Development of a Structured Learning Assistance (SLA) Program

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It has been reported that students in need of remediation drop out of college at a much higher rate than students not requiring remediation (Burley, Butner, & Cejda, 2001). The rate of retention for developmental students can also be negatively affected by the number of developmental courses the students need to complete (Bailey, Jeong, & Cho, 2010). Attrition is not only attributed to a lack of preparedness but also to a host of other variables such as self-doubt, lack of study skills, familial distractions, lack of perseverance, and adult responsibilities, among others (Damashek, 1999).

Research has shown that many students enrolling in postsecondary education are not academically ready for the coursework they will encounter in college (Fine, Duggan, & Braddy, 2009), and the longer a student is enrolled in developmental coursework, the less likely the student will persevere to graduation (Stigler, Givvin, & Thompson, 2010). Mathematics is "the most difficult area to remediate" (Burley et al., 2001, p.778) and only half of the students who enroll in developmental mathematics complete it successfully (Fike & Fike, 2007). In addition Fike and Fike (2007) found that students are less prepared in mathematics than any other subject and that mathematics is also the deficiency that is most influential in determining the successful completion of the degree program (Fike & Fike, 2007).

Challenge Addressed

As the literature notes, students struggle to learn developmental mathematics. A positive experience with developmental mathematics has been shown to increase students' confidence in learning mathematics (Duranczyk, 2008). Additionally, students who have a successful developmental experience are more likely to experience success in subsequent courses and are more likely to persist and earn a degree (Penny & White, 1998). Program factors that have been shown to impact success are smaller class size, development of a sense of community, and positive interaction with faculty (Duranczyk & Higbee, 2006). Another program aspect that has been shown to be a level one best practice for developmental mathematics is supplemental instruction (Wright, Wright & Lamb, 2002). Collaborative learning helps to reduce math anxiety among developmental students (Galbraith & Jones, 2006) and is a major component of Supplemental Instruction and a Structured Learning Assistance (SLA) program. SLA has the potential to address each of the factors outlined as it helps students to delve deeper into the subject matter with support from their SLA leader as well as their peers.

Prior to my Kellogg Institute Practicum project, the Department of Academic Enrichment did not have any out of class support program to assist students enrolled within developmental mathematics. There is an urgency to help students be successful because the longer a student is enrolled in developmental mathematics courses, the less likely he or she is to graduate (Stigler, et al., 2010). In an effort to improve students' completion, I proposed designing a Structured Learning Assistance program to assist students in developing the skills necessary to experience success in their developmental mathematics courses.

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Background Information

My Kellogg Institute practicum focused on developing an out of class support program for developmental mathematics students in the form of SLA. The SLA program was targeted for developmental mathematics students enrolled in one of two courses: Introductory Algebra or Intermediate Algebra. These courses are offered at a four-year public institution in north-central Pennsylvania with an undergraduate population of approximately 8,000 students. Enrollment in Introductory Algebra is limited to 20 students and Intermediate Algebra is capped at 25 students per section. Students in either course can be ACT 101 students or regular admission students. ACT 101 students are loosely defined as economically and educationally disadvantaged. Part of the funding the department receives for the ACT 101 program comes through a grant for ACT 101 which is a Pennsylvania state program.

The SLA program was set within the Department of Academic Enrichment, which provides remedial coursework in reading, writing, and mathematics, as well as tutoring services to undergraduate students in a variety of courses. The department also provides counseling services to ACT 101 students. This department is considered a centralized developmental education program because the disciplines are all in the same department, rather than immersed throughout the campus community in various academic departments.

ACT 101 students only gain admission to the university after proving themselves successful in the 6-week summer program. Both regular admission and ACT 101 students are placed into mathematics courses based on their SAT score and their score on the *Accuplacer*© placement exam. Students can be placed into Introductory Algebra, Intermediate Algebra (which are developmental courses), or a variety of college-level math courses.

Numerous ACT 101 students require a mathematics course or two, as do many regular admission students. The grades that students earn in the developmental math courses (Introductory Algebra and Intermediate Algebra) affect their GPA but are not factored in as credits towards graduation requirements. Each of the courses offered in the Department of Academic Enrichment are held Monday, Wednesday, and Friday for 50 minutes each or on Tuesdays and Thursdays for 75 minutes.

Program Design

Before development of the SLA program for my institution, the SLA program at Ferris State University (FSU) was researched as a model program. I also reached out to Arlene Krellwitz, director of FSU's SLA program, to seek her permission to utilize and adapt the SLA materials from FSU for my institution. Once her permission was received, I adapted the materials appropriately for my institution and the students it serves.

During the 2008-2009 academic year, I designed the SLA program for my Kellogg Practicum project. Contained within the practicum were 15 objectives aimed at assisting in the design and development of an SLA program for my department. The practicum's objectives were focused on developing the following materials: job description for SLA leaders, criteria for selecting SLA leaders, an informational brochure, a welcome/information letter for SLA, workshop rules for SLA, a list of expectations for students participating in SLA, an attendance policy, a survey to determine the effectiveness of training for SLA leaders, and a survey to determine the effectiveness of SLA as determined by the participants. Additionally, I developed criteria for selecting SLA leaders: student leaders must attain/maintain a 3.0 GPA and earn a B+ or above in the course she or he will be facilitating. The practicum staff also selected SLA leaders and arranged trainings for those leaders with the intent to implement the program during the Fall 2009 semester.

Contained within the practicum were 15 objectives aimed at assisting in the design and development of an SLA program.

Securing funding was an important issue related to the development of the program. I proposed compensating each SLA leader an hourly rate of $8.15. Each SLA leader was reimbursed for 10 hours of work each week. Therefore, I estimated that it would cost $1304 per semester for each SLA leader. My institution has a Teaching and Learning Enhancement (TALE) center that provides various resources for the faculty. The TALE center solicited proposals for a competitive grant program to provide funding for new classroom strategies. During the Spring 2009 semester I submitted a proposal and was selected to receive funding for this practicum. Within the proposal, I requested funds to support two SLA leaders. Consequently, I implemented the SLA program in one section of Introductory Algebra and one section of Intermediate Algebra during the Fall 2009 semester. I taught two sections of each course that semester; therefore, I was able to have one treatment group and one control group for both courses.

During the Fall 2009 semester I piloted the SLA Program designed for my Kellogg practicum in one section each of Introductory Algebra and Intermediate Algebra. All students enrolled in an SLA course were mandated to attend at least two SLA workshops per week until after the first exam. Once the first exam was assessed, students earning a grade of C or better in the course were no longer mandated to attend the workshops, but they were still encouraged to take advantage of the resource. If a student's grade fell below the cutoff (C), the mandate to attend workshops continued for that student. Student expectations were also contained within the Attendance and Workshop Policy. Among the expectations was that students would arrive on time and stay for the entire session.

A goal of this practicum was to help students develop mathematics study skills. The SLA leaders played a vital role in meeting that goal. Training sessions were arranged with the initial training occurring for 3 to 4 hours prior to the start of the Fall 2009 semester. Once the semester started, the SLA leaders participated in 1-hour, weekly training sessions throughout the semester. The trainings focused on strategies and techniques to assist student participants in learning course content, such as think-pair-share, predict quiz/exam questions, and notes verification. A survey instrument was developed to assess the effectiveness of the training for SLA leaders.

Results of the Study

During Fall 2009, I piloted SLA in one section of Introductory Algebra and one section of Intermediate Algebra. I also taught one section of non-SLA Introductory Algebra and one section of non-SLA Intermediate Algebra, both of which I used for my control sections. All four classes were taught with the same pace and identical course content and classroom delivery throughout the semester. The only difference was the treatment classes included SLA whereas the control classes were not provided any support options. The data in Tables 1 and 2 represent the students whose course grades were below a C (which I defined as a 73%) after each exam and then at the conclusion of the semester. A grade of C was chosen because ACT 101 students must earn a C or better in both Introductory Algebra and Intermediate Algebra to progress to the next level.

The data shown in Table 1 illustrates the grades from the treatment group (SLA section) and control group (non-SLA section) for two sections of Introductory Algebra for the Fall 2009 semester. The table displays the percentage and number of students whose grade was below a C at each of the markers shown. Table 2 shows the same information as Table 1 for students in Intermediate Algebra.

Table 1

Comparison of Student Grades Below a C for SLA and Non-SLA Students in Introductory Algebra

Section	Students Below C After				
	Exam 1	Exam 2	Exam 3	Exam 4	end of semester
SLA	26%	11%	21%	37%	32%
	6/23	2/19	4/19	7/19	6/19
Non-SLA	64%	57%	52%	57%	57%
	14/22	12/21	12/21	12/21	12/21

Table 2

Comparison of Student Grades Below a C for SLA and Non-SLA Students in Intermediate Algebra

Section	Students Below C After				
	Exam 1	Exam 2	Exam 3	Exam 4	end of semester
SLA	23%	35%	40%	55%	55%
	5/22	7/20	7/20	11/20	11/20
Non-SLA	48%	52%	57%	71%	76%
	10/21	11/21	12/21	15/21	16/21

Discussion

Examination of the data in Tables 1 and 2 validates the positive benefits of an out of class support program to assist developmental mathematics students. Although the percentage of students earning below a C increased over the course of the semester in both classes, the students enrolled in the SLA sections of both Introductory Algebra and Intermediate Algebra had fewer students earning below a C as compared to the non-SLA sections of those same classes during the same semester. At the end of the semester for Introductory Algebra, the percentage of students below a C in the SLA section was 25% less than the percentage in the non-SLA section. Likewise, the percentage of students earning below a C in Intermediate Algebra for the SLA section was 21% less than the percentage in the non-SLA section. The data confirms that SLA was helping students to be successful in both Introductory Algebra and Intermediate Algebra.

Increased success has been shown to augment students' confidence in learning mathematics.

Due to the outcomes, SLA was deemed a success and adopted by the department as a student support program for all developmental mathematics classes beginning in the Spring 2010 semester. At that same time, supervision of this academic support program was taken over by the department's Academic Support/Tutorial Director. When SLA was implemented department wide, the demand for the support program grew rapidly. Unfortunately with this demand and associated growth, there were unanticipated challenges, such as space limitations, increased financial need, and increased staffing needs, to name a few. As a result of these resource issues, the SLA model was changed by the department into a "Math Lab" structure to accommodate the increased demand and mitigate resource issues that arose during the Fall 2010 semester.

Conclusion

The inclusion of SLA with Introductory Algebra and Intermediate Algebra at Bloomsburg University of Pennsylvania increased students' attainment of a C or better grade at various points in their progression through the course as well as at the end of the semester. Increased success has been shown to augment students' confidence in learning mathematics (Duranczyk, 2008), and the collaborative learning aspects of SLA may also have assisted in reducing math anxiety (Galbraith & Jones, 2006). Both of these factors can contribute to student success in mathematics and reduced attrition. Overall, findings from our SLA Program show promise for the intervention to enhance student success in mathematics and progression toward degree completion.

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