

Getting Science Students to PASS-UIW: A Successful Collaboration Between Students, Staff, and Faculty

CRISTINA ARIZA, JULIAN M. DAVIS, MICHAEL FRYE,
AND EARL HARMSEN
UNIVERSITY OF THE INCARNATE WORD

Abstract

This article explores the reasons that Peer Assisted Study Sessions (PASS) at the University of the Incarnate Word (UIW), commonly called PASS-UIW, has been successful in science courses at the University. The intent is to provide information for other institutions to launch, evaluate, or improve their own programs. PASS-UIW is a student-led program to assist undergraduate students taking Chemistry and Physics gateway courses. PASS-UIW has shown improved student engagement and created an opportunity for student leaders to gain valuable experience teaching peers. Several key criteria have been identified as impacting the success of the program: 1) extensive training, 2) use of collaborative learning techniques, 3) communication among constituents, and 4) dedication of leaders and faculty.

The University of the Incarnate Word (UIW) has a large population of students who are the first in their families to attend college (36%), as well as many students with marginal high school backgrounds. UIW also has a relatively large number of transfer students who come from other colleges and universities which have varied levels of expectations of their students. Often, as both faculty and students have commented, these students have not had the opportunity to develop the study skills necessary to succeed academically in college-level courses. In addition, on average, 7.1% of students are typically enrolled in one or more developmental courses their first year. These developmental courses are designed to bridge the gap between their high school experience and college-level coursework. With this same intention in mind, the goals of the Peer Assisted Study Sessions (PASS-UIW) program are to increase student retention and grades for Chemistry, Physics, and Business Statistics, as well as to stress learning skills that will help the students succeed in these and other courses.

The student body composition at UIW, and in particular the School of Mathematics, Science, and Engineering (SMSE), has an atypical mix of gender and ethnicity. Although the university and the SMSE have the same proportion of students based on gender (67% female and 33% male), this proportion differs from the national average for degree-granting institutions

as reported on the National Center for Education Statistics (NCES, 2010a) website (59% female and 41% male). The NCES (2010b) further reports the proportion of minority students in the School of Mathematics, Science, and Engineering (70%) is higher than that of the university (65%), and both are higher than national degree-granting institutions (33.5%).

As part of its mission to be committed to educational excellence and promotion of life-long learning, UIW seeks to provide all students with educational experiences that are tailored to their individual needs and learning styles. Many studies have examined learning styles as a function of gender and race as well as the positive results of collaborative learning (Mather & Champagne, 2008; Reese & Dunn, 2007-2008; Riding & Rayner, 1998). Review of these studies suggests that a modified Supplemental Instruction Program would be beneficial for UIW's diverse student body. The Dean of Student Success, the Director of the Learning Assistance Center (LAC), chemistry faculty members, and an undergraduate chemistry student (who was recommended to become a leader) collaborated to create a modified Supplemental Instruction (SI) program to provide an opportunity for students to develop their study skills and help each other learn in a collaborative environment. The program was named PASS-UIW, for Peer Assisted Study Sessions, and was modeled from the University of Wollongong's program of the same name (PASS, n.d.). It is worth noting that at least one other program called PASS has been described in the literature; Saunders and Gibbon (1998) have reported the successes and challenges with the Peer Assistant Student Support program at the University of Glamorgan in the United Kingdom. In the course of analyzing the pilot for PASS-UIW, several key criteria emerged as impacting the success of the program: 1) extensive training 2) use of collaborative learning techniques, 3) communication among students, faculty, leaders and administrators involved in the program, and 4) dedication of leaders and faculty.

The benefits of SI programs have been known for some time (Blanc, DeBuhr, & Martin, 1983) and have been shown to include improvements in retention (Bowles & Jones, 2004), grades (Congos & Schoeps, 2003), and timely graduation (Bowles, McCoy, & Bates, 2008). Studies on various programs have indicated they can be particularly beneficial to women and minorities (Lundenberg & Moch, 1995; Van Lanen & Lockie, 1997; Peled & Kim, 1996).

It is also a well-established fact that "collaborative learning makes a strong contribution toward students becoming active learners rather than passive recipients of information" (Tinto, 1998). This is exemplified in a study by Van Lanen and Lockie (2008). Collaborative learning and the relationships among those involved play key roles in PASS-UIW. Therefore, the selection and training of leaders was carefully considered.

Method

The pilot for the PASS-UIW program was launched in the spring of 2008 with one course, Organic Chemistry I; two professors and one leader hosted two weekly sessions of two hours each. From the beginning, the program was assessed in order to make improvements as well as to understand and demonstrate its effectiveness. During the pilot, the program was

small enough that the key personnel could meet regularly and discuss improvements. Students were administered surveys at the end of each semester to collect feedback.

Review of the survey data and discussion of the way the program functions demonstrate the lessons learned and the changes that have been made since the pilot. The intent is that other institutions will use this information to evaluate, improve, or start their own programs. The key elements examined are related to training, the use of collaborative learning techniques, communication among those involved in the program, and the characteristics of the both SI Leaders and Faculty.

Training

Training building blocks consisted of University of Missouri-Kansas City Supplemental Instruction (SI) materials combined with tutor training and other learning-related materials tailored to specific needs. Basic training varied from four to eight hours, and it was followed by developmental training according to the needs of the individual leaders or the group. The core of the basic training was divided into administrative and session-related topics. It aimed at providing general employee information, preparing them to be responsible employees, giving specific and essential information about SI and PASS-UIW, and preparing leaders to conduct group and individual sessions, as well as to manage situations that could come up with students or professors.

Trainees received information about our Learning Assistance Center policies and the tutoring appointment system. They also discussed professionalism, ways to advertise the program, and the purpose of meetings with professors, supervisors and team members. As a team, leader trainees participated in creating fliers and posters that were later displayed around campus. Much was packed into those few hours of training; therefore, observing the leaders during the first weeks of the semester was very important to immediately address any issues with individuals or with the group.

Collaborative Learning Techniques

The heart of successful PASS-UIW sessions is the use of collaborative learning techniques by the leader to engage all the students present and empower them to take ownership of their learning. During training, new PASS leaders learn the collaborative learning techniques and learning strategies they will use during the sessions by being an active participant in them.

The techniques that leaders report work the best in their sessions are traditional group discussions, discussions moderated by someone chosen from the group at random, individual presentations, and organizers such as concept maps. One sample topic for moderated group discussion used in training is testing tips; the facilitator comes up with suggestions that the leaders validate, build on, and use to spark their own ideas. Individual presentations keep leaders engaged during training and give them a powerful tool to use in their sessions. For example, during the training, each leader practiced the introduction they would give students during their first PASS-

UIW session or when presenting the program to the students the first day of class. This practice speech challenged the leaders' preconceptions that they can walk into a session without preparation and that they do not need training. When the leaders go on to use this technique in their sessions, it is especially effective at engaging passive students and helping them overcome their anxieties, shyness, and self-doubt. One of the leaders shared a clever method of choosing students to present to the rest of the attendees during her sessions: "For the longest time I had trouble getting students to come to the board. My solution to this was Luck of the Draw. This way I was not just calling a specific student out. It's just the luck of the draw if you get called."

Communication

The success of a program such as PASS-UIW depends on the communication, relationships, and characteristics of the people involved. Leaders host study sessions for specific courses in which they not only assist students in understanding course content, but also share learning strategies and study skills. Leaders are students with good communication skills who have succeeded in the target courses, demonstrated interest in helping other students, and been recommended by faculty teaching those courses. Assessment of need determines which courses are selected—although PASS-UIW is only offered when it will be supported by faculty.

Since the inception of the program, frequent communication has been critical to the success of the PASS-UIW program. During the pilot, the team met frequently to discuss the progress of the sessions, need for changes, additions and ways to improve the program, and to review survey results. The communication that occurred reflected the interactions among the people involved (see Process Flow Interactions illustrated in Figure 1). The professor and leader met weekly in preparation for the sessions. The professor and director met four times to discuss the structure of the program, responsibilities, and progress as well as to share information. The leader and director met every two weeks to discuss session attendance, do developmental training, and create advertisements. A great sense of excitement, expectation, and hope characterized communications and general attitudes toward the program. The professor and leader communicated with students face to face and by email or text messaging as often as necessary. The director visited the classroom twice in the semester and had conversations with some of the students who attended the sessions. In all of these communications, the director, professor, and leader all had an equal voice.

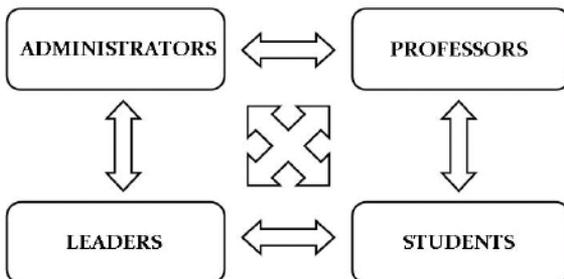


Figure 1. Process Flow Interactions in the PASS-UIW Program

Dedication and Personality

Successful PASS-UIW leaders are outgoing, engaging, highly self-motivated, filled with initiative, and empathetic. They are easy to talk to, maintain a positive outlook, and are encouraging to other leaders and students alike. Such leaders bring not only a characteristic sense of responsibility to their job in the program, but also tremendous dedication. They understand that their role in assisting fellow students to succeed is facilitated by their perspective of looking at the material from one or two semesters away, plus the more advanced material they have learned in subsequent courses. When leaders realize that their opinions and ideas matter to the administrators and faculty, they take ownership of the program, and their enthusiasm shows in many ways.

For example, in this project, some leaders involved themselves in creating and modifying session surveys to ascertain how to improve their service to the students. Some of the leaders who did not regularly attend class visited the classroom from time to time to inform, cheer, and exhort the students. By being conscientious of dates for important activities such as exams in the classes and surveys from the LAC, good leaders are prepared ahead of time and help these activities run smoothly.

The leaders who invested extra effort in the program ensured the seamless continuation of their contributions by recruiting and helping train fellow students who will build on their work. When the program was still relatively small, many of the early leaders were more involved in the administrative aspects of the program. These leaders saw the needs of the program and took the initiative to help organize and run it. They essentially became leaders among leaders because of their exceptional dedication to the program. The PASS-UIW program offered them the opportunity to put in as much creative energy as they wanted to. One characteristic of the leaders who go far beyond the core responsibilities of their job is that their attitudes consistently reflect their ownership of the program; for example, they refer to it as “our program” rather than “the program” or “your program.”

Perhaps the leaders’ dedication to the program is, at least in part, emulating the commitment they observe in their professors, who are available to them for consultation, support, and guidance. The professors use the weekly meetings with the leaders to provide guidance and support. Frequently, these meetings deepen what is already a close working relationship between a professor and a student who may also be an advisee or research student. While the primary focus of these meetings is on course content, the professors also give the leaders guidance on classroom management, addressing different learning styles, and other issues related to facilitating sessions. Wolfe (1990) has reported similar benefits of faculty mentoring student leaders.

The professors who volunteer their assistance with training sessions provide an extra dimension to the training program. Having the professors’ perspectives provides the leaders with examples and experience related to the mentoring aspect of their jobs. The professors’ endorsement of the leaders and the program carries a lot of weight with the students. Consequently, the professors play a critical role in promoting their leaders and the program

to their students. Seamless incorporation of program surveys into their class time underscores the professors' belief in the program.

The professors provide support not only to the leaders but also to the director of the program. The two professors who first worked on the program contributed in a variety of ways like finding classrooms in which to hold the sessions and providing supplies needed by the leaders. These individuals have become liaisons to their departments and have consistently promoted the program to their colleagues. They have developed into an unofficial advisory board offering support, their own perspective as faculty, additional analysis of the program, and their own suggestions for improvement.

Assessments

In order to examine how the students were influenced by the PASS-UIW program, the following multiple methods were used: indirect and direct evaluations, chiefly surveys and attendance rosters, collected data on a variety of points including attendance and the students' impression of the PASS leaders.

1. Indirect evaluation. Indirect evaluation, often in the form of surveys given to students, is a time-honored method of garnering information on the success of the program as well as identifying opportunities for improvement (Jarrett & Harris, 2009; Hall, 2007). In this program, a voluntary survey is administered during lectures near the end of each semester before finals. The survey used in the spring of 2009, the results of which will be the focus of discussion, is included below in Figure 2. This survey was piloted in previous semesters, and has evolved each semester as it is improved. Additional questions are added or deleted as necessary to address specific program outcomes. The seven items measured in the current study are as outlined in Figure 2.
2. Quantitative measurement. Students were asked how many sessions they attended and what grade they expected to earn; additionally, they were asked to use a Likert-type scale to evaluate both the sessions and leader in five facets each using a three-point Likert-type scale (Very Useful, Useful, Not Useful). The choice for "Not Applicable" was also provided.
3. Qualitative measurement. Students were also asked for a qualitative evaluation of when they attended sessions and, if no sessions were attended, why not. Lastly, one open-ended, free-response question was utilized to gather additional ideas and feedback for the program.
4. Direct evaluation. Attendance (which is voluntary) is recorded at each PASS-UIW session via sign-in sheets. Direct evaluation frequently focuses on measurable student outcomes like grades, as discussed in the works of Peled and Kim (1996) and Webster and Hooper (1998). Course grades have been collected from each participating professor since the beginning of the program.

P.A.S.S. PROGRAM SURVEY - SPRING 2009

COURSE _____

Thank you for answering this survey. We want your opinion, suggestions and feedback whether you attended the sessions or not. Please use the back of the page if needed.

1. How many sessions did you attend?	Please CIRCLE your answer: none 1-2 3-5 5-7 more than 7
2. If you did not attend any sessions, please indicate why and skip to question #6.	Please CHECK all that apply: <input type="checkbox"/> I did not need them—I understood the material <input type="checkbox"/> The time of the session conflicted with class/work <input type="checkbox"/> A friend explained what I did not understand <input type="checkbox"/> I did not know about the sessions <input type="checkbox"/> Other _____
3. I attended the sessions...	Please CHECK all that apply: <input type="checkbox"/> As often as I could <input type="checkbox"/> Right before the exam <input type="checkbox"/> Right before homework was due <input type="checkbox"/> Because the chapter(s) was (were) difficult <input type="checkbox"/> Right after the exam was returned <input type="checkbox"/> Other _____
4. Please rate the usefulness of the sessions in the following aspects.	RATING SCALE: 1: very useful 2: somewhat useful 3: not useful 4: not offered/not applicable ___ Additional examples were provided ___ Additional time given to explaining difficult concepts ___ Easier to ask questions in PASS than in the lecture ___ Having an alternate explanation of the material ___ Having a scheduled time outside the class to learn the material ___ Other _____
5. Please rate the leader on the following criteria.	RATING SCALE: 1: excellent 2: okay 3: poor ___ Knew the material and explained it in terms I understood ___ Was friendly and welcoming ___ Made the environment informal and comfortable ___ Explained study skills for the course ___ Provided alternative explanations to the ones given by my professor ___ Provided more problems for practice ___ Other _____
6. The grade I expect to make in this course is...	Please CIRCLE ONE ONLY : A B C D F
7. What could we do to improve? Use the back of the page if you need more room.	

Figure 2. Spring 2009 End of Semester Survey.

However, direct evaluation based on student grades can be complicated. In particular, separating out the effect of the program can be challenging as it is difficult to define control groups and so many factors are involved in student performance (Maxwell, 1990; Bowles & Jones, 2003; McCarthy, Smuts, & Cosser, 1997). For instance, student performance can be affected by not only the preparation they received in high school but also the student's performance in previous university courses.

Results

The program was evaluated in part using surveys administered near the end of the semester, a practice dating from the pilot program in spring 2008; however, the survey results presented in this study are from spring 2009 (see Figures 3 through 6). Spring 2009 was chosen to best represent the overall responses over the years for two reasons. First, previous semesters have included smaller numbers of sections, thus making the sample error much larger. Second, the survey has evolved over the semesters, so that the previous surveys are not conducive for incorporating consistent data into a longitudinal study. The 2009 survey responses—which generally echo the other surveys—in the section entitled, “Usefulness of PASS Session” (see Figure 3) overwhelmingly support the program, with an average 70% of respondents indicating the PASS sessions across all the categories as “very useful,” the most favorable choice. The next favorable choice “Somewhat useful,” garnered an average 26% of respondents, a clear indication that students felt every category represented in the survey was very useful. Further, students in both classes ranked “examples provided” as the most useful aspect of the session (with 80% of Physics students and 71.4% of the Chemistry students choosing this option).

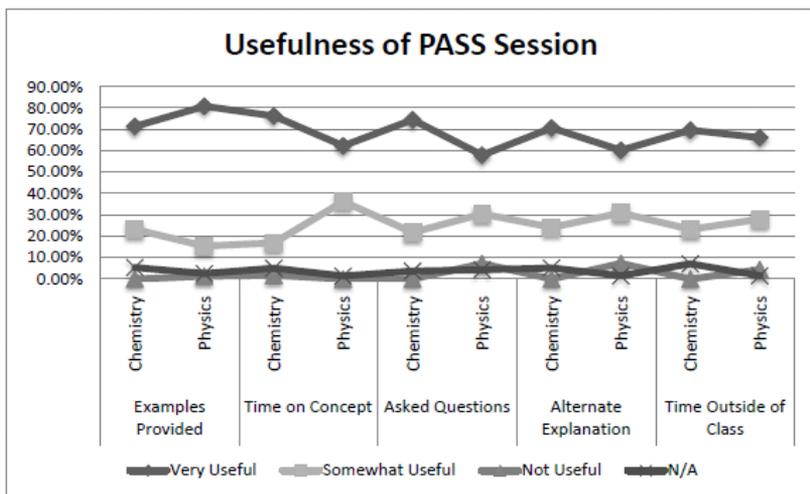


Figure 3. Perceived Usefulness of the PASS-UIW Sessions.

The results in Figure 4, “Value of the PASS Leaders,” also indicate a consistent ranking of the PASS leaders as “excellent” in all categories, with a range from a low of 60% percent of the respondents indicating an “excellent” ranking in Chemistry for “alternate explanations” category to a high of more than 90% percent of the respondents indicating an “excellent” ranking in Chemistry “friendly and welcoming” category. In evaluating the leaders, physics and chemistry students alike cited among the top attributes their leaders’ ability to possess a “friendly and welcoming manner” and creating a “comfortable environment.” In physics, the use of “additional examples” was also rated highly, with 80% ranking as “excellent.” The only area in which students gave a significant negative response was that 15% of respondents

ranked the chemistry leaders' knowledge of the material as "poor," but an equal percentage of respondents (15%) also ranked the chemistry leaders' knowledge as "okay." The similar rankings for this question may reflect the difficult nature of some of the chemistry courses, and possibly misperceptions on the part of the students about what the leader can do for them and their own responsibility in learning. Nevertheless, these comments emphasize the importance of regular contact between leaders and their faculty mentors. Written comments from students on the surveys emphasized and elaborated on these findings. Many said that PASS-UIW provided regularly scheduled time to study. Several students wrote comments like "the regularly scheduled time helped with a subject that I find I do not like or is intimidating." The students were more comfortable asking questions during the sessions than in the classroom because the leaders created a comfortable, welcoming environment in which the students have a sense of control over the pace of the sessions.

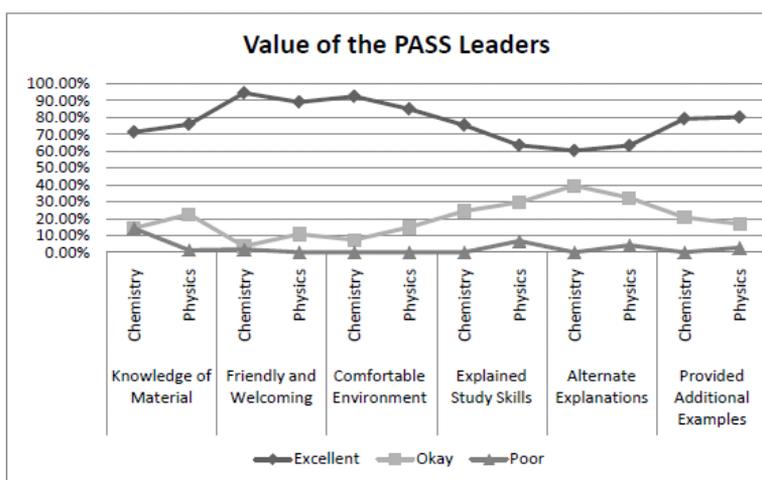


Figure 4. Perceived Value of the PASS -UIW Leader.

Based on self-reported attendance (see figure 5, "PASS-UIW Sessions Attendance"), more than 70% of the student in the Physics course voluntarily attended at least one session of the program and 52% of the students in Chemistry course voluntarily attended at least one session of the program. While the overall attendance at the physics sessions was better than at chemistry sessions, this statistic may be due to more physics faculty providing more enthusiastic support of the PASS-UIW program. Interestingly, while students in Physics classes consistently out-attended the students in Chemistry courses for the 1-2 sessions category (with 34% student attendance for Physics compared with 16% student attendance for Chemistry) and the 3-5 sessions category (with 28% student attendance for Physics compared with 14% student attendance for Chemistry), that ratio flipped for the next two categories, with Chemistry students more than doubling attendance—and in one case tripling—the attendance rates for the Physics students. For instance, 15% of the Chemistry students attended for

more than seven sessions compared with 5% of Physics students attending this same category. It may be that chemistry students were using the sessions more as a consistent part of their study plan. Although these numbers were estimates that students self-reported on the survey, the numbers correlate reasonably well with formal attendance records.

How many sessions did you attend ?	Chemistry	Physics
None	47.17%	29.17%
1-2	16.04%	34.17%
3-5	14.15%	28.33%
5-7	7.55%	3.33%
More than 7	15.09%	5.00%

Figure 5. PASS-UIW Sessions Attendance.

Reasons for attending also showed some interesting correlations (See figure 6: Purpose for Attending PASS-UIW Sessions). Of the students who attended at least one physics session, the largest number indicated they went for assistance "right before an exam." On the other hand, students in chemistry also reported seeking assistance, "right before the exam," as one of the top three motivations for attending sessions, but approximately equal numbers also reported they went to the program, "as often as they could" and "when the material was difficult." This trend seems to fit well with the attendance pattern in that a larger fraction of physics students attended sessions mainly as an exam review, whereas chemistry students were more inclined to attend sessions regularly. For students who did not attend any sessions, the most frequently given response for both chemistry and physics was schedule conflict. As the program continues to grow, it will be interesting to note if fewer students report schedule conflicts for courses where a larger number of sessions are offered each week. For the physics sessions, the second most popular reason (21 responses out of 65) for not attending was by students who reported they did not need the help, whereas this reason was relatively infrequent in chemistry (only eight responses out of 65).

I attended the sessions...	Chemistry	Physics
As often as I could	32.50%	31.30%
Right before the exam	26.67%	47.33%
Right before homework was due	7.50%	3.82%
Chapter(s) were difficult	27.50%	11.45%
Right after exam was returned	5.83%	6.11%

Figure 6. Purpose for Attending PASS-UIW Sessions.

In terms of reported expectations on grades, a large majority (82%) of the students in physics reported expecting to get an A or B, with roughly an equal division between the two. In chemistry, however, only 17% reported expecting an A. About half (46%) of the chemistry students expected a B, while fully a third (34%) reported expecting a C, which was double the

fraction of physics students who expected a C (16%). Very few students in either course expected grades lower than a C. Not surprisingly, these expectations were not uniformly met. There is ongoing analysis of the relationship between students' expectations and their grades in the courses. (See figure 7: Expected Grades for Courses with PASS Leaders).

The grade I expect to make in this course is ...	Chemistry	Physics
A	17.31%	42.74%
B	46.15%	39.52%
C	33.65%	16.13%
D	2.88%	0.81%
F	0.00%	0.81%

Figure 7. Expected Grades for Courses with PASS Leaders.

Discussion

The program has grown tremendously since its inception to include 10 courses, 15 professors, 15 leaders, and four junior leaders in the fall of 2009. The growth has been driven by student and faculty demand and facilitated by funding from an external grant. In the process of expanding, the researchers have had to modify the approach to many aspects of program administration and build infrastructure to accommodate the increased number of students, leaders, and faculty involved. In the process of doing so, a great deal was learned about the factors contributing to the success of the program, and the intent is that readers will find some of these lessons applicable to their own programs.

In the process of examining why the PASS-UIW program has been successful, several key criteria emerged: 1) training of the PASS-UIW leaders; 2) collaborative learning techniques in the study sessions; 3) communication between faculty, staff, PASS-UIW leaders, and students enrolled in classes; and 4) the dedication and personality of the PASS-UIW leaders and participating faculty. As the program expands, these aspects of the design will be given particular attention.

Each new semester, while core training remains, trainees benefit from additional insights gained during previous semesters. With returning leaders, training emphasizes building upon their skills and knowledge of collaborative learning; as a result, leaders among leaders still emerge; the more experienced SI leaders take on a more involved role in organizing and mentoring other leaders.

Collaborative learning techniques remain a regular aspect of the training and continue to be part of the way PASS leaders run the sessions. They are taught, demonstrated, and discussed with leaders during their meetings with supervisors. Furthermore, leaders have the opportunity to comment, share and demonstrate collaborative learning techniques to the group during development training. The techniques, as taught in training, equip the leaders to guide more effective group discussions, solve problems and

improve communications among students attending sessions. Feedback from students who participated supports that working with the other students in the PASS session environment provides encouragement and an opportunity to learn from their classmates as well as the PASS leader. For example, during a recognition luncheon at the end of the semester, one of the students shared that “the PASS program is the reason I am still at UIW”. Because of the support the program provided, this student, who had considered dropping out, gained the confidence to learn the course material and continue in the program.

It is clear to all those running the program that good communication is essential for the program to be effective; therefore, a commitment was made to maintaining the regularity and quality of communications that have been critical to the success of the program. So far, communication has remained effective in spite of the increase in infrastructure. The original paradigm for communication was effective due to the small size of the PASS-UIW team; however, as the number of people involved has grown, including a graduate assistant who now fulfills many of the administrative roles the early leaders took on, a number of adaptations have been necessary. For example, it is no longer feasible for all the people involved to meet very often. We have adapted by starting to meet by subjects—chemistry, physics, and business—and by process flow interactions—administrators and professors, leaders and administrators, leaders and professors (see Figure 1).

The administration, which consists of the director and a graduate assistant, meets with all the professors involved in the program by department once per semester. The graduate assistant meets with the leaders every other week. The administrator and the graduate assistant have one officially scheduled weekly meeting and frequently meet more often. Additionally, leaders still meet weekly (or more often, as needed) with professors. This interaction is especially important to keep the leaders up to speed on topics being discussed in lecture and upcoming material. While having the leader attend lectures is helpful, meeting with the professor still adds value in that the leader can gain a clearer context for the material and be better prepared to anticipate students’ difficulties with the content and guide their learning.

In addition to training, collaborative learning techniques, and communication, the dedication and personality of student leaders and faculty members remains a key factor in the program’s success. Student leaders who are knowledgeable in the subject matter, are good students, and love to assist others in learning provide the expertise, dedication, and enthusiasm that help the program succeed. These dedicated leaders contribute to the success of the program in a myriad of ways. The positive attitude leaders have towards their students’ potential for success is an excellent foundation on which the students can build their confidence. In working with the students, the leaders’ enthusiasm for the subject and the program sets an example of the attitude successful students have towards their studies; the leaders become role-models of how to be actively engaged in their education and how to take responsibility for managing it. When problems with room reservations or other administrative details arise, for instance, they are cordial with people involved and proactive about finding solutions and communicating important information to students, easing what has the potential to be frustrating experiences for the students.

The leaders are not the only ones whose participation impacts the students in the program. Faculty members that believe in and support the program offer greater cooperation which helps make the program more effective. A feedback loop develops between faculty, students, and leaders which allows faculty to pinpoint needs of the students and communicate them to the leader. In turn, the leader can provide useful information about what students find difficult, when they do not understand very well, or when they need more or less clarification. Often, working with supportive faculty who are willing to collaborate makes it easier for the PASS leader to help the students succeed. Indeed, some faculty members have offered guidance and advice to not only the PASS leader assigned to their section but other PASS leaders as well. Moreover, one faculty member observed that working with the program can help new faculty members become more integrated into the campus and more active in helping their students succeed.

Implications

First, the program must be selective when determining the participating disciplines, courses, faculty, and leaders. Selection of faculty overlaps course selection, though choosing courses that students have difficulty with is especially important. The support the program receives from the discipline (department or school) also proves valuable. The PASS-UIW program has been fortunate that the Dean of the School of Mathematics, Science, and Engineering (SMSE) has supported it since its inception. This support has ranged from encouraging faculty to participate to dedicating financial resources to the program. The financial support, particularly under the SMSE's recent College Cost Reduction and Access Act (CCRAA) grant, has made the growth of the program to its current level possible. In addition, the Dean of Student Success and the Provost are highly supportive of the program. Furthermore, faculty members who appreciate the student-leader relationship as the cornerstone of the program are necessary to provide adequate support to the leaders and encouragement to the students. The program is designed to take advantage of the relationship between students and peer leaders. Therefore, choosing leaders who are empathetic, have good communication skills, and have sufficiently mastered the relevant course materials is critical.

The second issue that the PASS-UIW program needs to address is the design and implementation of faculty and peer leader surveys. The results from these additional stakeholder measurements could then be combined with the results of the student surveys for greater insight into the advantages and usefulness of the program. The stakeholder surveys will also facilitate the modification of the program to meet a variety of academic needs. As schools, disciplines, and courses begin to participate in the PASS-UIW program, the additional survey information could be used to justify the selection of courses and the training of peer leaders in an effort to develop a more customized service.

The third issue requiring additional study is the performance measurements used in determining the effectiveness of the PASS-UIW program. As the program begins to gain momentum, the measurements used in the evaluation of the program will also need to be modified. Attendance, usefulness, and value of the leader will still be important PASS-

UIW program goals. Students who do not attend sessions may seem like a natural control group, but since reasons for not attending sessions vary, and sessions are generally made available by course and not by individual course section, this delineation has proven unreliable. In addition, improvements within the departments and new faculty hires as the departments expand make comparison of current data to historical grade profiles implausible. The search for a method of correlating performance with participation in the PASS-UIW program that accounts for the many other variables that affect students' grades in the course is ongoing. With this goal in mind, further examination might seek to demonstrate what faculty and administrators in the program repeatedly hear from students: that the practice they had at the PASS-UIW sessions bolstered their confidence in a variety of ways, such as the experience of solving a problem on the board in front of their peers as well as studying in a group where they gave and received help. In informal discussions with PASS-UIW participants and in the comments section of the surveys, students report time and time again how helpful it is for them to be encouraged to go to the board during a PASS-UIW meeting to work a problem. They share that the experience builds their confidence in a supportive environment where they can get help and encouragement from their peers.

Future Study:

Future efforts will look for correlations with demographic factors such as first-generation college students, transfers, gender, and race, as well as introduce end-of-semester surveys for leaders and faculty to garner their input. In addition to this indirect evaluation, it is hoped to find a way to de-convolute some of the other variables that influence grades and make a meaningful evaluation of grades as a function of involvement in PASS-UIW.

Conclusion

This study developed, implemented, and expanded a modified SI program that has been beneficial for student attendees and student leaders alike. The results were evaluated using an end-of-semester survey given to students in the classes for which PASS-UIW was offered, by taking attendance at each PASS-UIW meeting, and through an experiential description of the program. Response to the program has been very positive, and the survey results and other feedback have been used to make improvements to the program. For example, there have been efforts to enhance students' perception of leaders' knowledge by focusing on improving communication between leaders and faculty to ensure leaders are well-versed in the current course content. Administrators have recognized the importance of emphasizing study skills during the sessions and the tendency of some leaders to drift towards just course content based sessions; therefore, during the training as well as at meetings with leaders each semester, they have stressed the development of study skill sets that will help the students in current and future courses.

This study confirms that the PASS-UIW program is both feasible and repeatable. However, as the program evolves and expands at UIW, the lessons learned have emphasized three additional considerations that need to be addressed for the program to remain sustainable.

Ultimately, the success of the program will depend on greater institutional objectives. Additionally, the program will need to demonstrate that it has a positive impact on both student retention rates and persistence to graduation. Although course grades and student GPAs will still be an important course level measurement, it will be the ability of the PASS-UIW program to enhance the students' overall academic experience at the University that will ensure its continued success.

References

- Blanc, R. A., DeBuhr, L., & Martin, D. C. (1983). Breaking the attrition cycle: The effects of Supplemental Instruction on undergraduate performance and attrition. *Journal of Higher Education*, 54(1), 80-89.
- Bowles, T. J., & Jones, J. (2003). An analysis of the effectiveness of Supplemental Instruction: The problem of selection bias and limited dependent variables. *Journal of College Student Retention: Research, Theory, and Practice*, 5(2), 235-243.
- Bowles, T. J. & Jones, J. (2004). The effect of Supplemental Instruction on retention: A bivariate probit model. *Journal of College Student Retention: Research, Theory, and Practice*, 5(4), 431-437.
- Bowles, T. J., McCoy, A. C., & Bates, S. (2008). The effect of Supplemental Instruction on timely graduation. *College Student Journal*, 43 (3), 853-859.
- Congos, D. H., & Schoeps, N. (2003). Inside Supplemental Instruction (SI) sessions: One model of what happens that improves grades and retention revisited. *Journal of Student Centered Learning*, 1(3), 159-170.
- Hall, R. (2007). Improving the peer mentoring experience through evaluation. *The Learning Assistance Review*, 12(2), 7-17.
- Jarrett, C. J., & Harris, J. A. (2009). SI Plus: A program description and an analysis of student feedback. *The Learning Assistance Review*, 14(2), 33-42.
- Lockie, N. M. & Van Lanen, R. J. (2008). Impact of the Supplemental Instruction experience on science SI leaders. *Journal of Developmental Education*, 31(3), 2-14.
- Lundeberg, M. A., & Moch, S. D. (1995). Influence of social interaction on cognition: Connected learning in science. *Journal of Higher Education*, 66(3), 312-335.
- Mather, J. A. & Champagne, A. (2008). Student learning styles/strategies and professor's expectations: Do they match? *College Quarterly*, 11(2), 1-8.
- Maxwell, M. (1990). Does tutoring help? A look at the literature. *Review of Research in Developmental Education*, 7(4), 1-5.
- McCarthy, A., Smuts, B., & Cosser, M. (1997). Assessing the effectiveness of Supplemental Instruction: A critique and a case study. *Studies in Higher Education*, 22(2), 221-231.

- National Center for Education Statistics. (2010a). Retrieved 4/1/210 from http://nces.ed.gov/programs/digest/d10/tables/dt10_202.asp
- National Center for Education Statistics. (2010b). Retrieved 4/1/2010 from http://nces.ed.gov/programs/digest/d10/tables/dt10_236.asp
- PASS. (n.d.). Retrieved from www.uow.edu.au/student/services/pass/index.html.
- Peled, O. N., & Kim, A. C. (1996). Evaluation of Supplemental Instruction at the college level. *The Learning Assistance Review*, 1(2), 23-31.
- Reese, V. L. & Dunn, R. (2007-2008). Learning-style preferences of a diverse freshmen population in a large, private, metropolitan university by gender and gpa. *Journal of College Student Retention: Research, Theory, and Practice*, 9(1), 95-112.
- Riding, R. & Rayner, S. (1998). *Cognitive styles and learning strategies: Understanding style differences in learning and behavior*. London: David Fulton Publishers. Pp. 217.
- Saunders, D., & Gibbon, M. (1998). Peer tutoring and peer-assisted student support: Five models within a new university. *Mentoring and Tutoring*, 5(3), 3-13.
- Tinto, V. (1998). Learning communities and the reconstruction of remedial education in higher education. Paper presented at the conference on Replacing Remediation in Higher Education, Stanford University, Palo Alto, CA.
- Van Lanen, R. J., & Lockie, N. M. (1997). Using Supplemental Instruction to assist nursing student in chemistry: A mentoring program's support network protects high-risk students at Saint Xavier University. *Journal of College Science Teaching*, 26(6), 419-423.
- Webster, T., & Hooper, L. (1998). Supplemental Instruction for introductory chemistry courses: A preliminary investigation. *Journal of Chemical Education*, 75(3), 328-331.
- Wolfe, R. F. (1990). Professional development through peer interaction. *The Journal of professional Studies*, 14(1), 50-57.