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Participation in peer-led academic support services: One adaptation of a natural sciences peer learning model to enrichment in the humanities

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Cover Page Footnote

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Stephen Cheng and Susan Johnston

ABSTRACT

Supplemental instruction (SI) has proven highly effective at improving success rates in high-risk first and second-year courses, in part because peer-led SI sessions inculcate best-practice study skills in a specific learning context which provides opportunities for skill mastery. A successful SI program in the Faculty of Science at the University of Regina, Canada, was adapted to support high-risk classes in the Faculty of Arts. A number of challenges around student participation in SI sessions for arts emerged. This paper provides a brief case study of the adaptation and outlines factors which impact student participation in academic support sessions.

INTRODUCTION

While supplemental instruction (SI) has proven highly effective at improving success rates in high-risk first and second-year courses, its primary application has been in natural and laboratory sciences, which in 2006 represented over half of all SI courses (University of Missouri-Kansas City, 2007, p. 10). Yet the increasing availability of tertiary education to non-traditional populations, alongside increasingly flexible cutlines for high school entrance, has meant increasing, and increasingly diverse, challenges in inculcating academic literacy. Can an SI model, whose success in improving performance and retention in science, math, and engineering is well known, support enrichment in the humanities? This was the question a composition instructor posed to a colleague in science whose supplemental instruction program had been making clear strides in improving student scores in first-year STEM courses. What follows describes how we approached the question and what we learned in our attempts to answer it.

BACKGROUND

The SI model of student support first developed at the University of Missouri-Kansas City in the mid-1970s (Martin & Blanc, 1981). In this model, undergraduate students with outstanding academic and communications skills lead peer-assisted, structured study sessions for high-risk first-year courses. SI has repeatedly been found to improve student performance and retention rates in high-risk classes (Blanc, DeBuhr, & Martin, 1983; Congos & Schoeps, 1993; Shaya, Petty, & Petty, 1993; McCarthy, Smuts, & Cosser, 1997; Ramirez, 1997; Ogden, Thompson, Russell, & Simons, 2003).

SI applies evidence-based good practices in teaching and learning. Typically in SI the peer facilitators, called SI leaders, are required to attend all the lectures for the course they are assigned to and then to conduct three weekly SI sessions based on the lecture materials. SI leaders are trained to deliver positive learning experiences using active learning techniques in the SI sessions. At the University of Regina, for example, the SI Leader in Introductory Biology I and II (BIOL 100 and BIOL 110, respectively) uses a Jeopardy game to help students learn the concepts and terminology. In Elementary Statistics for Applications (STAT 100), the SI leader goes over an example together with the students; then, students are given a similar problem to work on by themselves before the answers are shared and discussed. In Organic Chemistry I (CHEM 140), structures of organic compounds are drawn on the board and students are asked to name them. In Calculus I (MATH 110), the SI leader reviews and summarises the lecture and lays out a procedure to solve a problem; then, students work together to solve problems of increasing levels of difficulty. In General Physics I (PHYS 109), students are divided into two groups working on two different problems before each group shows the other group how they came up with the answer.

Such structured and active techniques engage students to spend time on task. Through social interaction students are stimulated to explore, apply, and review what they have learned in lectures, reflecting research which positively correlates practice and review with content and skill mastery, individual performance, group success, and long-term retention (Péladeau, Forget, & Gagné, 2003). At the same time, SI leaders provide immediate feedback to students.

SI's success is linked to such collaborative learning (Martin & Arendale, 1992) and peer-led activities (Saunders and Gibbon, 1998), an approach which has also produced better success rates for minority students than lecture-only pedagogical methods (Katz, 1996; Peters, 2005; Treisman, 1992). Our research sought to apply the Science SI model to perceived high-risk core requirements in the humanities to improve student success and retention in humanities classes.

This paper outlines the original SI program on which we modeled SI for the humanities, details the challenges we encountered in this adaptation, and highlights some of the factors affecting the success of SI programs. In particular, because the efficacy of SI is based on collaborative learning and therefore increases with increased attendance at SI sessions (Packham & Miller, 2000), the paper reports shifting attendance patterns, since these are a significant marker of participation in the collaborative learning model.

Massingham and Herrington (2006) have shown, too, that increased attendance affects class performance: good and satisfactory attendance correlates positively with good and satisfactory participation. Similarly, the National Survey of Student Engagement (2012) interprets working with classmates outside of class and discussing ideas from readings or classes outside of class with others, both part of voluntary SI attendance, as benchmarks of active and collaborative learning.

METHODOLOGY

The attendance data of SI sessions and Academic Advantage sessions were obtained by asking students to sign in voluntarily every time they came to a session. The data were tabulated and analysed after course grades were submitted. When applicable, the attendance data of individual students were compared to their course grade.

Attrition rates for ENGL 100 (Critical Reading and Writing I) were obtained by analysing the course grades of students from the University of Regina main campus and its three federated colleges. Off-campus locations are not included. Deferred examinations have also been excluded.

While students participating in SI were surveyed, as were a group of non-attendees, these surveys did not accurately report or predict student behavior. For example, students who attended only one session nonetheless reported on their survey that they would be very likely to attend another session. Given the inaccuracy of student surveys in this regard, we have concentrated in this paper on the 9% of students who attended five or more SI sessions.

SUPPLEMENTAL INSTRUCTION FOR SCIENCE

From Fall 2008 to Winter 2013, the Faculty of Science at the University of Regina sought to improve retention and student success by offering Supplemental Instruction (SI).¹ The University of Regina is a comprehensive university in Saskatchewan, Canada, with a total undergraduate population of 12,242 as of Fall 2014 (University of Regina, 2014), 21% of whom were in their first term of study. International students make up 13% of the total student population. Approximately 71% of undergraduates, based on the 10 year average enrolment from 2004–2014, are from Saskatchewan high schools (University of Regina, 2014).

SI is offered for most large first year introductory science classes and selected second year classes, especially those perceived by students as challenging or which have high attrition or failure rates. The classic SI model targets high-risk classes rather than students, based on high weekly reading demands, infrequent exams that focus on higher cognitive functions, unrecorded attendance, and large classes where interaction with peers and with instructors is minimal (Arendale, 1994).

In SI, attendance is voluntary and therefore a good marker of participation. SI attendance in science at the University of Regina has been good for most classes, but as the attendance table for SI in Fall 2011 (Table 1) illustrates, a number of factors are at work. BIOC 220 (Biochemistry I – Biomolecules), which is often perceived as very challenging (Peters, 2005), has high attendance: 51% of students enrolled in BIOC 220 in Fall 2011 attended at least three sessions. Note also that organic chemistry (CHEM 140), again perceived as a more challenging class (Katz, 1996; Szu et. al., 2011), had 30% of students attending three or more sessions, as opposed to 20% in the general chemistry class (CHEM 104). Interestingly, though BIOC 220 is perceived as very challenging and has a very high SI attendance, the failure

¹ The program was cancelled in Fall 2013 due to funding cuts in the Faculty of Science and partially restored in the 2014 Winter semester.

rate of the class is very low. However, because the course features weekly assignments and two mid-terms, SI attendance seems focused on the immediate relevance of problem-solving tasks. For science classes required by both engineering and science students, such as PHYS 109 (General Physics I), attendance of the non-engineering section is higher than for the engineering section—compare the 14% attending at least three sessions for PHYS 109's non-engineering section with the 5% attending the same number for the Engineering section (Table 1). In the non-engineering section, more than 80% of the students are science students. In the engineering section, more than 90% are engineering students. While there were three arts students in the non-engineering group who attended three or more SI sessions, one was being transferred to engineering and one was a former engineering student. The comparative engineering and non-engineering attendance figures are within 1% of the attendance figures for PHYS 109's non-engineering and engineering sections in Fall 2010 (not included). We surmise that attending SI has become part of undergraduate culture for science students but not for engineering students.

By far the lowest attendance in Fall 2011 was in Geology SI (GEOL 102), with 7% of enrolled students attending three or more sessions and only 2% attending five or more. Table 2 outlines the historical attendance patterns for SI in GEOL 102 and shows that attendance of these SI sessions has always been poor, even when the instructor and the SI leader regularly advised students to attend. Notably, the four semesters recorded in Table 2 involved different combinations of instructors and SI leaders, so at least in this case poor attendance is unlikely to be due to staffing or the personalities of the SI leaders. However, unlike other SI courses that have weekly assignments or two mid-terms (e.g., BIOL 100 and BIOL 101), GEOL 102 has only one midterm exam with no weekly assignments. There is a strong positive correlation between SI attendance and frequency of evaluation in the supported classes.

Observations of these attendance patterns indicate that participation in SI for science depends on the perception of the difficulty of the class, the evaluation structure of the course, and the learning culture of the students.

Table 1
Fall 2011 Science SI attendance data

Course	Enrolment	SI attendance (No. students)			SI attendance (%)	
		≥ 1 sessions	≥ 3 sessions	≥ 5 sessions	≥ 3 sessions	≥ 5 sessions
BIOC 220	109	95	56	33	51	30
BIOL 100	353	239	99	42	28	12
CHEM 104-001	284	129	27	19	10	7
CHEM 104-002/003	290	179	58	43	20	15
CHEM 140	119	88	36	18	30	15
CS 110-001/002	223	82	29	18	13	8
GEOL 102	234	72	16	5	7	2
MATH 103-001	111	58	16	8	14	7
MATH 110-001	91	30	19	13	21	14
MATH 110-002/003	237	129	39	16	16	7
MATH 122	199	111	72	55	36	28
PHYS 109 (Engineering)	178	56	9	6	5	3
PHYS 109 (Non-engineering)	190	55	27	20	14	11
STAT 100-001	153	93	49	20	32	13
STAT 160-001	126	65	30	20	24	16

Table 2
GEOL 102: Historical SI Attendance Patterns

Course	Enrolment	SI attendance (No. students)			SI attendance (%)	
		≥ 1 sessions	≥ 3 sessions	≥ 5 sessions	≥ 3 sessions	≥ 5 sessions
Winter 2009	123	50	21	14	17	3
Winter 2010	150	50	7	3	5	2
Fall 2011	234	72	16	5	7	2
Winter 2012	148	66	14	9	9	6

INCREASING CHALLENGES IN FIRST-YEAR ENGLISH

In the summer of 2009, we discussed and sought a successful student support model to improve outcomes in Critical Reading and Writing I (ENGL 100), the University of Regina's required first-year literature and composition class. ENGL 100 is required for graduation in all degree programs and therefore is a crucial gateway course. With a total attrition rate ranging from 15% to over 25%, including failure, no paper, and withdrawal (see Figure 1), ENGL 100 is a critical site for student success and retention initiatives.

The data in Figure 1 include the main University of Regina campus and its three federated colleges; off campus locations are not included. Deferred exams have also been excluded. Note that success rates are much higher in Fall semester courses than in Winter semesters; Winter sections of ENGL 100 typically include higher numbers of at-risk students and those who have failed ENGL 100 at least once.

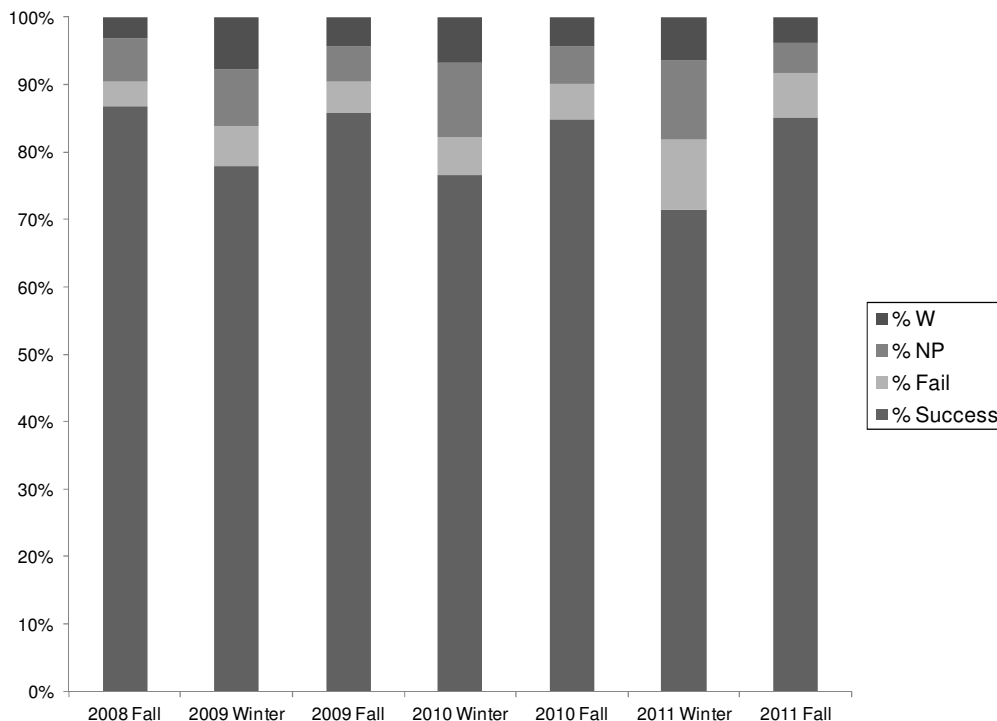


Figure 1. English 100 Attrition Rate from Fall 2008 to Fall 2011 (W = Withdrawn, NP = No Papered; that is, the student failed to complete a required element of the class).

ENGL 100 devotes one-third of its time to composition and academic writing and the other two-thirds to critical reading and interpretation through a variety of literary and non-literary genres. Notably, ENGL 100 is not conceived as remedial, nor even as developmental, but as building academic literacies for a variety of already-proficient learners.

While Canada as a whole, and Saskatchewan as well, continues to perform at or above OECD averages in literacy measures, assessments of writing and reading achievement in the province over the past decade point to a declining number of students who are proficient rather than merely sufficient as

writers and readers. While there is no national or international comparative data on Saskatchewan high school writing achievement since 2002, it's worth noting that according to the Ministry of Education, the provincial Assessment For Learning (AFL) 2008 rated 34% of Grade 11 students proficient in quality of writing product (Government of Saskatchewan, 2008), while 29% achieved the same standard in 2010 (Government of Saskatchewan, 2010).

Comparative reading outcome data is more readily available. In 2007, the Pan-Canadian Assessment Program found the number of Saskatchewan 13-year-olds achieving proficiency in reading to be 9%, rather than the 22% which is the average nationwide (Government of Saskatchewan, 2009). Yet between 25-30% of these students will go on to university. While it remains possible that these students will catch up in high school, if the trend continues we can expect that fewer than half of high school or sequential admits will be reading at the highest level by the time they reach university. Nor does this take into account the diversity of reading skills in mature and additional language learners. These challenges are compounded by the divergent aims of the secondary and post-secondary curriculum: the Saskatchewan English Language Arts curriculum mandates that 50% of instruction and assessment through elementary and high school be devoted to reading and writing, with 25% allocated to speaking and listening and the final quarter to viewing and representing; that is, to recognizing and creating "appropriate nonverbal aids and visual images" (Government of Saskatchewan, 1999, p. 19). In ENGL 100, however, between 80% and 90% of instruction and assessment in each section is devoted to reading and writing.

Significantly, ENGL 100 assumes proficient extensive readers and writers who are being inculcated into university level argument and interpretation skills; that is, into intensive reading. What these assessments suggest, however, is that the 39 instructional hours of a three-credit introductory class in critical reading and writing may be insufficient to develop the requisite proficiency the course assumes in its students. In other words, despite the English Department's conception of ENGL 100 as non-developmental, there is increasing evidence that over half of its students are, in fact, developmental readers and writers who struggle with college-level reading and writing requirements.

Nor is this challenge unique to the University of Regina. In America, the National Endowment for the Arts recently noted that reading test scores for seventeen-year-olds have been trending gradually downwards since 1992, with the rate of decline speeding up as we enter the 21st century and the Web 2.0 generation (Gioia, 2007, p. 12). In the United Kingdom, an independent Committee of Inquiry found significant deficits in the search, retrieval, evaluation, and attribution skills of new digital learners (Hughes, 2009, p. 6) but also endorsed the view of the Leitch Review that the country's skill base would need to double over fifteen years in order for the U.K. to compete in a global economy (Hughes 2009, p. 18; Leitch, 2006, pp. 32-33). Indeed, the challenges we are encountering in building academic literacies in a diverse student population are shared by many relatively open-access post-secondary institutions. Thus, the question of appropriate supports is a pressing and broad-based one.

ADAPTING SUPPLEMENTAL INSTRUCTION TO THE FACULTY OF ARTS

In the discussion about the successful science SI program, one of the authors (SC) noted that the SI model was designed for large classes with emphasis on problem solving and critical thinking. Literature and writing classes require more individual attention, particularly in grading papers. In addition, sections are capped at 35 or 40 students. With approximately 40 sections each in the Fall semester, it's neither financially practical to have 40 SI leaders, nor can the university infrastructure provide the required meeting spaces.

Despite some successes in transferring the SI model to first-year composition classes (Hafer, 2001; Ochse, 1995) and to the humanities (Zerger, 1994), or at least some elements of it (McMillan, 1983), the literature provides few examples of the successful use of SI to support a large number of small sections. Such a model does not lend itself to empirical validation because it presents so many statistical variables. Yet these classes continue to pose particular challenges for an open-access institution, both in high rates of non-completion and in the provision of lateral student support to diverse student audiences, including foreign students, mature admissions students, and those Saskatchewan students whose reading and writing challenges were noted above. Most significant is the need to adapt a program developed to provide small-group, peer-led support for large lecture classes with common content to multiple sections whose shared outcomes are defined in terms of skills rather than content.

Thus, rather than supporting many individual classes with different instructors, we decided to focus on interdisciplinary learning and writing skills (in other words, general skills that are transferable) using the student-led SI concept, resulting in the birth of Arts Academic Advantage.

When Arts Academic Advantage was first started in Fall 2009, a total of six 2-hour sessions were offered every two weeks focusing on reading strategies, note-taking, writing papers, effective research and citation strategies, critical thinking, and exam writing skills. Attendance was good for the first two sessions (Figure 2).

Because Arts Academic Advantage was not linked to a particular class, as SI for science was, it is not useful to report results in a table, since there is no percentage that can be obtained for number of attendees per class. Moreover, attendance overall was too low for any conclusion to be drawn about the effectiveness of the program. However, the graph (Figure 2) does show the trend in times attending.

The first session focused on classroom cultures—lectures, discussion, and small group work—emphasising active learning strategies in each mode. The second session focused on writing essays. Attendance then dropped but recovered in session 6 (weeks 11–12 of semester), which was about exam writing. It is interesting to notice that attendance dropped during mid-term and exam period rather than increasing as seemed to be the case in SI for science. The drop in attendance may have been due to students focusing on assignments and midterms rather than lateral academic support and because the sessions are not attached to a particular course, they are not seen as immediately relevant to the more pressing evaluative tasks at hand.

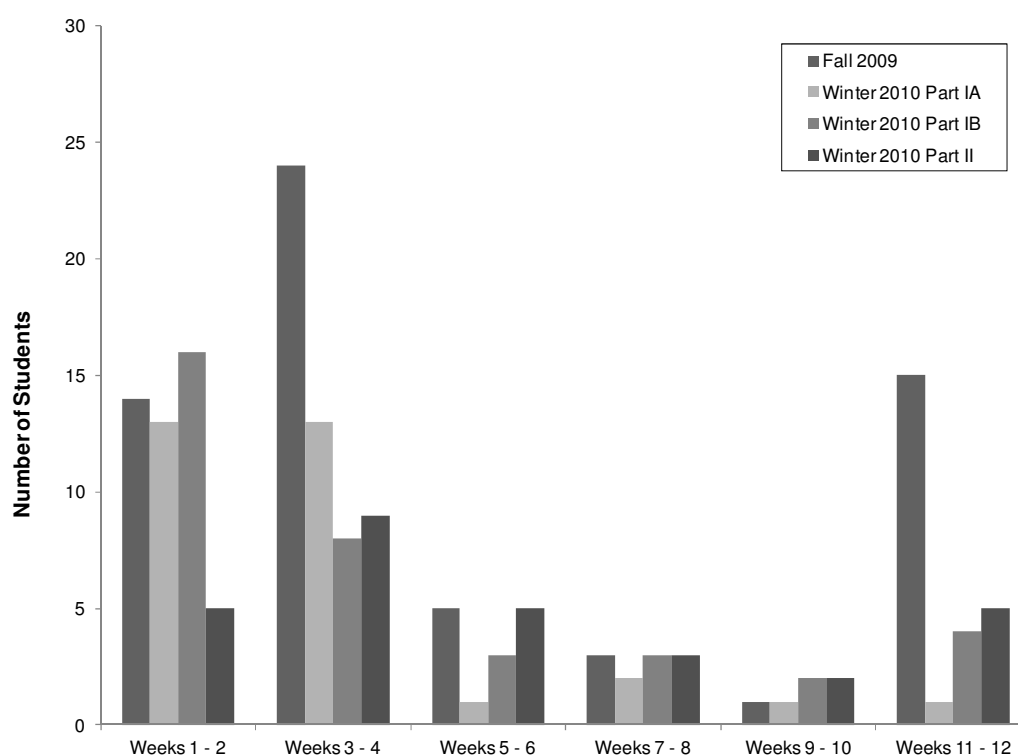


Figure 2. Arts Academic Advantage Attendance

DISCUSSION: INSIGHTS FROM ARTS ACADEMIC ADVANTAGE

As the program was implemented, a number of challenges emerged, particularly in finding space at the desired time and promoting the service. To help solve the space problem as well as to provide administrative and publicity support of the program, the Arts Academic Advantage program was renamed Academic Advantage and the program was attached to the Student Success Centre in Fall 2010. The program was also expanded to 12 sessions including more sessions on essay writing, a critical thinking session for the core Logic class (PHIL 150), and an extra session on midterm writing. Attendance was good in the first few sessions and then it tailed off because students were busy with classes and they didn't have time to attend. Many part-time, adult, and commuter students will not attend support activities that are scheduled late in the day, after their classes are over (Stevens, 2000, p. 78). Research shows that commuter students are less likely than their non-commuting peers to participate in campus activities they regard as irrelevant to their studies (Glass & Hodgins, 1977, p. 254). This research supports our surmise that the low attendance is mainly due to the fact that the program was not attached to a class (Hodges & White, 2003). Based on what we have learned, we developed the following hypotheses:

1. Students are more likely to use academic support services for historically challenging courses, especially when the service is attached to the course.

2. Students in classes with frequent evaluations are more likely to use academic support services.
3. SI works best for disciplines involving problem solving and critical thinking.
4. Science students are more likely to use SI than arts students because they are more used to group work and collaboration.

REVISION OF PILOT PROGRAM

To test our hypotheses we decided to choose the largest section of a philosophy course (PHIL 150). We selected this course because it is essentially a logic class rather than a historical overview or ethics class, requires problem solving and critical thinking skills, is characterised by regular problem-based assignments, is seen as historically challenging, and is regularly taken by arts and science students, forming part of the core curriculum in the Faculty of Arts. Students are evaluated by three midterms and a final exam plus regular ungraded assignments.

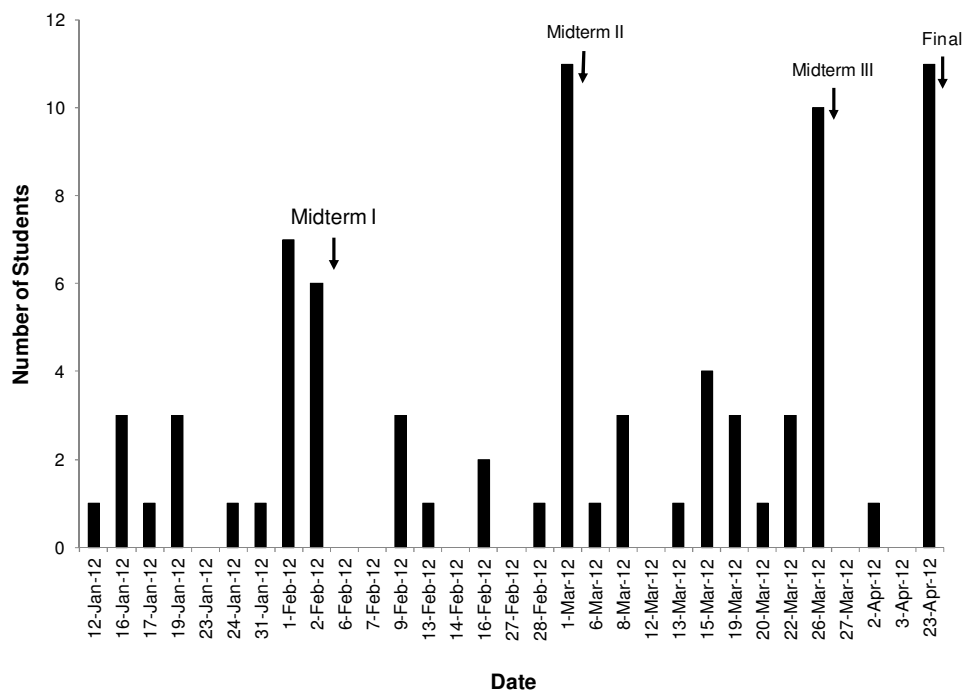


Figure 3. SI Attendance for PHIL 150-C01

Total enrolment in the experimental section was 67. Of these, four withdrew (W) from the class after the last date for dropping or adding classes and seven “no-papered” (NP; that is, the student failed to complete a required element of the class). No member of the W group or the NP group attended any SI sessions. Reviewing the attendance statistics (Figure 3), we see that attendance was good right before the exams but no students attended immediately following the first midterm. Students did very well on the first midterm, which seemed to reduce attendance at subsequent SI sections. What is most striking is that 8 out of 63 students attended at least three sessions, which is 12.7% of the total course population. Of these students, six were arts students, one was a business student, and one was a fine arts

student. Of the six arts students, only two majored in disciplines which stress collaboration and group work, in this case, psychology. None of the 12 science students regularly attended the PHIL 150 SI sessions, though we later found that some of these students had regularly attended SI sessions for science classes in the same semester they were taking PHIL 150. We infer that science students don't perceive the class as challenging. In fact, 6 of the 12 science students received grades of 90 or above.

CONCLUSIONS AND FUTURE WORK

The pilot project of having SI for an Arts course taken by both arts and science students has offered important insights for our hypotheses. Academic support services are more effective for classes that are perceived as historically challenging and students are more likely to attend when they perceive particular challenges, such as upcoming exams. They are used more often by students when attached to a class. When more than one of their classes in a particular semester is supported by SI, students will attend SI for the class they see as most challenging.

Our early hypothesis that science students are more likely to use SI than arts students is not valid. It does not seem like there is a correlation between SI attendance and a particular discipline. While SI-style academic support services could work for students in all disciplines and faculties, students in classes with weekly assignments or frequent tests are far more likely to use student support services.

To better support our preliminary results and hypotheses, future work will be performed by offering SI sessions in other disciplines and faculties. For example, accounting courses are known to be historically challenging and require a high level of problem-solving skills. By learning the behavior of students from different disciplines and faculties, we will be able to offer better academic support services.

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