=243409.

Supplemental Instruction/Peer Assisted Study Sessions (SI-PASS) is a peer learning program used worldwide to improve students' learning and performance in challenging courses in higher education. A bonus effect of the program is the transferable skills that the student leaders may develop when facilitating the study sessions. These student leaders can potentially gain communication, group management, and other personal skills that are useful later in life. The relatively few studies devoted to this topic suggest that this is the case; however, these earlier studies have several limitations. They cover only one SI-PASS program, raise generalizability questions, and frequently use their own definitions of skills gained by student leaders that seldom are linked to employability skills. Furthermore, it is rare that these studies include former leaders and their use of the developed skills in working life. This study addresses these limitations for a broader understanding of skills gained by SI-PASS Leaders and how these skills transfer to a job environment. The study includes student leaders from three SI-PASS programs in three countries across three continents. Two questionnaires were used—one for active SI-PASS Leaders and one for former student leaders who graduated from their university. The results show that the SI-PASS Leaders gained transferable skills within several areas, primarily in communication and group management. This skill improvement is independent of the SI-PASS program. The study also shows that most former leaders report the use of these developed skills both in the application/hiring process as well as in the job itself.

Maloney, R. S. (1992). *The Supplemental Instruction program as an alternative field experience for secondary education majors.* (Bachelor of Science with Honors thesis), University of New Orleans, 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: (a) 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); (b) classroom management (manage time, mange classroom routines, maintain student engagement, manage task related behavior, and monitor and maintain student behavior); and c) 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.

Marin, M. (2022). Five essays on the trail to medical school. *Advances in Peer-Led Learning, 2*(1), 101-110. doi: https://journal.pltlis.org/wp-content/uploads/2023/01/8-Marin-APLL-Vol-2.pdf. https://journal.pltlis.org/wp-content/uploads/2023/01/8-Marin-APLL-Vol-2.pdf.

This collection of essays provide advice and guidance to students, especially Peer Leaders (PLs), seeking to apply to graduate or professional schools. These essays were inspired by my experiences as a leader and helped me craft my medical school applications. These essays exemplify how journaling the opportunities encountered as a PL proves to be of extreme value. In addition to the essays, my PL experiences helped to provide meaningful insights which I could share and reflect on throughout the interview process. When faced with provocative questions (e.g., Describe a challenge you have faced; discuss the importance of diversity; tell us about a time you failed), I continuously found myself able to rely on lessons learned from working as a Peer Leader. I am pleased to describe a variety of special experiences that enabled me to present different aspects of my character to interviewers and to clearly personify the traits that appealed to them in my written application.

Martin, D. C., & Arendale, D. R. (1997). *Mainstreaming of developmental education: Supplemental Instruction and Video-based Supplemental Instruction*. Unpublished manuscript. University of Missouri-Kansas City. Kansas City, MO. www.arendale.org/storage/pdf-documents/peer/MainstreamingDE97.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

Martinez, G. S. (2022). The impact of Peer-Led Team Learning (PLTL) on the life of a Latina. *Advances in Peer-Led Learning, 2*(1), 111-116. doi: https://doi.org/10.54935/apll2022-01-09-111. https://doi.org/10.54935/apll2022-01-09-111.

As a Latina at a Hispanic Serving Institution, I joined the Peer-Led Team Learning (PLTL) program at the University of Texas at El Paso to overcome my language insecurity, gain confidence, persevere, and become a more successful student. Peer leading has helped me boost my confidence, gain better communication and time management skills, learn to work under pressure, manage difficult situations, and improve my ability to work with diverse students. In addition, it increased my sense of responsibility. The PLTL program is advantageous for both students and Peer Leaders alike because each group learns from the other while overcoming challenges together. Peer Leaders learn to communicate effectively while allowing space and time for students to make mistakes, collaborate with one another, and learn through engaging activities. As a Latina Peer Leader, I was also able to foster collaboration between Hispanic and non-Hispanic students, promoting inclusion in a friendly workshop environment that promoted high participation.

Mason-Innes, T. A. (2015). *The leadership identity development of Supplemental Instruction leaders: A case study.* (Ph.D. dissertation), University of Alberta, Calgary, Alberta. www.theses.ucalgary.ca/jspui/bitstream/11023/2126/4/ucalgary_2015_masoninnes_tracey.pdf

Much of our understanding of leadership theory is based on hierarchical systems and is grounded in research from business settings. Although researchers have presented more collaborative, relational leadership models for post-secondary students, these models have not been widely applied to Supplemental Instruction (SI) leader training programs. Having a better understanding of how students become SI leaders, the influences that shape their experiences, and how the SI experience shapes their leadership development has the potential to not only help SI program administrators, but also to assist all student affairs practitioners as they develop leadership programs that address institutional leadership learning outcomes. This descriptive case study describes the background characteristics and experiences of the SI leaders at a mid-size, regional, western Canadian university (WCU). The leadership identity development (LID) model was applied as a conceptual lens for this study-a model that is well-respected in the student affairs field. Six participants volunteered to participate in three interviews as well as reflective writing exercises. A document review of the SI program was also conducted. Based on the findings of this study, four conclusions were identified. First, when looking at student LID with SI leaders or any student leader, it is important to understand, acknowledge, and know the whole student. Secondly, many learning outcomes associated with the SI leader position were found in this study and warrant more emphasis in the SI literature and SI leader training. Thirdly, leadership identity development occurred for the SI leaders because of the structure and the nature of the SI program philosophy itself, as well as from the specific SI program training for the SI leaders. Finally, post-secondary institutions and the institutions' student leadership programs need to adopt a leadership philosophy and ground their student leadership development in leadership scholarship, language, and theory to inform their programs. In the case of supplemental instruction, although the leadership identity development of the SI leaders is not a prominent or identified outcome, the findings from this study demonstrate that LID is likely occurring.

McGlone, F. D. (1994). *A training and implementation program for first year student peer mentors*. Unpublished manuscript. Queensland University of Technology. Brisbane, Queensland, Australia.

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.

McIntosh, E. A. (2017). Working in partnership: The role of Peer Assisted Study Sessions in engaging the Citizen Scholar. *Active Learning in Higher Education*, 1-16. doi: www. .org/10.1177/1469787417735608.

This article argues that peer learning, specifically Peer Assisted Study Sessions, supported by academic tutors, is a

valuable part of the agenda to emphasise the social mission of higher education. This study draws on data collected at two time points from respondents who were trained as Peer Assisted Study Sessions leaders. The data reveal that peer learning interventions nurture specific proficiencies and attributes of the Citizen Scholar, particularly creativity and innovation, design thinking and resilience. This study focuses on how Peer Assisted Study Sessions leader respondents conceptualise and articulate their own learning, relating it to the development of these specific proficiencies and attributes. It also offers insight into how Peer Assisted Study Sessions leaders foster the skills of citizen scholarship for those participating in their sessions.

McPhail, R., Despotovic, W. V., & Fisher, R. (2012). Follow the leader: Understanding the impact being a PASS leader has on self-efficacy. *Journal of Peer Learning, 3*(7). www.ro.uow.edu.au/cgi/viewcontent.cgi?article=1056&context=ajpl.

The purpose of this qualitative study is to inform and advance the body of knowledge of the contribution that 'Peer Assisted Study Sessions' (PASS) provides for student leaders in terms of its impact on their self-efficacy - the personal belief in competence to succeed within certain situations (Bandura, 1986). To date, there has been little research providing a practical insight into whether acting as the leader of university PASS has a perceived impact on self-efficacy. The results of the qualitative research are based on interviews from a sample of 16 leaders. We found that being a PASS leader improved self-efficacy specifically in the areas of: cognitive development, performance, engagement and satisfaction. The results of this study may have implications for the development of future programs, particularly, in terms of attracting suitable candidates in the recruitment process, the future training of leaders and the provision of ongoing support for the leaders to participate effectively in such programs.

Meikle, J. (1993, 1993, February 16). Learning to help others, *Guardian Education Newspaper,* 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.

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). Supplemental Instruction (SI) was compared with another form of tutoring. 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.

Meyers, J. M. (2022). Student to coordinator: My 20-year PLTL journey. *Advances in Peer-Led Learning, 2*(1), 96-100. doi: https://doi.org/10.54935/apll2022-01-07-96. https://doi.org/10.54935/apll2022-01-07-96.

Peer-Led Team Learning has proven to be an inextricable part of my academic and professional journey. This essay describes my journey from a freshman chemistry major and workshop student to Assistant Dean and PLTL program coordinator, and the people who helped me along the way.

Micari, M., Gould, A. K., & Lainez, L. (2010). Becoming a leader along the way: Embedding leadership training into a large-scale peer-learning program in the STEM disciplines. *Journal of College Student Development, 51*(2), 218-230. doi: 10.1353/csd.0.0125.

Although many college students enter leadership programs with the express goal of developing leadership skills, some specialized leadership programs draw students who seek to gain expertise in a disciplinary area, with leadership development as a secondary goal. The Gateway Program is based on Peer-led Team Learning. In the latter case, program developers face the challenge of generating enthusiasm among student participants for thinking and talking about leadership. This paper addresses the question of whether undergraduates can develop as leaders when that is not their explicit goal, chronicling the evolution of a program designed to do just that. Data collected through survey and interview research suggest that participating students do indeed develop as leaders in meaningful ways.

Micari, M., Streitwieser, B., & Light, G. (2006). Undergraduates leading undergraduates: Peer facilitation in a science workshop program. *Innovative Higher Education, 30*(4), 269-288. doi: 10.1007/s10755-005-8348-y.

This article presents the results of a study at Northwestern University concerning experiences of undergraduate students serving as facilitators of Peer led Team Learning (PLTL) sessions for introductory undergraduate sciences and engineering course. The PLTL facilitators reported growth in a variety of areas: cognitive growth (consolidating knowledge in the discipline, enhancing conceptual understanding, and developing problem-solving skills); personal growth (communication skills in confidence, audience understanding, and self-expression; pedagogical skills; improved ability to explain concepts; and skill at learning to allow students to work out their ideas on their own without interrupting to offer guidance; understanding the role of the teacher); and instrumental growth (career development and striving to achieve professional goals).

Montes, M. O., & Becvar, J. E. (2021). Per leader alumni reflections: Advancing visibility and reach of Peer-Led Team Learning. Panel from the 2021 PLTLIS Conference. *Advances in Peer-Led Learning, 1*(1), 122-141. doi: doi.org/10.54935/apll2021-01-11-122. www.doi.org/10.54935/apll2021-01-11-122.

Calculating roughly, starting in 1992 with Peer Leaders from “Workshop Chemistry” at the City College of New York, Peer-led Team Learning programs may have an aggregate of perhaps 30,000 students who became Peer Leaders and are now alumni. How are Peer Leaders affected by their experiences? This paper is an edited transcription of Peer Leader Alumni panelists from the discussion at the 2021 PLTLIS Annual Conference, held online on Saturday, June 5, 2021.

Moore, I. (1992). *Undergraduate students as assistant demonstrators in the first year physics laboratory*. Unpublished manuscript. Queensland University of Technology, School of Physics. Brisbane, Queensland, Australia.

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.

Muller, O., Scacham, M., & Herscovitz, O. (2017). Peer-led Team Learning in a college of engineering: First-year students' achievements and peer leaders' gains. *Innovations in Education & Teaching International*. doi: 10.1080/14703297.2017.1285714. www.srhe.tandfonline.com/doi/full/10.1080/14703297.2017.1285714?scroll=top&needAccess=true.

Due to high dropout rates (30%) among first-year students, our college of engineering operates programmes for promoting students’ retention and learning. The peer-led team learning (PLTL) programme accompanies Science, Technology, Engineering and Mathematics introductory courses with a high rate of failures, and incorporates workshops of small groups of students for developing active-learning and problem-solving skills. The workshops are led by outstanding students from advanced years; the peer leaders (PL). This study focused on the effects of the PLTL programme (40 workshops, 26 PLs) on the achievements of students who participated in the workshops compared with those who did not, and on its impact on the PLs. Findings reveal that workshops advance students of all levels and improve their achievements in several courses, while contributing more to students with higher academic capabilities. PLs felt satisfaction and believe they have gained self-confidence, and mentoring and communication skills for their future careers.

Murray, M. H. (1996). *Resources for the resourceless: Maximizing student learning.* Conference Proceedings of the 8th Conference of the Australian Association of Engineering Education, Sydney, Australia.

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. (1996). Alternative to lecturer-centered teaching enhances student learning and costs no more. *Academic Staff Development Unit Update (Queensland University of Technology, Australia)*, 6-7.

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. (1999). *SI down under - Australian innovations: Funding, solutions, and analysis.* Conference Proceedings of the First National Conference on Supplemental Instruction and Video-based Supplemental Instruction, Kansas City, MO.

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 Supplemental Instruction (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. (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 database. (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.

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.

Nadelson, L. S., & finnegan, J. (2014). Path less traveled: Fostering STEM majors' professional identity development through engagement as STEM Learning Assistants. *Journal of Higher Education Theory & Practice, 14*(5), 29-40. http://www.na-businesspress.com/JHETP/NadelsonLS_Web14_5_.pdf.

Professional identity development of undergraduate STEM majors is associated with their retention, engagement, and career success. Student professional identity development is posited to occur when students engage in professional roles. Learning assistants (peer learning facilitators) assume roles of authority, leadership, and content experts, which we posited would foster a more mastery perspective of learning (focused on concepts over facts) and internalize perceptions of themselves as professionals. Our research on a group of STEM education learning assistants revealed over time the students tended to shift toward a mastery perspective of learning and used internal cues to communicate their professional identity.

Narode, R. (2001). PLTL and the future of science teacher education. Peer-Led Team Learning: Implementation in high schools. *Progressions: The Peer-Led Team Learning Project Newsletter, 2*(2). www.pltlis.org/wp-content/uploads/2012/10/High-School-Implementation-Narode-PLTL-Future-of-Science-Teacher-Education.pdf.

The current shortage of math and science teachers (especially physical science teachers) is exacerbated by two important factors: 1) a strong economy offering excellent employment opportunities with higher starting salaries, faster financial growth, and greater status than teaching, and 2) a culture among scientists that encourages students to become scientists far more frequently than to become teachers of science. While PLTL cannot directly change the first of these factors it can directly and indirectly address the second factor. By supporting Peer-Led Team Learning (PLTL) faculty with initial funding, professional development, inquiry-based curriculum for student-led workshops, guides for workshop development, and continuing education of workshop leaders, the PLTL Model educates college science faculty about the potential of students as teachers / learning-facilitators. The student workshop leaders themselves awaken faculty to the understanding that their talents ought to be directed toward the profession of teaching. Furthermore, the presence and support of learning specialists in collaboration with PLTL science faculty and workshop leaders complete the connection to teacher education.

Nkosi, J. D. (2013). *A critical portrait of student voice among community college students of color.* (Ph.D. dissertation), California State University Fresno.

This study utilized Freire's conscientização as a framework to understand the development of student voice among traditionally underrepresented students of color in a sociology classroom at a large community college in the Central Valley of California. Understanding how student voice is developed in a community college classroom provides faculty with knowledge and practices to help students develop voice and therefore an ability to critically reflect on their classroom learning, apply knowledge to their lived experience, and develop a sense of agency in their ability to effect change. A case study design allowed for an in-depth examination of the elements that foster voice. Participant observations and semi-structured interviews with 10 students, the instructor, and Supplemental Instruction leader revealed conditions, practices, and pedagogies that nurtured student voice. Findings provide faculty with practical ideas to create community in the classroom, help students feel connected, and engage students with pedagogy that transforms the classroom into the real world to foster voice.

O'Connell, T. L. (2021). *Creating transformational opportunities for college student Supplemental Instruction leaders to thrive during COVID: An action research study.* (Ph.D. dissertation), Azusa Pacific University.

Despite the multiple benefits for Supplemental Instruction (SI) leaders who facilitate study sessions for peers enrolled in high failure rate courses, those employed in large programs frequently become frustrated with their leadership development and position. Additionally, a significant percentage of SI leaders are first-generation, whose feelings of diminished satisfaction with the program maybe compounded by additional socioeconomic or familial factors. The purpose of this action research study was to create a more dynamic organizational environment for first-generation SI leaders through the creation of transformational experiences centered around elements of thriving, strengths, and self-authorship. This study addressed the following question: how can I implement an equity focused student employment experience where student SI leaders thrive as a result of their developed sense of agency and ownership in the SI program? In this study, 14 SI leader study participants engaged in training, leadership development sessions, and written reflections. It is significant to note this study's implementation occurred within the historical context of 2020, which influenced the study and its findings on student success. This study revealed two major findings: (a) SI leaders thrived as a result

of their developed self-authorship, agency, and program ownership, and (b) SI leaders thrived within the historical context of 2020. Implications for policy and practice include the creation of a cohort, mentoring, and strengths-based model for SI programs.

O'Donnell, R. (2004). *Introducing peer-assisted learning in first year accounting in Australia*. Unpublished manuscript. Department of Economics, Macquarie University. Sydney, New South Wales, Australia. www.econ.mq.edu.au/Econ_docs/research_papers2/2004_research_papers/PALDec04.pdf

At Macquarie University in Australia, Peer Assisted Learning (PAL) is an adaptation of the Supplemental Instruction (SI) model. PAL was piloted in an accounting course. The paper describes the pilot program regarding its design, outcomes, benefits, costs, and lessons learned. There was a positive correlation between higher grades and more frequent attendance in the PAL sessions. There were also benefits for the PAL facilitators: development of keys skills such as leadership, communication, group management; deeper understanding of course content; valuable enhancement to employability; and financial payment.

Ody, M., & Carey, W. (2000). *Demystifying Peer Assisted Study Sessions (PASS): What...? How...? Who...? Why...?* Unpublished manuscript. The University of Manchester. Manchester, U.K. www.documents.manchester.ac.uk/display.aspx?DocID=7418

PASS offers benefits at several levels to various stakeholders. At an institutional level it provides an additional cost-effective method of student support, which has been highlighted as good practice by the Quality Assurance Agency in supporting the student experience. The impact of PASS on a student 's employability is also recognized by employers and professional accreditation bodies; during a recent visit to the School of Chemical Engineering and Analytical Sciences the IChemE reported positively on the use of PASS and notably its impact on the transferable skills developed by PASS Leaders. Anecdotal feedback from a range of graduate employers recognizes that students who engage in voluntary roles, such as a PASS Leader, develop competencies and transferable skills that increase their employability prospects

Outhred, T., & Chester, A. (2010). The experience of class tutors in a peer tutoring programme: A novel theoretical framework. *Journal of Peer Learning, 3*(1), 12-23. www.ro.uow.edu.au/ajpl/vol3/iss1/3.

This campus program called P2P is based on the PASS model which is based on Supplemental Instruction. Three female first-year class tutors provided insight into how they experienced a novel peer tutoring program embedded in their tutorials. Five themes emerged: role exploration and their professional identity, sharing responsibility, regulation of the peer tutored groups, harnessing the peer tutor role, and community.

Parente, A. D. (2010). The scholarship of Peer-Led Team Learning: My progression from student leader to faculty. Peer-Led Team Learning: The experience of leading. *Progressions: The Peer-Led Team Learning Project Newsletter, 12*(1). www.pltlis.org/wp-content/uploads/2012/10/Experience-of-Leading-Parente-The-Scholarship-of-Peer-Led-Team-Learning.pdf.

This is a first-hand account to a student facilitator involved with the Peer-led Team Learning (PLTL) program. Twenty years ago, I was an undergraduate majoring in Biology and Chemistry, struggling with the desire to integrate the details I had learned in my Chemistry courses with the 'big picture' philosophy stressed in my Biology curriculum. These early educational experiences fostered my passion for curricula geared towards interdisciplinary learning and in programs designed to increase awareness of alternative learning styles and pedagogies for instruction. My Workshop journey began five years later, shortly after the program's inception in Organic Chemistry at the University of Rochester under the direction of Jack Kampmeier. To this day, I can't remember how I became involved with this program, but know it was a life-changing opportunity with incredible people that played a central role in shaping my academic career.

Parsons, E. A. (2012). *What and how university student leaders learned in one peer education program.* (Master of Education thesis), Queen's University, Kingston, Ontario Canada.

The purpose of the study was to explore what and how university students learned from their experiences working as peer educators. In my study, the researcher was only interested in investigating peer educators working in formal peer education programs within the post-secondary setting. Supplemental Instruction was the program identified for this study. Learning was defined as "a comprehensive, holistic, transformative activity that integrates academic learning and student development" (italics in original, ACPA & NASPA, 2004, p. 2). A modified version of the CAS 2009 learning outcomes framework was used to understand what peer educators learned. Those six CAS learning outcomes are: knowledge acquisition, construction, integration, and application; cognitive complexity; intrapersonal development; interpersonal competence; humanitarianism and civic engagement; and practical competence. The researcher used a qualitative, descriptive, exploratory approach to the study of the content and context of peer educators' learning. Selected participants for my study came from a pool of peer educators of a student affairs' learning

assistance peer education program at a mid-sized Ontario university. Face-to-face, in-depth interviews were conducted with seven peer educators. The research revealed what peer educators in a single peer education program learned; it also provided insight into their experience of learning within the peer education program, i.e., how they learned. This study offers some insight into the potential for learning, as well as potential facilitators of learning, in the university peer educator role. The research findings indicate that the peer educators studied learned in each of the six CAS learning outcomes. The facilitators of learning that these peer educators described in their interviews include learning from experience, interactions with others, reflection, and training. The findings of the study suggest that further research could be conducted, at various institutions as well as within and across peer education programs. SI leader reflections included: debrief with SI staff after observation of their SI session, periodic written reflections following writing prompts from the SI staff, and a detailed written reflection at the end of the academic term.

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.

Paz, J., & Lilly, M. (Eds.). (2014). *Tried and tweaked: Activities to re-energize peer learning sessions*. Minneapolis, MN: SMART Learning Commons, University of Minnesota. University of Minnesota Digital Conservancy, www.z.umn.edu/PALactivities

"Tried and Tweaked: Activities to re-energize peer-learning sessions" is a collection of activities designed and conducted by undergraduate students at the University of Minnesota to use in their role as facilitators leading study sessions in the University's Peer-Assisted Learning (PAL) Program. The activities were developed and tested during their weekly sessions and focus on two particular guiding principles of the PAL program (there are eight): modeling productive learning behaviors, and engaging students with each other. Each activity offers suggestions for preparation, supplies needed, appropriate courses, and the type of student grouping used in the activity. The spirit in which these session activities are designed is one of creating an informal, social, and welcoming environment. This is a companion volume to the Guide for Peer Learning Facilitators, which details all eight principles.

Pham, M. (2022). Enabling the enablers: Professional development for peer leaders to enhance the learning experience of enabling education students. *Journal of Peer Learni9ng, 15*, 4-16. https://ro.uow.edu.au/ajpl/vol15/iss1/2/.

This paper discusses the impact of a series of professional development workshops for peer leaders to enhance the student learning experience at an Australian enabling education institution over the period of three years (2019–2021). It reports the impact of these workshops on peer leaders' professional development and, more importantly, on enhancing the learning experience of students participating in Peer Assisted Study Sessions (PASS). The paper also highlights the effect of this initiative on curricular and teaching practices. The insights for this report are drawn from a wide range of data including student and peer leader surveys, reflections, and teacher commentaries. Via the use of NVivo, qualitative data was coded and organised into themes while quantitative data was used as a reference for the discussion of the identified themes. The findings directly support the recommendation that sufficient and contextualised professional development training be provided to promote peer leaders' impacts on student learning experience and to provide an important source of reference for curricular and teaching practices.

Phelan, L., Baker, S., Cooper, G., Horton, T., Whitling, S., Hodge, P., . . . McBain, B. (2022). Putting the PASS in class: Peer mentors' identities in science workshops on campus and online. *Journal of Peer Learning, 14*(1), 21-36. http://files.eric.ed.gov/fulltext/EJ1349041.pdf.

In this paper, we analyse the introduction of peer mentors into timetabled classes to understand how in-class mentoring supports students' learning. The peer mentors in this study are high-achieving students who previously completed the same course and who were hired and trained to facilitate Peer Assisted Study Sessions (PASS). PASS gives students the opportunity to deepen their understanding through revision and active learning and are typically held outside of class time. In contrast, our trial embedded peer mentors into

classes for a large ([approximately]250 students) first-year workshop-based course. We employed a participatory action research methodology to facilitate the peer mentors' cocreation of the research process. Data sources include peer mentors' journal entries, student cohort data, and a focus group with teaching staff. We found that during face-to-face workshops, peer mentors role-modelled ideal student behaviour (e.g., asking questions) rather than acting as additional teachers, and this helped students to better understand how to interact effectively in class. The identity of embedded peer mentors is neither that of teachers nor of students, and it instead spans aspects of both as described using a three-part schema comprising (i) identity, (ii) associated roles, and (iii) associated practices. As we moved classes online mid-semester in response to the COVID-19 pandemic, mentors' identities remained stable, but mentors adjusted their associated roles and practices, including through the technical aspects of their engagement with students. This study highlights the benefits of embedding mentors in classrooms on campus and online.

Phillips, K. (1999). *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.

Podolsky, T. (2017). Building leadership skills: A small cohort study of the associated benefits of being an SI leader. *Supplemental Instruction Journal, 3*(1), 6-23. www.info.umkc.edu/si/wp-content/uploads/2017/12/Compressed-siJ-Volume-Three-Issue-One.pdf.

Since the inception of Supplemental Instruction study groups in 1973, the benefits for student participants have been thoroughly studied and reported. There have also been reports about the associated benefits that SI Leaders can acquire from being involved with the program as peer mentors; however, these claims remain primarily anecdotal, and there has been a minimal amount of research conducted on the actual nature of the benefits for SI facilitators (Couchman, 2009). This research project aims to discover the specific nature of the benefits to SI Leaders who have moved on to other academic programs or professional careers. The research was conducted by surveying 24 former SI Leaders and through two focus groups consisting of 5 former Leaders in total. The results indicate that the SI Leaders benefitted by improving their own study skills in a variety of ways, improving their communication skills, increasing their self-confidence when public speaking, developing both their appreciation of and their ability to work in group situations, increasing their capacity to be flexible and adaptable, and improving their teaching abilities. Although these skills are not necessarily taught or learned through typical course work, they are highly valuable in graduate and professional programs, and workplaces often covet employees who already have many of these “leadership” skills. By placing a greater focus on the leadership development aspects of SI programming, this research study provides concrete evidence that there are tangible benefits for SI Leaders themselves, which confirms the value of SI programming beyond the more established benefits for student participants.

Pyatt, R. E., Rosser, T., & Powell, K. (2009). Undergraduates as science museum docents: Training students to be the teachers using Peer led Team Learning. *The American Biology Teacher, 71*(1), 16-19.

This article describes how the Fernbank Museum of Natural History trained undergraduate students as docents for The Genomic Revolution exhibit. Methodology from Peer led Team Learning (PLTL). The best elements of PLTL were important for the docents to acquire: good communication abilities, demonstrate knowledge of the content material, and strong leadership skills. Rather than focusing on a class of students who were preparing for exams, this application of PLTL was focused on helping groups of visitors to the museum exhibit to interact with the learning content and with one another to increase their learning outcomes. The student docents reported that as a result of their experience they learned more about the content material of the exhibits.

Quinn, K. B. (1990). *Retaining undergraduates and training graduates: A variation on Supplemental Instruction in a College Biology class*. Conference Proceedings of the 14th Annual Conference of the National Association for Developmental Education, Boston, MA.

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.

Rapley, E. (2015). Reaping what you sow: How the University of Bedfordshire uses experienced Peer Assisted Learning (PAL) students to inspire and nurture future generations of PAL leaders. *Journal of Pedagogic Development, 5*(2). www.journals.beds.ac.uk/ojs/index.php/jpd/article/view/172/266.

As staff awareness and understanding of Peer Assisted Learning (PAL) has continued to develop, a conscious decision has been made to hand over greater responsibility and ownership of PAL to the PAL Leader student team. PAL is based on the Supplemental Instruction (SI) model with a broader interest in holistic development of the students beyond just subject course competence. The success of any PAL initiative rests upon the quality of the PAL Leaders who facilitate the sessions. Motivated, committed and enthusiastic PAL Leaders are key to ensuring that engaging and meaningful sessions are provided for first year students. With our mission to ensure PAL Leaders truly benefit and develop themselves during their tenure, it was felt that this transformation could only take place if PAL Leaders really had opportunities to step up and take ownership of PAL.

Rawson, R., & Rhodes, C. (2022). Peer-assisted learning online: Peer leader motivations and experiences. *Journal of Peer Learning, 15*, 32-47. https://ro.uow.edu.au/ajpl/vol15/iss1/4.

This research explores the different types of motivation that inspired students to engage in an online peer-assisted learning (PAL) leader role. An interdisciplinary online PAL pilot programme at a university in the United Kingdom was reviewed to investigate the experience and perceptions of voluntary online PAL leaders. The purpose of the study was to address a paucity in knowledge about the motivations for this role, specifically from an online perspective, and to guide future online PAL leader recruitment. A thematic analysis of in-depth qualitative semi-structured interviews was used to determine emerging and relevant themes. Three research questions guided the interviews, and findings are presented in response to these questions. Findings indicate that different types of intrinsic and extrinsic motivation were key reasons for engaging in the online PAL leader role. The participants expressed an altruistic and empathic approach towards volunteering. Potential personal benefits motivated their participation, including improved study skills, transferable skills, and the possibility of an award. These motivations fell into two significant themes: the awareness of personal gain and the emergence of a desired version of self. Recommendations are made for the recruitment and training of online PAL leaders and the logistics of the scheme to ensure it is well advertised, accessible, endorsed by academic staff, and combines synchronous and asynchronous modes. It is hoped that this research will be valuable given the shift to online study and blended learning in response to and as an outcome of the COVID-19 pandemic and the value placed on interactive virtual spaces to minimise isolation.

Rios, L., & Lutz, B. D. (2022). *Operationalizing the orthogonal role of a Learning Assistant in the classroom to analyze epistemological development.* Conference Proceedings of the Excellence through Diversity ASEE Annual Conference, Minneapolis, MN. https://sftp.asee.org/40939

Learning Assistants (LAs) are students trained to facilitate discussion among student groups for socially mediated learning. They are distinct from teaching assistants and tutors in that they receive additional pedagogical training based on constructivist models of teaching and learning (e.g., sociocultural theory [1]). Their role in the classroom is to facilitate and guide, often through questioning, in ways that will help students reach

understanding on their own. Studies on the Learning Assistant model have demonstrated numerous benefits, such as increased conceptual understanding; an increase in positive affective dimensions such as belonging; and an increase in well-trained and enthusiastic future STEM teachers. While existing education research has illustrated positive impacts on students in STEM classrooms, less work has focused on the personal and epistemological development of the LAs themselves. In this paper we provide an analytical lens through which to assess epistemological development of LAs. This is critical to understanding and promoting LA development, but has been relatively overlooked to date. We define epistemology as the beliefs, ideas, and conceptions one has about the justification, nature, and source of knowledge. Within the Learning Assistant program, there are many avenues for participating LAs to reflect on and potentially rearrange their epistemology. To analyze LA epistemological development, we turn to Baxter Magolda's Epistemological Reflection Model, which describes student epistemological stances for the role of learners, peers, and instructors. In this paper, we adapt the model to account for the unique role of LAs in educational settings. Through analysis of semi-structured interviews and written assignments with LAs before and after participation in the LA program, we find that the role of the LA as narrated by the participants is orthogonal to that of peers, learners, and instructors in the classroom. Further, the role of the LA evolves over time, often as a result of incidents in the classroom that prompt LAs to confront and reorganize their beliefs about teaching, learning, and knowledge. Here, we operationalize the Role of the LA within the context of the Epistemological Reflection Model to articulate the ways LAs are distinct from both instructors and peers and discuss how instructors employing LAs or other near-peers may productively engage with their LAs' epistemological development. This study constitutes an extension on previous work and serves as a jumping-off point for further study on the affordances of pedagogical training for near-peers.

Rodrick, H. K. (2020). *Helping them changes us: Experiences of Supplemental Instruction leaders with transformative learning.* (Ph.D. dissertation), Wichita State University, Wichita, KS. www.soar.wichita.edu/bitstream/handle/10057/18819/d20022_Rodrick.pdf?sequence=1&isAllowed=y

Supplemental Instruction (SI) is an academic success program with a proven track record that was developed in the early 1970s to improve student academic performance in traditionally difficult courses (Arendale, 2000; Bonsangue et al., 2013; Bowles, McCoy, & Bates, 2008; Rabitory, Hoffman, & Person, 2015; Widmar, 1994). In over 40 years of program implementation, SI has been almost exclusively studied from the perspective of benefits to the Institutions of Higher Education (IHE) and the students receiving the instruction. Notably less research about SI has been conducted from the SI leader's point of view or included descriptions of their experiences in relation to changes in perception or critical self-reflection (A. W. Astin, 1985; Cress, Astin, Zimmerman-Oster, & Burkhardt, 2001). Using Mezirow's (1991) transformative learning theory in combination with Nohl's (2014) practice-based model as the theoretical structure, I conducted an interpretive qualitative study to investigate SI leaders' experiences. I interviewed former SI leaders who have held the position for at least 2 semesters in one of two institutions in different countries. The experience of being an SI leader shaped participants' whole college experience, their post-graduate education, and professional careers. It also changed their perspectives about themselves, their career choices, and teaching and learning. Implications for policy and practice include teaching and learning connections, educating future teachers, structure and support for peer leaders, recruiting program leaders and participants, broadening student success, applied learning opportunities, and expanding the SI program. Implications for Mezirow's (1978) transformative learning theory in combination with Nohl's (2014) practice-based model include: the theories coexist and interact, context influences learning, stages may be skipped or experienced out of order, stages have nuances, and perspective transformation takes time.

Rodriguez, M. (2021). Feaer became fascination. *Advances in Peer-Led Learning, 1*(1), 162. doi: doi.org/10.54935/apll2021-01-14-162. www.doi.org/10.54935/apll2021-01-14-162.

A poem about a PLTL leader who overcomes the fear and challenge of COVID-19 by becoming a PLTL leader and the lessons learned during the process.

Rodriguez, N., Cruz, A., Sardinas, S., & Ramon, A. (2016). *Peer leaders' perceptions of learning experiences*. Paper presented at the 2016 Conference for Undergraduate Research at Florida International University, FL. www.digitalcommons.fiu.edu/cgi/viewcontent.cgi?article=1057&context=fiu-undergraduate-research-conference.

Peer-Led Team Learning (PLTL) at Florida International University maintains a large volume of student and Peer Leader (PL) participation. Students, who participate in PLTL, on average, perform a letter grade better than their peers who do not participate in PLTL. To analyze PL perspectives on learning, a survey was conducted. The survey had a series of Likert scale statements and free response questions on learning. The nature of the questions are regarding barriers in education, individual learning strengths and weaknesses, and the perception that PLTL improved the learner's capabilities to overcome these obstacles. Based on the survey responses, PLs perceive an improvement in the way they learn during and/or after becoming a PL. Students

participating in PLTL exhibited an increase in course content retention and perceived improvement in study skills. Students in PLTL also perceived the PLTL workshop environment to be comfortable enough to address questions and misconceptions.

Romito, L., Daulton, B. J., Stone, C., & Pfeifle, A. L. (2020). Peer-Led Team Learning in a foundational IPE curriculum. *Health, Interprofessional Practice and Education, 4*(1). doi: www.org/10.7710/2641-1148.2126. www.scholarworks.iupui.edu/bitstream/handle/1805/27551/Romito2020Peer-CCBY.pdf?sequence=1&isAllowed=y.

The Peer Led Team Learning (PLTL) instructional model utilizes Peer Leaders, advanced students who mentor and guide student teams to collaborate on applied course concepts. PURPOSE To apply a modified PLTL model in the university's foundational, longitudinal, competency-based interprofessional education (IPE) curriculum. METHODS Twelve Peer Leaders were selected, trained, and deployed as facilitators for interprofessional teams of students during the IPE curriculum's first three large-scale learning events. Peer Leaders completed an evaluation of training, a facilitation skills survey, and participated in a semi-structured focus group interview process. RESULTS After participating in the PLTL program, Peer Leaders reported increased confidence in their interprofessional knowledge and facilitation skills. The primary challenge for Peer Leaders in facilitating teams was lack of student engagement (n=7, 58%). CONCLUSION PLTL is a feasible model for IPE settings. It has the potential to both increase facilitator capacity in interprofessional learning activities and have a positive impact on Peer Leaders.

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.

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%).

Sabella, M. S., Van Dezor, A. G., Passehl, J., & Weisenburger. (2012). A collaboration between university and high school in preparing physics teachers: Chicago State University's Teacher Immersion Institute. *The Physics Teacher, 50*(5), 296-300. doi: https://doi.org/10.1119/1.3703548. https://pubs.aip.org/aapt/pte/article-pdf/50/5/296/16058852/296_1_online.pdf.

Because of the diverse character of colleges and universities throughout the United States, it is naive to believe that a one-size-fits-all model of teacher preparation aligns with specific resources and student population needs. Exploring innovative models that challenge traditional programs is now being encouraged by organizations such as the American Association of Physics Teachers and the American Physical Society. Chicago State University (CSU) is now exploring exciting changes to its physics teacher preparation program by utilizing the expertise of Chicago Area teachers and early teaching experiences for students interested in, but not yet committed to, the physics teaching profession.

Sabella, M. S., & Van Duzor, A. G. (2013). *Cultural toolkits in the urban physics learning community* Conference Proceedings of the Physics Education Research Conference, Philadelphia, PA. https://pubs.aip.org/aip/acp/article-pdf/1513/1/34/12186095/34_1_online.pdf

Chicago State University has been involved in curriculum development, teacher preparation, and education research that targets urban physics learners on the south-side of Chicago. Through this work we have begun to recognize specific cultural norms that our students bring to the classroom. These cultural norms appear to help our students establish strong communities in classes. Because of the homogeneity of our population, with most students coming from within a five-mile radius of our campus, there are a set of shared experiences that help establish a level of trust and sense of community that manifests itself in the science learning environment. Aspects of community play a major role in the preparation of teachers. In this paper we discuss our understanding of CSU student culture, its importance in the development of community, and its role in the preparation of future physics teachers.

Saenz, G. A. C. (2022). Inspire. *Advances in Peer-Led Learning, 2*(1), 117-119. doi: https://journal.pltlis.org/wp-content/uploads/2023/01/10-Chavez-Saenz-APLL-Vol-2.pdf. https://journal.pltlis.org/wp-content/uploads/2023/01/10-Chavez-Saenz-APLL-Vol-2.pdf.

Sandler, C. R., & Salvatore, J. A. (2013). Peer-led study groups as learning communities in the natural sciences. In R. E. Yager (Ed.), *Exemplary college science teaching* (pp. 47-60): NSTA Press

At the University of Michigan in Ann Arbor (UM) created the Peer-Led Study Group (PLSG) program to support student academic achievement through its sponsorship by the Science Learning Center. The PLSG employs over 250 high-achieving undergraduates each term to facilitate nearly 300 groups meeting weekly. While participation is voluntary, missing two weekly sessions precludes further attendance for the academic term. This program provides a smaller learning space than the large lecture halls that are prevalent for the introductory sciences courses. Three full-time staff members lead the program. Twenty different science courses are supported. PLSG shares commons practices with Supplemental Instruction, Peer-led Team Learning, and Northwestern University's Gateway Science Program, to name a few. Satisfaction surveys of participants rated effectiveness of the program with over 92% of the students. Studies also identified personal and professional growth by the study group leaders.

Sands, J., Lilly, M., & Arendale, D. R. (2017). *Guide for Peer-Assisted Learning (PAL) facilitators*. Minneapolis, MN: SMART Learning Commons, University of Minnesota. For more information www.lib.umn.edu/smart/guide-peer-learning-facilitators

This training manual is used with the Peer Assisted Learning (PAL) program at the University of Minnesota. It is organized around eight principles for the student paraprofessionals to guide their work with assisting students to excel in historically-difficult courses.

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 & 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, 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, micro anatomy, 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.

Schick, C. P. (2018). *Trying on teaching: Transforming STEM classrooms with a Learning Assistant Program.* Conference Proceedings of the ACS Symposium. https://pubs.acs.org/doi/pdf/10.1021/bk-2018-1280.ch001

The nationally recognized Learning Assistant (LA) model, originating at the University of Colorado, Boulder (CU-Boulder), has been adapted for the two-year college setting at Montgomery College. LAs are recruited to assist in STEM classrooms and laboratories with a variety of unique assignments designed to enhance collaborative learning and student engagement. LAs get the opportunity to 'try on teaching' as they work alongside their faculty mentors, assisting students in the classes they support. Highlights on the faculty mentorship and reflections on teaching for the LAs are presented. Academic success, for both the students in the LA-supported classes and the LAs themselves, plus positive transformations in the STEM classrooms are discussed. The LAs, their faculty mentors, the classroom students, and the field of STEM education all benefit from this collaboration.

Scott, C. A., McLean, A., & Golding, C. (2019). How peer mentoring fosters graduate attributes. *Journal of Peer Learning, 12*(1), 29-44. www.ro.uow.edu.au/ajpl/vol12/iss1/3.

The most common approach to foster graduate attributes is to teach them in the curriculum of a bachelor's degree. However, it is difficult to include every graduate attribute in every degree. In this article we consider how co-curricular peer mentoring might provide an additional approach. We examine a case study of the mentors of the Peer Assisted Study Sessions (PASS) programme at a research-intensive university in New Zealand, and we examine the process by which they developed graduate attributes. PASS mentors reported that they developed a range of graduate attributes such as communication, critical thinking, and ethical responsibility, due to the extra responsibility and leadership involved in being a mentor in an authentic work environment. We argue that co-curricular programmes such as PASS can provide useful additional opportunities for students to acquire and develop graduate attributes. While not all students will be able to participate as PASS mentors, we also argue that our findings can inform other programmes for fostering graduate attributes. If these programmes offer authentic responsibilities to participating students, they may be more effective at fostering graduate attributes.

Sedghi, G., & WFashbourn, G. (2021). An essay: PAL training and future use in one's career. In A. Strømmen-Bakhtiar, R. Helde & E. Suzen (Eds.), *Supplemental Instruction: Student learning processes, volume 2* (pp. 141-159). LMunster and New York: Waxmann.www.www.waxmann.com/index.php?eID=download&buchnr=4325.

The transition between school and university is a longstanding issue in higher education (HE) due to significant differences between the two educational environments. The lack of extra support to ease the transition for students results in poor retention in HE institutions. Various provisions are introduced at universities to support students with adapting to the new educational environment. One of the means of tackling this issue is peer-assisted learning (PAL), a student-led scheme in which higher year students, called leaders, provide lower year students with subject support through facilitating discussions in small groups. Several benefits of PAL, to both student participants and higher year students, are reported in the literature. There are also many reports about leader training, what it covers and how it is delivered. However, there is not much in the literature about how, when and where the acquired skills are articulated in one's career. In this chapter, we will explain the details and structure of initial and ongoing leader training, in supporting students to not only gain various skills through PAL leadership but also reflect on and articulate the skills to future studies or employment. Different PAL leadership roles and progression pathways will be explained as a means to enhance employability. We will reflect on one's journey from becoming a leader to a lecturer, and how the gained skills through PAL leadership are mapped to the globally-recognised framework, for benchmarking success within HE teaching and learning.

Shook, J. L. (2012). *An analysis of academic peer leaders' perceptions of academic skills and performance.* (Ph.D. dissertation), University of South Carolina.

This research study explored academic peer leadership in the context of higher education and student affairs. In this study, a peer leader was considered to be "an undergraduate student who has been selected to serve as a mentor or peer educator to other students through a position with a school-run organization" (Keup & Skipper, 2010). The study focused on academic peer leaders, which included students who served within tutoring services, Supplemental Instruction, first-year seminar courses and academic advising. This study examined the change in academic skills and performance as a result of the academic peer leadership

experience. Mixed methodology allowed the researcher to gain a deeper understanding of the academic peer leader experience. The 2009 Peer Leadership Survey, conducted by the National Resource Center for The First-Year Experience & Students in Transition in spring 2009, provided the "first national portrait of peer leader experiences" (Keup & Skipper, 2010). Quantitative findings noted that academic peer leaders are better able to make connections between their peer leadership experience and changes in their academic skills and performance, as compared to other types (housed in other programs). Qualitative findings demonstrated how academic peer leaders made the connections between their role and their academic performance. The findings had implications on higher education professional practice and demonstrated a need for future research about peer leader programs and the experiences of students who serve as peer leaders.

Skalicky, J. (2008). Providing multiple opportunities for PASS leaders to reflect critically. *Australasian Journal of Peer Learning, 1*, 91-97. www.ro.uow.edu.au/ajpl/vol1/iss1/11

Peer Assisted Study Sessions (PASS) at the University of Tasmania at based on an adaptation of the Supplemental Instruction (SI) model. This articles used Brookfield's framework of critical reflection to consider multiple ways in which PASS programs can embed opportunities for PASS leaders to reflect critically upon their practice. "Critically responsive teaching is concerned with developing critical thinking in students, encouraging them to question assumptions and acquire a mind that is skeptical of claims to final trusts or ultime solutions to problems, is open to alternatives, and acknowledges the contextuality of knowledge" (Brookfield, 1990, p. 2) The author advocates for the intentional use of Brookfield's framework during training and as part of the ongoing training/supervision of SI leaders throughout the academic term.

Skalicky, J., & Caney, A. (2010). PASS student leader and mentor roles: A tertiary leadership pathway. *Australasian Journal of Peer Learning, 3*(1), 24-37. www.ro.uow.edu.au/ajpl/vol3/iss1/4.

This articles describes a study of the Peer Assisted Study Sessions (PASS) program which is modeled after the Supplemental Instruction (SI) program. The program also includes PASS mentors as part of the scheme. Data was collected using a structured survey with open-ended questions designed to capture the personal experiences and self-reported learning outcomes of students taking leadership roles within the PASS program. Twenty-three student PASS leaders and mentors were part of the study. Twelve themes of leadership development emerged: organization, facilitation, support, attitude, relationships, role model, collaboration, communication, responsibility, decision making, pedagogy, and session management. Students displayed growth as they moved from the initial role as PASS leader to the more demanding role of PASS mentor. The study focused on the experiences of the PASS program at the University of Tasmania.

Sletvold, H., Loftffell, A. L. G., Lervik, M., Suzen, E., Helde, R., & Amundstuen, L. (2021). Supplemental Instruction implementation in healthcare education. In A. Strømmen-Bakhtiar, R. Helde & E. Suzen (Eds.), *Supplemental Instruction: Organisation and leadership, volume 3* (pp. 85-100). Munster and New York: Waxmann. www.www.waxmann.com/index.php?eID=download&buchnr=4326.

Within pharmacy or nursing education, the literature on the implementation and evaluation of Supplemental Instruction (SI) is limited. The objective of this study was to describe the experiences of an SI pilot in two first-year courses in pharmacy and nursing education, and to evaluate the impact of the SI model on SI leaders and students. A case study was performed on the development and structure of an SI pilot programme, and qualitative analysis was used in the evaluation. Students and SI leaders were concerned about not receiving or providing answers to questions in SI sessions, respectively. However, various helpful learning strategies were used in the sessions. The organisation of the SI programme was challenging and required continuous attention and evaluation. Positive outcomes for both students and SI leaders included improved self-confidence, socialisation, knowledge of learning strategies, and communication skills. Students were motivated to study, and SI participation was relevant to exams. SI leaders gained increased management, teamwork development, and discussion facilitation skills. We conclude that care must be taken when implementing peer-assisted learning interventions, and this study provides valuable insights into adapting SI as a pedagogical model in healthcare education. This work lays the foundation for the further development and utilisation of the SI programme in healthcare education.

Smith, J., May, S., & Burke, L. (2007). Peer assisted learning: A case study into the value to student mentors and mentees. *Practice and Evidence of the Scholarship of Teaching and Learning in Higher Education, 2*(2), 80-109.

Peer-assisted learning (PAL) is a system of student support used in a growing number of universities in the UK and worldwide which is based on Supplemental Instruction (SI). Practitioners in the School of Surveying at Kingston University have been running such a scheme for first-year undergraduates since 1990 (Author 2003) and have recently undertaken a research project into perceptions of PAL by both attendees and mentors. Case study methodology (Tellis 1997) was the chosen research design for the evaluation in which

data from focus groups, interviews, and student questionnaires were collected and analysed. The results support much of the previous literature related to PAL/SI schemes, but also highlight gaps which this study may begin to fill. Student perceptions appeared to be clustered into two groups: those who used PAL as a means of managing a comprehension problem (reactive) that had arisen and those that used it as a means of preventing problems (proactive). Additionally, PAL mentors also fell into two groups: those who elected to become mentors for other-centered reasons and those who did so for personal gain. The findings show that both PAL attendees and mentors perceived a number of benefits from the scheme and that local lessons were learned that enabled the School of Surveying to better support its undergraduate students.

Smith, L. D. (1999). *SI leadership and personal growth: A South African perspective.* Conference Proceedings of the First National Conference on Supplemental Instruction and Video-based Supplemental Instruction, Kansas City, MO.

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 Supplemental Instruction (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.

Smuts, K. B. (1996). The role of student leaders in Supplemental Instruction. *South African Journal of Higher Education, 16*(3), 225-231.

Benefits for the Supplemental Instruction (SI) leaders include: develop a sense of personal adequacy; communication skills; relationship skills; find meaningful use of the subject matter in their own studies; improves their own grades; reinforce their own knowledge of fundamentals; reviw of course material assists them with professional school entrance exams; develop citizenship skills; and skills for the workplace.

Snyder, J. J., & Wiles, J. R. (2015). Peer Led Team Learning in introductory biology: Effects on peer leader critical thinking skills. *PLOS One*. doi: 10.1371/journal.pone.0115084. www.journals.plos.org/plosone/article?id=10.1371/journal.pone.0115084.

This study evaluated hypothesized effects of the Peer-Led Team Learning (PLTL) instructional model on undergraduate peer leaders' critical thinking skills. This investigation also explored peer leaders' perceptions of their critical thinking skills. A quasi-experimental pre-test/post-test with control group design was used to determine critical thinking gains in PLTL/non-PLTL groups. Critical thinking was assessed using the California Critical Thinking Skills Test (CCTST) among participants who had previously completed and been successful in a mixed-majors introductory biology course at a large, private research university in the American Northeast. Qualitative data from open-ended questionnaires confirmed that factors thought to improve critical thinking skills such as interaction with peers, problem solving, and discussion were perceived by participants to have an impact on critical thinking gains. However, no significant quantitative differences in peer leaders' critical thinking skills were found between pre- and post-experience CCTST measurements or between experimental and control groups.

Speed, K. D. (2004). *Perceptions of teaching, teaching practices and effectiveness of Supplemental Instruction leaders and selected students at a Research I institution.* (Ph.D. dissertation), Texas A & M University, College Station, TX. www.researchgate.net/publication/26898949_Perceptions_of_teaching_teaching_practices_and_effectiveness_of_supplemental_instruction_leaders_and_selected_students_at_a_Research_I_institution

This study examined students and Supplemental Instruction (SI)leaders perceptions of teaching, teaching practices, and faculty teaching effectiveness. This study also examined the impact of the SI leader's role on those perceptions and subsequent behaviors on end-of-course evaluations and sought to determine whether differences existed between the two groups in order to determine whether or not SI leaders' perceptions should be included in a comprehensive evaluation system. A purposive sample of 17 SI leaders, who had been employed during the spring 2002 semester and returned for the fall 2002 semester, and 17 students, who had attended at least 10 SI sessions during the fall 2002 semester, were selected to participate in this study.Data for the study were collected through individual interviews using a protocol designed to collect their perceptions regarding the following: 1) definitions of teaching and its activities; 2) descriptions of good and bad teaching or good and bad teachers; 3) definitions and descriptions of faculty teaching effectiveness; 4) role of the SI leader; 5) impact of SI leader's role on perceptions of teaching, its activities, and faculty

teaching effectiveness; and 6) impact of SI leader's role on behaviors on end-of-course evaluations. A major finding of this study is that SI leaders and students define teaching and its activities in a similar fashion. SI leaders, unlike students, however, report that learning is tied to teaching effectiveness, or lack thereof. This study has three major results: 1) SI leaders end up teaching, rather than facilitating; 2) the SI leader's role impacts views on teaching; and 3) the SI leaders' role impacts behaviors on end-of-course evaluations. A review of the literature on student ratings of instruction and regular attendance at SI indicate that both correlate, to a small degree, with mean end-of-course grades. Claims of validity with respect to both may be somewhat suspect, in light of SI leader's claims that they teach, rather than facilitate. Investigation of the impact of regular attendance at SI on end-of-course grades and end-of-course evaluations may result in the need to draw new conclusions with respect to validity of student ratings of instruction and SI.

Spike, B. T., & Finkelstein, N. D. (2012). *Toward an analytic framework of physics teaching assistants' pedagogical knowledge.* Conference Proceedings of the Physics Education Research Conference, Omaha, NE. https://pubs.aip.org/aip/acp/article-pdf/1413/1/363/12210853/363_1_online.pdf

Graduate Teaching Assistants (TAs) are the subject of increasing attention in education research, both as partners in supporting the goals of research-based curricula, and as future faculty learning about the nature of physics instruction. In previous work [1], we began documenting TA beliefs and presented two contrasting case studies of TA beliefs about teaching physics. In this paper, we begin to build a framework that identifies categories of epistemological and pedagogical resources that TAs draw upon when talking about and when engaging in teaching practices. By applying this framework to observations and interviews of a set of TAs from an introductory physics course, we demonstrate emergent differences in how these instructors talk about their own teaching, as well as examples of how these differences appear to be reflected in their framing of the instructional activity. We conclude with implications for teacher preparation and professional development at the graduate level.

Staff. (1990, November 19). Education student gets SCUP of reality at Westport High, *University News (Student newspaper of the University of Missouri-Kansas City),* 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 level student.

Staff. (1995, August 2). Students helping boost pass rates, *The University of Southern Queensland Newspaper,* 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. (1993). 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.

Stone, M. E., & Jacobs, G. (Eds.). (2006). *Supplemental Instruction: New visions for empowering student learning*. New Directions for Teaching and Learning, No. 106, San Francisco: Jossey-Bass

This sourcebook includes the following chapters: 1. The impact of Supplemental Instruction on teaching students "how to learn," Saundra Yancy McGuire. 2. The basic SI model, Maureen Hurley, Glen Jacobs, Melinda Gilbert. 3. Supplemental Instruction at community college: The four pillars, Joyce Ship Zaritsky, Andi Toce. 4. A credit-bearing course for training SI leaders, Sally A. Lipsky. 5. Video-based Supplemental Instruction: Serving underprepared students, Maureen Hurley, Kay L. Patterson, F. Kim Wilcox. 6. Benefits to Supplemental Instruction leaders.M. Lisa Stout, Amelia J. McDaniel. 7. How Supplemental Instruction

benefits faculty administration, and institutions, Sandra Zerger, Cathy Clark-Unite, Liesl Smith. 8. New directions for Supplemental Instruction, Sonny L. Painter . 9. TeamSI : A resource for integrating and improving learning, Carin Muhr, Deanna C. Martin. 10. The New vision for SI: Where are we heading ? Glen Jacobs, Marion E. Stone, M. Lisa Stout.

Stone, M. E., & Jacobs, G. (Eds.). (2008). *Supplemental Instruction: Improving first-year student success in high-risk courses* (Monograph No. 7, 3rd ed.). Columbia, SC: University of South Carolina, National Resource Center for the First-Year Experience & Students in Transition. ERIC Document (ED559247) www.archive.org/stream/ERIC_ED559247#page/n0/mode/2up

This monograph explores the Supplemental Instruction (SI) model through the following chapters: (introduction) 35 years of SI, F. Kim Wilcox and Glen Jacobs; (1) basic SI model, Maureen Hurley and Melinda Gilbert; (2) research on the effectiveness of SI, Maureen Hurley and Melinda Gilbert; (3) theoretical frameworks that inform the SI model, Sandra Zerger; (4) implementing a new SI program, F. Kim Wilcox; (5) recruiting and training SI leaders, Amelia McDaniel; (6) strategies for adapting SI to specific academic disciplines, Sandra Zerger; (7) Video-Based SI, Maureen Hurley, Kay Patterson, Sonny Painter, and Jennifer Carnicom; (8) SI international adaptations and future directions, Glen Jacobs M. Lisa Stout, and Marion E. Stone; (9) Concluding the first 35 years, Amelia McDaniel; (appendix a) glossary of terms; (appendix b) selected annotated bibliography for SI, David R. Arendale

Stone, M. E., Jacobs, G., & Hayes, H. (2006). Supplemental Instruction: Student perspectives in the 21st century. In D. B. Lundell, J. L. Higbee & I. M. Duranczyk (Eds.), *Student standpoints about access programs in higher education* (pp. 129-141). Minneapolis, MN: Center for Developmental Education and Urban Literacy, University of Minnesota. www.education.umn.edu/CRDEUL/publications.html.

This qualitative study was conducted with Supplemental Instruction (SI) participants at the University of Missouri-Kansas City. Themes that emerged regarding the positive benefits of SI included: better organization of course material, reinforcement of major concepts, clarification of questions asked identification of key concepts, learning in a "safe" environment, opportunity to voice understanding., exposure to other perspectives, deeper understanding, and increased confidence. Several themes emerged regarding challenges with the SI model. These included: unproductive SI sessions, SI leaders did not reteach the course material, sometimes received contradictory or confusing information, and some expressed dissatisfaction with peer cooperative learning. SI leaders were also a part of the qualitative study. Themes that emerged included: leadership development, study strategy development, opportunity to teach, deeper content knowledge, and development of relationships.

Stout, M. L., & McDaniel, A. J. (2006). Benefits to Supplemental Instruction leaders. In M. E. Stone & G. Jacobs (Eds.), *Supplemental Instruction: New visions for empowering student learning* (pp. 55-62). New Directions for Teaching and Learning, No. 106. San Francisco: Jossey-Bass

This chapter explores the many benefits that accrue to Supplemental instruction (SI) leaders as a result of their participation: academic competency, improved communication and relationship-building skills, enhanced personal development such as higher self-confidence and self-esteem, and enhanced professional development such as leadership skills, teamwork strategies, verbal and written expression, and self-assurance.

Strait, M. (2023). *Assessing Supplemental Instruction leaders' intercultural competence and culturally responsive practices in non-traditional learning environment.* (Ph.D. dissertation), Purdue University. https://hammer.purdue.edu/ndownloader/files/39417886

Social justice researchers and practitioners have beckoned post-secondary institutions to provide inclusive and culturally responsive instructional practices that promote students' sense of belonging and empowerment. However, little research has demonstrated how competent intercultural behaviors can connect to one's integration of culturally responsive teaching. Therefore, this explanatory sequential mixed-methods study examined the interplay between these components within a distinguished undergraduate peer learning program, Supplemental Instruction (SI). Undergraduate SI leaders' behaviors were examined for their intercultural competence level, potential influencers, and valued commitment to diversity and inclusion. This study was supported and guided by Hammer's (2012) Intercultural Development Continuum (IDC) and Gay's (2018) Culturally Responsive Teaching (CRT) practices. Quantitative data were collected using Hammer's (2012) Intercultural Development Inventory (IDI), and qualitative data were in the form of interviews and analyses of leaders' session plans. The findings revealed that participants overestimated their intercultural competence. Relatedly, participants expressed concerns of uncertainty beyond solely acknowledging diversity and addressing intercultural insensitivity. Curricular and co-curricular programming were potential influencers to the leaders' intercultural competence knowledge (i.e., cultural self-awareness, culture-general, and culture-specific). Additionally, implications include recommendations for higher education administrators'

initiatives for more inclusive and culturally responsive peer-learning programs.

Suzen, E., Helde, R., & Strømmen-Bakhtiar, A. (2021). Supplemental Instruction as a programme for developing leaders and facilitators for learning. In A. Strømmen-Bakhtiar, R. Helde & E. Suzen (Eds.), *Supplemental Instruction: Student learning processes, volume 2* (pp. 11-24). Munster and New York: Waxmann. www.www.waxmann.com/index.php?eID=download&buchnr=4325.

The topic of this article is the student-active programme Supplemental Instruction (SI) and the students who lead this programme, the SI leaders. SI is a voluntary offer of professional guidance under the leadership of the students themselves. The purpose of SI is to improve student performance and reduce interruptions to studies through collaborative learning strategies. We have chosen to focus on the students who lead this programme, the SI leaders. The question we have sought to answer is: How do SI leaders understand and experience (a) SI as pedagogical programme and (b) SI as a leadership development programme? A phenomenological approach was chosen in relation to the aim of the study in order to obtain a deeper understanding of how SI leaders have understood and experienced their role as leaders and educational facilitators. The study was aimed at the SI leaders in the subject of physics working on the driving instructor education at Nord University, Norway, autumn 2017. We conducted two interviews with each SI leader, both interviews regarding their experience of being an SI leader. Six main themes emerged from our analysis indicating that SI leaders benefit from the SI programme, both in terms of leadership development and as a pedagogical learning arena for themselves as future teachers.

Tanaka, C. (1995). *Peer Assisted Study Sessions in HUB 661 Japanese*. Unpublished manuscript. Queensland University of Technology. Brisbane, Queensland, Australia.

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 (Ed.), *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.

Tenney, A., & Houck, B. (2004). Learning about leadership: Team learning's effect on peer leaders. *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.

Thalluri, J., O'Flaherty, J. A., & Shepherd, P. L. (2014). Classmate peer-coaching: "A study buddy support scheme". *Journal of Peer Learning, 7*(1), Article 8. www.ro.uow.edu.au/cgi/viewcontent.cgi?article=1097&context=ajpl.

This study had two aims: firstly, to determine whether participation in a peer support scheme called Study Buddy Support (SBS) improves pass rates of “at risk” students, and secondly, to examine the advantages of this model over hierarchical models where senior students tutor junior years. Bachelor of Nursing and Midwifery

students in a first year Bioscience course completed an assessment early in the semester. Based on their performance, “at risk” students (Buddies) and high achievers (Buddy Leaders) were identified to participate in this scheme, either on campus (internal) or via Virtual Classrooms (VC) (external). Quantitative percentage failure rates for those “not at risk” and those “at risk” utilising and not utilising SBS were compared. Qualitative comments were also examined. Of those in the SBS scheme, 72% passed, while only 49% of those not participating passed. Buddies identified the reassurance of not being alone, as well as a friendly, non-intimidating learning environment, as SBS positives. For Buddy Leaders, consolidation of learning, developing networks, and improved team and leadership skills were positives. The current SBS scheme increased percentage pass rates and Buddies and Buddy Leaders alike suggested personal benefits for the initiative. The networks developed in this SBS scheme can progress throughout the entire degree but are lost in a hierarchical model as senior mentors graduate. This suggests that the advantages of the SBS scheme may persist beyond first year and may further strengthen retention in later years.

Thiry, H., Hug, S., & Barker, L. (2008). *CAHSI Year 2 annual evaluation report: Recruiting, retaining, and advancing Hispanics in computing*. University of Colorado. Bolder, Colorado. www.colorado.edu/eer/downloads/CAHSIyear2Report2008.pdf

CAHSI institutions have focused their efforts on the recruitment, retention, and advancement of Hispanic computer science students. In 2007, the seven CAHSI computer science departments graduated 149 Hispanic computer science majors. Excluding the University of Puerto Rico, Mayaguez, which is 100% Hispanic, 45% of computer science majors at CAHSI institutions were Hispanic. In addition, two CAHSI institutions graduated an above-average proportion of women in computer science. Three institutions serve other underrepresented minorities as well, specifically African-American computer science students. When compared to other Hispanic serving institutions, the enrollment of Hispanic computer science students at CAHSI institutions is closer to parity with the overall enrollment of Hispanic students at their schools. However, most CAHSI schools have opportunities for growth in this area. The Alliance has implemented multiple interventions to enhance the recruitment, retention, and advancement of Hispanic computer science students at participating institutions. The CS-0 course is intended to help CAHSI institutions recruit and retain more Hispanics into the computer science major. At every institution, the percentage of Hispanics enrolled in CS-O is higher than the percentage of Hispanics enrolled in the CS major, suggesting that CS-0 is an effective method for recruiting more Hispanics into the department. Although the recruitment, retention, and advancement of women into computing are not explicit goals of CAHSI, CS-0 has also been successful in enrolling women in CS-0. At every institution except one, the percentage of women undergraduates enrolled in CS-0 is higher than the percentage of women enrolled in the CS major. Though the CS-0 course has attracted more Hispanics and women than are presently enrolled in CAHSI computer science departments, it is too early to tell whether these students will continue in computer science. To determine the retention rate of CS-0 students, the evaluation team will track whether these students enroll in CS1 in subsequent semesters. In addition, the enrollment of Hispanics in many CAHSI computer science departments is lower than the enrollment of Hispanics in the institution, suggesting that there is room for growth in the recruitment of Hispanics into the computer science major. The CS-0 course was successful in boosting students’ confidence in their programming abilities. Students who had not programmed a computer made the greatest gains in confidence. Women gained greater confidence in computer programming than men. All racial/ethnic groups, including Hispanics, exhibited strong increases in confidence in computer programming. Indeed, the gains in computer programming confidence across all demographic variables, such as gender and ethnicity, suggest that the CS-O course served to boost the confidence of most students. Peer-Led Team Learning in “gatekeeper” courses aims to increase student retention in the major by providing near-peer role models to boost their confidence and knowledge. Sessions were informal and involved group work to develop relationships among students in the course, said to influence student persistence in the major. Overall, students found the PLTL sessions to be fun, interesting, and helpful. Students, particularly Hispanic students, gained confidence in their computing abilities through PLTL sessions, and leaders reported confidence gains as well. Being a peer leader increased students’ communication, teaching, leadership, and interpersonal skills. Hispanics had slightly better gains in skills than other peer leaders. Students were generally confident in their skills as a peer leader, particularly in their ability to help students understand concepts, to motivate students, and to effectively communicate. Students’ experiences as peer leaders also increased their aspirations to have a computing career and, to a lesser extent, their aspirations to attend graduate school in computing. Peer leading had a more positive influence on the aspirations of women and Hispanics. Being a peer leader also enhanced students’ disciplinary and conceptual knowledge. In part, this increase in knowledge and confidence contributed to some students’ motivation to pursue graduate studies.

Top, L., Schoonraad, S. A., & Otero, V. (2018). Development of pedagogical knowledge among learning assistants. *International Journal of STEM Education, 5*(1), 1-18. doi: https://doi.org/10.1186/s40594-017-0097-9.

https://link.springer.com/article/10.1186/s40594-017-0097-9.
Background Successful outcomes of the Learning Assistant (LA) model include increased learning outcomes in STEM gateway courses and increased persistence to graduation among LAs and the students they serve. While there are many possible reasons that the LA program is effective, the pedagogical development of the LAs themselves has not yet been systematically studied. The research reported here investigated how deeply first-time LAs enrolled in a one-semester pedagogy course took up the language associated with the course's essential pedagogical principles. By reviewing prior research as well as assessing our target population and our pedagogy course learning goals, we developed a set of three essential pedagogical principles that are critical for effective classroom instruction and developed a coding scheme for identifying these principles in LAs' written work. We then looked at LA's development of language with respect to these principles by analyzing weekly teaching reflections submitted by LAs during five iterations of our pedagogy course. Results Our research indicated that the language used to introduce particular pedagogical principles might play an important role in initiating LAs' uptake of these concepts. We found that LAs began to develop an understanding of the language that values students' prior ideas in learning, but the depth of this understanding varied. In addition, LAs did not demonstrate as much growth in their language with respect to the formative assessment or to the idea that students play a role in constructing knowledge. Conclusions In developing a pedagogy course for LAs, relating to their prior backgrounds in STEM appears to be critical. Using language that is accessible seems to increase LAs' ability to develop pedagogical principles. Although LAs' development of language related to the essential pedagogical principles is small, it may be enough to allow them to create contexts that facilitate learning.

Tran, C., Hartmann, K., Olsker, T. C., & Bonsangue, M. (2016). The impact of Supplemental Instruction on the SI leader. *Supplemental Instruction Journal, 2*(1), 6-18. www.info.umkc.edu/si/wp-content/uploads/2016/09/siJ-Volume-Two-Issue-One.pdf.
This study conducted at California State University, Fullerton, examined the impact of SI upon the leaders. Variables included sex, first generation status, and underrepresented minority group status. Men increased incresed confidence and communication effectiveness at higher rates than women. The underrepresented group reported higher ability to handle student conflict and communicate with peer than majority students.

Turner, M. (2004, 2004, October 2). $3M grant helps students with learning, teaching, *The Modesto Bee*, p. A 22.
This newspaper article describes how Supplemental Instruction (SI) is being implemented to support academic success of students but also provide a professional development experience for the SI leaders. The article contains quotations from SI program administrators and SI leaders. One of the leaders describes how serving as a SI leader provided insight to a potential teaching career.

Van der Meer, J., Skalicky, J., & Speed, H. (2019). "I didn't just want a degree": Students' perceptions about benefits from participation in student leadership programmes. *Journal of Leaderslhip Education, 19*(1), 25-44.
Increasingly, universities are involved in providing leadership development opportunities that support students' academic endeavours and their personal and professional development, including employability and citizenship skills. Leadership experiences are beneficial not only for students, but also for universities, the wider community, and future employers. To develop a greater understanding of students' perceived benefits of their involvement in peer leadership activities, a group of Australasian universities participated in a pilot survey based on the United States National Survey of Peer Leadership. Overall, the results suggest students believe they benefit from peer leadership experiences across a range of key outcomes areas, most prominently creative problem solving, appreciation of diversity, and a sense of belonging and contributing to the university community.

Varma-Nelson, P., Cracolice, M. S., & Gosser, D. K. (2003). Peer-Led Team Learning: A student-faculty partnership for transforming the learning environment *Invention and impact: Building excellence in undergraduate science, technology, engineering, and mathematics (STEM) education* (pp. 43-48). Washington, D.C.: American Association for the Advancement of Science
This chapter describes the use of the Peer-Led Team Learning (PLTL) program in science courses to increase their academic success. After providing an overview of the PLTL program, effects on the peer leaders are presented along with a report of the national dissemination of the model.

Vaughan, J. (2009). My experience as a Peer Leader: Insight hindsight.. Peer-Led Team Learning: The experience of leading. *Progressions: The Peer-Led Team Learning Project Newsletter, 10*(2). www.pltlis.org/wp-content/uploads/2012/10/Experience-of-Leading-Vaughn-My-Experience-as-a-Peer-Leader.pdf.

This report is based on first-hand account by a student facilitator involved with the Peer-led Team Learning (PLTL) program. Some of my favorite memories over the last four years at The City College of New York of the City University of New York were not of me at a desk, listening intently about the mysteries of the known universe. Rather, my finest memories involved me in a workshop, at a chalkboard, using wit and comedic humor to clarify a topic that was introduced by a 'boring' professor not more than an hour prior.

Walker, L. (Ed.). (2010). *Two (or more) heads are better than one: Adventures in leading group learning, a facilitator storybook*. Minneapolis, MN: SMART Learning Commons, University of Minnesota. University of Minnesota Digital Conservancy, www.z.umn.edu/PALadventures

Whether as study group leaders, undergraduate TA's, or tutors, college students working in peer-led academic support programs have a unique role in the learning environment - acting as model students and sharing their productive study behaviors. Along the way, these students gather wisdom and insight into what works and what doesn't when assisting their fellow undergrads. The Peer-Assisted Learning (PAL) Program at the University of Minnesota has compiled a storybook to capture some of that wisdom so that those who follow can benefit from their predecessors' experiences - some positive, some challenging, but all "learning opportunities". Two (or More) Heads are Better than One: Adventures in leading group learning is a collection of first person narratives, told by peer facilitators and recorded and edited by one of the PAL program's undergraduates - Lana Walker. What began as her thesis project, the collection turned into a book that has become a staple in the pre-semester training workshops and weekly team meetings. The stories are a springboard for discussions of program policies, the particulars of cooperative learning, and a clearer understanding of roles and boundaries. The format is engaging; peer leaders find some of the stories "funny" and laugh along with the narrators about their experiences. Anyone working with undergrads will see how they can benefit from these honest and thoughtful reflections, carefully grouped by topic, with stimulating, open-ended questions at the end of each chapter.

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). 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

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. (Writer). (1996). Supplemental Instruction: The challenging way forward [Videotape]. In G. Mair (Producer). Glasgow, Scotland: Glasgow Caledonia University

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. (Writer). (1996). Supplemental Instruction: A profile of the scheme [Videotape]. In G. Mair (Producer). Glasgow, Scotland: Glasgow Caledonia University

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.

Wang, B. (2010). From Peer-Led Team Learning to professional work experiences. Peer-Led Team Learning: The experience of leading. *Progressions: The Peer-Led Team Learning Project Newsletter, 12*(1). www.pltlis.org/wp-content/uploads/2012/10/Experience-of-Leading-Wang-PLTL-to-Professional-Experience.pdf.

The author relates their personal story of how serving as a student facilitator of the Peer-led Team Learning (PLTL) program had benefits for himself as well as for the participating students. Some of those new sills were: improved problem-solving skills, increased interpersonal communication skills, and deeper understanding of the course material that benefited degrees in Computer Science (CS) and obtained employment as a Tech Analyst at JPMorgan Chase.

Watson, J. (2000). *A Peer Assistance Support Scheme (PASS) for first year core subjects.* Conference Proceedings of the 4th Pacific Rim First Year in Higher Education Conference: Creating Futures for a New Millennium, July 5-7, 2000. QUT: Brisbane.

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*. pages. Paper presented at the American Educational Research Association Conference, March 24-28, 1997, Chicago, IL.

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, facilitator skills, and insight into adult education.

Webster, T., & Dee, K. C. (1997, 1997). *Supplemental Instruction benefits students in an introductory engineering course.* Conference Proceedings of the Proceedings of the Conference on Frontiers in Education, Pittsburgh, PA.

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.

Whatman, S. (1995). *Peer assisted study sessions with Aboriginal and Tores Strait Islander students during semester two, 1995*. Unpublished manuscript. Queensland University of Technology. 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.

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.

Wilcox, F. K. (1996). 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). 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.

Wilkinson, J., & Brent, G. (2019). Peer Assisted Study Sessions (PASS): Recognizing employability through PebblePad *Blended learning designs in STEM higher education* (pp. 139-149): Springer

Peer Assisted Study Sessions (PASS) is a voluntary, weekly, academic assistance program utilizing peer-led group study to help students succeed in traditionally difficult subjects. PASS provides opportunities for students to strengthen their knowledge by being actively involved in group learning that is focused on identifying and reviewing key lecture content, testing understanding of difficult concepts, gaining confidence through discussing complex course material, and engaging in cooperative problem-solving methods. The sessions are facilitated by students who have completed at least one year of study, have excelled in the course, maintained a strong Grade Point Average and have completed a two-day intensive PASS Leader training course. Through planning, leading, and organizing sessions, leaders develop strong transferable attributes including interpersonal communication skills, listening skills, time management and organizational skills, leadership and team working skills, equipping them for professional life beyond university. Leaders are observed at least twice per trimester, by the PASS Coordinator and by a Senior Leader, with feedback provided to support development. Using an observation template on PebblePad ensures that comments can be easily reviewed before observations and leaders receive timely feedback that is stored in an accessible format, providing evidence of contribution and skills. Leaders also use PebblePad to reflect on their experience of the PASS Program and transferable skills developed, allowing them to identify, document, and evidence key employability skills and attributes.

Williams, B., Fellows, H., Eastwood, K., & Wallis, J. (2014). Peer teaching experiences of final year paramedic students: 2011-2012. *Journal of Peer Learning, 7*(1). www.ro.uow.edu.au/ajpl/vol7/iss1/7/.

Peer assisted learning (PAL) is one method of teaching which involves peers, or people from similar social groups, in reciprocal learning where one peer educates another and in return learns through the teaching experience. There have been many reported benefits of PAL programs. PAL has a long history of use in healthcare education; however, for paramedic education there is a paucity of literature. A pilot PAL project was undertaken in the Bachelor of Emergency Health (BEH) course at Monash University in Melbourne, Australia. This study had two aims: i) to evaluate the effectiveness of the pilot PAL program, and ii) to compare academic grades between peer teachers and those not involved in the PAL program over 2011–2012. Forty-one students volunteered, with 23 students in 2011 and 18 in 2012. At the completion of their peer teaching, all students were asked to complete the 14-item Peer Teaching Experience Questionnaire (PTEQ). Of the 41 students, 63.4% were female, 73.2% were under 25, 82.9% had been taught by peers previously, 31.7% had taught peers previously, and 51.2% had undertaken previous tertiary studies. Students strongly agreed teaching and leadership were important to the paramedic role. Students also strongly agreed that their peer teaching experience was personally rewarding, increased their knowledge and skills, and would be of direct benefit to them as a graduate paramedic. Moreover, students who participated in the PAL project as peer teachers obtained higher clinical marks on their final clinical examination than their non-PAL counterparts (2011 76.5% vs. 71.0%, $p < .001$, and 2012, 75.2% vs. 72.7%, $p < .001$). This study suggests PAL programs have a great potential to provide a wide range of benefits in paramedic courses. As this was a pilot program, there were many limitations and caution should be used in making any generalisations. However, the overwhelmingly positive response from the students strongly suggests PAL programs should continue to be implemented in paramedic education.

Williams, D. P. (2022). vPBL: Developing a facilitated remote approach to Problem Based Learning. *Journal of Chemical Education, 99*(4), 1642-1650. doi: https://doi.org/10.1021/acs.jchemed.1c01068. https://pubs.acs.org/doi/pdf/10.1021/acs.jchemed.1c01068.

A classroom based Problem Based Learning (PBL) activity was adapted to run as a remote activity during the COVID-19 pandemic using an approach described as virtual Problem Based Learning (vPBL). vPBL is

based on (i) identification of a suitable learning platform that supports collaborative working in a way that mimics the classroom based activity and provides additional flexibility for teams to work together, and (ii) adaptation of the problem structure to provide additional time for students to work together and additional facilitated support where needed. Student performance and self-reported levels of transferrable skills development in the vPBL activity were as good as they were in the PBL version of the same activity. Furthermore, the transition to vPBL appears to have no negative impact on student learning and development. Although there was evidence to suggest students in the vPBL cohort collaborate between sessions to a similar extent as their colleagues who learnt primarily through interactive online lectures, there was evidence of greater use of some collaborative digital learning tools (audio and video chat and desktop and file sharing) in the vPBL cohort.

Yates, J., Gill, F., & Webb, C. (1995). *Peer mentoring to facilitate learning in economics.* Conference Proceedings of the Australian Economics Education Symposium, Adelaide, South Australia, Australia.

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.

Zacharoppulou, A., Giles, M., & Condell, J. (2015). Enhancing PASS leaders' employability skills through reflection. *Journal of Learning Development in Higher Education*(November). www.aldinhe.ac.uk/ojs/index.php?journal=jldhe&page=article&op=view&path[]=348.

Whilst the benefits for students attending Peer Assisted Study Sessions (PASS) have been widely acknowledged, the benefits for its leaders have not been as clearly evaluated. This paper will explore how the more senior students who take on the role of PASS leader can develop employability skills through a programme of activity that formally rewards students for their participation and assists them in articulating their competencies. The paper presents the findings of a project undertaken by a cross-disciplinary team at Ulster University which focused on the benefits for PASS leaders and, more explicitly, on graduate employability skills such as communication, teamwork and leadership. Students were required to reflect on the PASS process and plan for subsequent sessions whilst also engaging in a series of skill-building activities (games and various practical exercises) which focused on those facets of employability that are of direct relevance to the PASS experience. Quantitative and qualitative methods were employed to evaluate the impact of the PASS programme: initial findings suggest that the programme served to enhance students' perceived competence in respect of some employability skills (e.g. spoken communication) but, more generally, served to raise their awareness and highlight their limitations in some areas. This paper suggests that the process of reflection has helped them to better articulate these skills and identify the steps needed to further develop them. As such, this project has provided research evidence to support the effectiveness of the PASS process and a collection of materials to support the further development of its leaders.

Zaritsky, J. S. (1994). *Supplemental Instruction: A peer tutoring program at La Guardia Community College*. Unpublished manuscript. La Guardia Community College. Long Island City, NY. ERIC database. (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., & Toce, A. (2006). The basic SI model. In M. E. Stone & G. Jacobs (Eds.), *Supplemental Instruction: New visions for empowering student learning* (pp. 23-32). New Directions for Teaching and Learning, No. 106. San Francisco: Jossey-Bass

This chapter describes how SI has since 1993 been successful in improving grades and reducing failure in high-risk courses at LaGuardia Community College, an urban institution.In addition, the SI experience has benefits for the SI leaders: better understanding of the course material, discovering the joy of learning and helping others, gaining self confidence, strengthen communication and leadership skills.