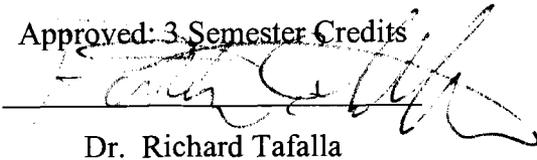


An Evaluation of Access to Learning Fee Program:
Supplemental Instruction

by
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A handwritten signature in black ink, appearing to read "Richard Tafalla", is written over a horizontal line.

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ABSTRACT

In 1999, the students of University of Wisconsin - Stout voted for the Access to Learning Fee, which is a budget funded by student fees to improve the learning environment. Through increasing the operating hours of laboratories, providing tutoring, Supplemental Instruction (SI), childcare, and graduate assistantships, the concerned collective of the UW-Stout administration believe that attrition of undergraduates will be reduced and students overall learning experience will be improved. The SI program was implemented to target Math-120, Computer Science-142, and Computer Science-144 courses that are considered to be very difficult for and contribute to attrition of students. It is a peer-lead tutoring program that offers students assistance outside of class lectures. This program was evaluated by assessing archival data such as students' grades, frequency of sessions attended, and program satisfaction survey data. The author hypothesized that students who attend at least one SI session receive higher final grades in the course than those who do not attend any SI sessions. The findings reveal to us that students who attend SI sessions have higher grades compared to those who did not attend any SI sessions. Qualitative findings also suggest that students are highly satisfied with the program and its leaders.

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Chapter I - Supplemental Instruction: A Process Evaluation

Students at the freshman and sophomore levels are more likely to fail their courses during those first two years than later in college (Bank, Biddie, & Slavings, 1990; Dodge, 1991; Fidler, 1991; Tinto, 1993). A partial review of the literature indicates that the causes of attrition vary, and the strategies designed to reduce it produce different results at different institutions (Astin, 1975; Tinto, 1987, 1993; Upcraft & Gardner, 1989; Youn, 1992). Consequently, colleges may want to conduct more of their own research because institutional data should allow administrators and faculty to develop a better understanding of the problem within the culture of their own organization. In this way, the data can be used to design a comprehensive retention plan with appropriate interventions.

Statement of the Problem

In 1999 the Stout Student Association of UW-Stout voted a self-tax budget labeled “Access to Learning Fee”, which would be used to fund five programs, all aiming at providing optimal learning conditions for students, and preventing or reducing the attrition among undergraduates, especially freshmen and sophomores. While also, attempting to increase the grade point average of students in target courses contributing to attrition and academic difficulty for students. Those programs are: tutoring services, graduate assistantships, child-care services, upkeep of laboratories on campus, and Supplemental Instruction (SI) to the UW-Stout Students.

Purpose of the Study

The Budget Planning and Analysis (BPA) department of UW-Stout is committed to annually evaluating the effectiveness of the Access to Learning Fee, by assessing all programs annually evaluating the effectiveness of the Access to Learning Fee, by assessing all programs funded, individually. In effort to investigate areas for improvement as well as the strengths of the Supplemental Instruction (SI) program, the BPA utilized archival data including grades and End-of-Term SI Satisfaction survey results.

Assumptions of the Study

The researchers have few assumptions. First, those students who attend the SI sessions do so because they need the help. Second, students, who expect to fail the course, do so and attend no more than two SI sessions.

Definition of Terms

Supplemental Instruction Program – Program, which provides students with *SI leaders*, in order to provide assistance outside of course lectures so the students may perform at an average level or better (C or better).

SI Coordinator – The SI Coordinator is a trained professional who is responsible for identifying the targeted courses, gaining faculty support, selecting and training SI leaders, and evaluating the program.

Supplemental Instruction leaders – The SI leaders are students who have been deemed course competent, approved by the course instructor, and trained in proactive learning and study strategies.

Access to Learning – The Stout Student Association voted to add Access to Learning fee as part of their tuition charges, or in simpler terms self-tax. The Access to Learning funds are used to fund five different programs in effort to provide students with optimal learning conditions. The programs include supplemental instruction, tutoring services, child-care, graduate assistantships, and extended hours, assistants as well as up-keep of equipment in campus laboratories.

Limitations

Also, variables such the number of students who withdrew from the course would have been instrumental in comparing SI-attendees versus non-SI-attendees.

Methodology

Quantitative and qualitative archival data were used to provide a descriptive overview and landscape of the data. Also, inferential analyses were used to describe the correlation between: frequency of SI sessions attended and outcome measures, course grades.

An SI satisfaction survey was administered to the students to assess if, or if not, they plan to attend SI sessions for the following semester. For example: if so, how many hours per week, and if not, why not. The survey was a combination of quantitative and qualitative measures. Also, the students were provided to make any comments about the SI program itself, SI sessions, or the SI Leaders, or even express any interests to serve on the SI program.

The SI program facilitator designed the survey, and the data were used from the collection in Fall 2004, following after which the survey was reviewed and updated by the BPA researchers, including myself.

Chapter II - Relevant Literature Review

Some of the greatest philosophers beginning with Socrates, Plato, Aristotle, Francis Bacon, Rene Descartes, John Locke, Voltaire, Jean Jacques Rousseau, Adam Smith, Immanuel Kant, Karl Marx, Friedrich Nietzsche, and so on, continue to influence education around the world still today. “Plants are shaped by cultivation and men by education... we are born weak, we need strength; we are born totally un-provided for, we need aid; we are born stupid, we need judgment. Everything we do not have at our birth and which we need when we are grown is given to us by education. “(Jean Jacques Rousseau, “Emile”, 1762). Education gives us choices. Choice gives us power. Without education there is no power.

As a concrete example we can all relate to is thinking critically while solving an abstract problem. This is truly more of a learned skill than inborn ability. To recognize a problem and find the right solution for it, would mean that one has to have a pretty thorough understanding of options available or to be made available. The power to learn new information such as the multiplication table or alphabet, physics or music, depends on the learner’s ability, previous knowledge, skills, etc., but also on how well the teacher relays information. There have been studies concerning education; ways to improve teaching, advanced theories in how to measure abilities to learn, advanced technologies in teaching mentally or physically impaired persons, optimal age for learning the alphabet or numbers, multi-linguistics, continuing education, etc. The complex paradigms, which philosophers and other social scientists have developed, help us understand and therefore how to measure and improve learning and teaching.

We can agree that humans are born ignorant to the basic things that one learns through life and education. In 1690, the 17th Century philosopher, John Locke, explains in his published *Essay Concerning Human Understanding*, the human mind is a *Tabula Rasa*, or blank slate, at birth, and knowledge is derived through experience, rather than innate ideas as was believed by many at that time. According to Locke, from infancy onwards, the child's efforts toward power in possessions and over others should be thoroughly frustrated. As strange as this may sound, the result will be that habits of self-centered, aggressive behavior, and of preferring ignorance to learning, will not become established. Those efforts are directed by those that take the time to show us things that we are not aware of, encourage or discourage certain behaviors, and challenge us to learn new things of any nature at a growing pace. The most expensive price

humans face from birth is ignorance. The idea that the human mind at birth is a blank slate is almost the equivalent of lacking all of the five main senses at birth that humans need in order to survive on their own, and with increasing familiarity with the environment gaining these necessary senses.

Although people differ with abilities and skills to learn new things or master certain things, with constant learning, anyone may understand the subject matter better and even find enjoyment in the process of learning. As the saying goes: "Practice makes perfect!" so academic education alone is not sufficient. Moreover, class lectures alone are not sufficient. One's skills such as problem-solving, deductive-reasoning, critical-thinking, abstract-thinking, time-management, etc., are taught through education and applied experience at best. Education versus experience is a comparison synonymous with learning to speak a new language from lectures, books, tapes, tests, etc., versus actual communication. One to one communication on some level is vital not only in pre-kindergarten but all academic levels.

Effectiveness of formal academic education beginning in pre-kindergarten to college or onward, depends highly on how well a student truly understands the core of each subject and what the student takes away from the experience. Many factors play a role in how satisfied the student is with the course, the instructor's style of teaching, pace of speaking, materials assigned, tasks assigned, challenges in tests and everything that makes up a curriculum. Additionally, what is more important, the student's ability and interests, previous education, and other factors play important roles in not only the performance of the student, furthermore on attrition of poor-performing students. However, if the student is enjoying the learning experience, then speaking the language will come almost naturally in sorting through errors by practicing.

The enjoyment of learning new things is an innate human instinct. In 1943, Abraham H. Maslow proposed in his paper "A Theory of Human Motivation" known as the *Hierarchy of Needs*. This piece of work points out that as humans meet their 'basic needs', they seek to continually satisfy 'higher needs' that occupy a set hierarchy. The hierarchy includes the following five main categories, beginning with most necessary needs to be met: Physiological (food), Safety (shelter), Love/Belonging, Esteem, and Self-Actualization. The theory assumes that growth forces create upward movement in the hierarchy, whereas regressive forces push proponent needs further down the hierarchy. For example, if one does not have self-esteem, they

are not able to reach self-actualization, and so forth. Self-actualization stands for the instinctual need of a human to make the most of their unique abilities, through education and experience. One may safely assume Self-Actualization is reached through experience and education.

The purposes of education are multiple and interwoven. While in the United States education is mandatory for those up until the age of 18, many choose to further their knowledge by pursuing college education or beyond, as a means of successfully completing the Hierarchy of Needs. Those purposes change with age, the environment, and the peculiarities of individual students so that even within a specific classroom the primary purpose of schooling for this child may be one thing and the primary purpose for that child may be yet another. In the case of any given child, the parents' purposes for sending the child to school may differ significantly from the purposes of the educational agency requiring the child's presence. For all parties involved, the purposes of education change significantly with time. Kindergarten has a unique set of priorities for everyone engaged in the educational process. The nature of those priorities change significantly by middle school, are additionally altered in high school, and are further renovated in the college setting.

As children develop into adults, they desire to take on various roles in society. However, as we develop emotionally, mentally, and physically, we vary in our abilities and interests to learn and what we learn. As our experiences vary throughout K-12 years of education, we become prepared for college or the real-world of work variously. As the Tabula Rasa of the human mind state is changed with experience and education, hierarchies of needs and individual unique abilities vary greatly for most of us.

Academic institutions constantly show us that natural and physical sciences tend to be problematic for students. Although, a wide range selection of various areas in science are required as part of the college curriculum, most students prefer some courses over others based on knowledge, abilities, experiences and simple personal preference. Ultimately, one of the main reasons for individuals pursuing Higher Education (Associate's Degree or higher) is to have income stability and higher pay than non-college graduates. As for Higher Education institutions, some of the main concerns are to recruit and retain their students, by providing core courses needed in the real world of work and means to help students absorb the materials taught. To be successful in the world of work, one has to have a thorough understanding of the

discipline, receiving the knowledge and skills through experience and/or education. Education refers to traditional learning by attending class lectures, and experience refers to hands-on problem-solving (in or outside of class).

Most universities and colleges around the U.S. have some kind of alternative form of teaching in addition to classroom lectures, in order to enhance the students' academic progress and success. While certain core courses are mandatory, students continue to face difficulties with certain core science courses. A student may progress from one college level to another by receiving at least a final evaluation grade of average (C) or better overall. As established earlier, as students pursue college degrees, they are not equally qualified for the same courses. Therefore, some academic institutions have installed structures in place to help students outside of lectures in order to perform at average level or better (GPA equal to or greater than C) in the course.

Considering that the disproportion of the number of students per teacher tends to be great and inevitable in undergraduate classrooms (depending on the size of the institution), freshmen face the highest risk of dropping out of college for many reasons (Blanc, DeBuhr, & Martin, 1983), including the lack of one-to-one communication, lack of in-class interactivity during most lectures, new environment, as will be discussed below. So, if no other alternative form of teaching in addition to lectures is available (such as tutoring, supplemental instruction, study groups, etc), the students are by default at a higher risk of performing poorly if not withdraw from the course or semester.

Particular pressure points in a student's life are the period of transition to Higher Education (Fisher, 1994). Such as the new social environment, more school related expenses (books, room and board, etc), the first exam, first-final exam, first homework due date, first project due, traditionally first time living away from parents/guardians, etc. The adjustment period truly lasts throughout the whole college experience. So it is a period of adjustment not only for freshman but as well as the sophomores and upperclassmen, all with similar yet separate concerns. Take seniors for example, they have to make the decision of continuing Higher Education or joining the workforce, while still attending classes and preparing for exams. Other pressure points for some students are participation in community oriented activities, while some even work on the weekends, or are full-time employees. In addition, some are parents with

responsibilities other than attending classes and studying for exams, and/or working. Therefore, while providing academic support systems for students, such as tutoring services, and supplemental instruction, it is not only a “nice” thing to offer students, but it is a necessity and the institution’s responsibility to ensure that the mission to educate does just that. Students who feel intimidated by the course work, are more willing to try and learn the material, rather than stop attending class or doing homework, reading, etc, as long as they get help outside of class (Grant, 2002).

Overview of Supplemental Instruction

Supplemental Instruction (SI) is an academic assistance program that utilizes peer-assisted study sessions. SI sessions are regularly-scheduled, informal review sessions in which students compare notes, discuss readings, develop organizational tools, and predict test items. Students learn how to integrate course content and study skills while working together. The main purposes of Supplemental Instruction are to reduce rates of attrition within targeted historically difficult courses, to improve student grades in those courses, and to increase graduation rates of students. The SI model involves key persons: the SI Coordinator, SI leaders, students and faculty members.

SI is attached to specific historically difficult courses. These courses frequently are introductory but also include upper level undergraduate courses and courses in professional schools. SI leaders attend course lectures, take notes, read all assigned materials, and conduct three to five out-of-class SI sessions a week (depending on the resources available). The SI leader is the "model student," a facilitator who helps students integrate course content and learning/study strategies.

Brief History of Supplemental Instruction and previous evaluations

SI was created by Deanna C. Martin, Ph.D., at the University of Missouri-Kansas City in 1973. Dr. Martin was assigned the task of decreasing the attrition rate of minority students in the schools of medicine, pharmacy, and dentistry, and was given a grant of \$7,000 with which to do so. After initially offering SI at the health science professional schools, it was extended throughout the university. For a more complete history of the program, see:

Widmar, G. E. (1994). Supplemental Instruction: From small beginnings to a national program. In D. C. Martin & Arendale, D. R. (Eds.), *Supplemental Instruction: Increasing achievement and retention* (pp. 3-10). San Francisco, CA: Jossey-Bass.

After a rigorous review process in 1981, the SI Program became one of the few postsecondary programs to be designated by the U.S. Department of Education as an Exemplary Educational Program. The National Diffusion Network (NDN), the national dissemination agency for the U.S. Department of Education provided federal funds for dissemination of SI. Although the NDN was discontinued by the U.S. Government, national and international dissemination continues. Faculty and staff from hundreds of institutions across the nation have received training to implement their own SI programs. Outside the United States, SI operates in Australia, Canada, Denmark, Egypt, Malaysia, Marshall Islands, Mexico, New Zealand, Puerto Rico, South Africa, Sweden, United Kingdom, and the West Indies. Supplemental Instruction programs and other programs have been evaluated and modified based on the institution's needs and concerns; hence we can assume that depending on the culture of the organization, the results will be different as well. For example, Nancy Fjortoft et al. evaluated a Supplemental Instruction program at a College of Pharmacy in 1993, and found that regular attendance was significantly, positively related to final grades for minority students only. Students perceived any attendance as beneficial.

Another interesting study performed in 1987 by Hawthorne and Hawthorne examined Supplemental Instruction through a path analysis. The analysis studied: 1) the effect of factors affecting SI participation, such as high school rank, marital status, semester load, and expected grade; and 2) the effects of SI participation on course grade, semester grade point average, and re-enrollment. SI participation had significant direct effects on course grade, semester GPA, and reenrollment. A comprehensive report (Arendale & Martin, 1997) discusses the meta-analysis of SI research from 270 institutions from across the U.S. The analysis reviewed 4,945 research studies of 505,738 college students between 1982-83 and 1995-96. Regardless of institutional type or academic discipline, SI participants in comparison with non-participants receive mean final course grades that are higher (2.42 vs. 2.09), higher rates of A or B final course grades (46.8% vs. 35.9%), and mean percentages of D, F and withdrawal rates that are lower (23.1% vs.

37.1%). Also, the report reviews a national study of 13 institutions and 2,410 students, where the question of helpfulness of SI for students of color was examined. The study found that students of color participated in SI at rates equal or exceeding those of White students (White, 33.8%; African American, 42.0%; Latino, 50.9%; Asian/Pacific, 33.3%; and Native American, 42.9%). Students of color received higher grades than similar students (2.02 final course grade vs. 1.55, rate of 36% for D, F, or W vs. 43% for non-SI participants).

Visor et al. (1995) sought to determine whether positive change in certain affective variables was associated with participation in Supplemental Instruction (SI): locus of control, the feeling of being in charge of one's own destiny; self-efficacy, beliefs about one's ability to succeed at a given task; and self-esteem. Students from an introductory psychology course at Illinois State University (Normal, IL) were studied in Fall of 1994. Students were divided into three categories of participation: regular participants (4 or more times during the term); occasional participants (1 to 3 times); and non-participants. The results share with us that among freshmen, regular participants tended to have (a) higher self-esteem than non-participants, (b) greater self-efficacy than non-participants, and (c) greater internal locus of control than non-participants and occasional participants. However, because of difference in the studies provided, concentrations and degrees that students pursue, different demographics (male versus female; ratio of foreign language-speaking students, and so on), the results at UW-Stout may be different from other universities, for other reasons also, such as student perception of the professor, pre-college preparedness of students, admission requirements for the program, the literal effort the professor himself/herself puts in teaching and monitoring learning, different demands of the teacher, etc.

Demographics play a large role in the institution in which attrition may be high or simply a concern. The SI program is not available for Graduate courses so the data pertaining to Graduate students are not available. Some facts about UW-Stout:

- In 2005, there were 7,337 Undergraduate students, and 130 Undergraduate Continuing Education\Study Abroad Students reaching a total of 7,467 Undergraduate students.
- Among the Undergraduate students 51% were female. Only 6% of all students (Undergraduate and Graduate) are of ethnicities other than Caucasian, including: American Indian, African American, Asian American, Hispanic American, and International.

The Supplemental Instruction program should be available for students to use as needed. The evaluation of the SI using Fall 2004 data is the first evaluation performed at UW-Stout since its inception. The target should be customized for the population. With respect to the SI Program, attrition of freshmen was initially the main concern at UW-Stout. It is easier for the students to transition to college and post-college while having available programs such as tutoring, SI, even if the students who attend do not necessarily have significantly higher grade point averages than those who do not attend at all. As was mentioned earlier, those who do not attend the program, other than not being able to fit SI in their schedules, they may very well choose to not attend SI because they realize that receiving an average (passing) grade will not require for them to do extra work such as attending SI sessions.

Chapter III - Methodology

Subject Selection and Description

Students, who were enrolled in the courses providing SI, were classified as either SI attendees (attended at least one SI session) or non-SI attendees (did not attend any SI sessions). The students were enrolled in the Fall 2004 semester in Math-120, CS-142, and/or CS-144, reaching a total of about 400 students. A total of 185 students were enrolled in CS-144, 142 students enrolled in CS-142, and about 122 students enrolled in Math-120. The archival records such as the students' grades were collected and monitored by the course instructor and SI leader. Number of SI sessions attended by students were measured by the SI Leaders. Also, at the end of the semester, all students in question were asked to fill out the "End-of-Term Survey Satisfaction Survey".

Data Collection Procedures

The students' grades along with the number of SI sessions attended were collected by the course instructors and the assigned SI leaders throughout the semester. The survey aimed to assess students' overall opinion of the SI sessions, leaders, and program. In addition, the non-SI attendees were asked to share potential reasons why they did not attend any SI sessions. SI coordinator was contacted for all data and records with respect to the evaluation of the SI program.

Data Analysis

A number of statistical analyses were used in this study. The Statistical Program for Social Sciences, version 12.0, (SPSS, 2004) was utilized for analysis. Descriptive statistics were analyzed to measure the means (averages) of the data. Independent Groups T-Test analyses were conducted to compare the groups of students who attended SI sessions versus students who did not attend at all. Also, within group T-tests were performed to measure the difference in grades between students who did not attend any SI sessions, learners who attended only one session, two sessions, 3-14, 27-35, and 36-46 SI sessions (see Appendix A). Also, a distribution of frequency and percent of the SI attendees' and non-attendees' survey results was populated (see Appendix B). In this survey, students were also asked to write any comments or suggestions they had about the SI program, leader or sessions (see Appendix F). However, due to the nature of the question and comments, the author did not include them in the report for confidentiality purposes. A more

in-depth evaluation provided by Appendix B results helped the researchers better understand and control for variables such as expected final grade for the course, to avoid making inaccurate conclusions. The survey results are discussed in more detail under the *Results* and *Discussion* sections of this report.

Limitations

Limitations of the study were due to inconsistent data collection. For example: some professors reported individual raw scores for tests, and other assignments, including final grades; while others reported actual final percentage grades for the . Another example of inconsistency is that some instructors kept count of SI sessions pre- and post- each test or quiz, while others only reported the total number of SI sessions attended. Other limitations are the length in time and data which we had to work with. The data available for evaluating the outcomes of SI program were from the Fall semester 2004. In order to keep a clear outlook on the general effectiveness of the SI program, there should be a structured way of keeping track specific information throughout the courses which utilize the SI program. But also, the study might show different results from the data of the spring semester of 2005. However, if there is a strategy in place for data management and collection, the limitation would shrink, by allowing for the results to paint a clearer picture with regards to the effectiveness of the program, satisfaction with the SI leaders, etc.

Summary

The goal of this research study was to evaluate the effectiveness of the Supplemental Instruction program. The SI program is funded by the Access to Learning budget every semester. This program provides alternative help to students who need assistance with their coursework outside of lectures. The University of Wisconsin-Stout is committed to evaluating and improving programs, to ensure these programs are effective, the students are being helped and the learning environment and general quality of the services provided to students are under optimal conditions. Records such as number of SI sessions attended, test grades, quiz or project grades, were kept by the course instructor and the SI leaders. The researchers believe that the number of Supplemental Instruction sessions attended is positively correlated with the final course grades of the students. Meaning, the more SI sessions students attend, higher the grades

they will receive in exams, which in turn decreases the risk of failing the course, and having to retake the course or dropping out of college.

Different instructors keep track of grades in various ways, and in various levels of depth and detail. The grades were collected pre- and post- exams, while also keeping count of the number of SI sessions attended pre- and post- each exam. The survey data were collected in the beginning of the semester. The survey measured the average of SI sessions attended, the reason why, if the student did not attend SI sessions, comments students provided about SI leader, sessions or program, letter grade students expected to receive in course, how familiar students were with the subject area, etc.

The grades of those who attended at least one SI session were compared with those of students who did not attend any sessions. Also, those who attended one or two SI sessions were compared with those who attended more than two SI sessions. Also, the survey data were compared with course final grades. Students who passed the course (C- or higher) were compared with those who attended less or no SI sessions. SI coordinator was contacted for all data and records with respect to the study or evaluation as a whole.

Chapter IV - Results

In Fall 2004, over 50% of the students enrolled in SI courses attended at least one SI session over the course of the semester. The majority of students who participated in SI attended between 3 and 14 sessions. Overall, course grades and pass rates were higher for SI attendees, as compared to non-SI attendees.

The outcome was analyzed by grouping students in seven categories, based on how many SI sessions they attended and the final grade they received in the course. The results reveal to us that students who attended at least one SI session had a higher GPA than the non-attendees. A letter grade of D or F means the student has performed below average (<C) or has failed the course. Breakdown of the possible grades a student may receive is as follows: "A"=4.00; "A-="=3.67; "B+"=3.33; "B"=3.00; "B-="=2.67; "C+"=2.67; "C"=2.00; "C-="=1.67; "D+"=1.33; "D"=1.00; and "F"=0.00.

With data available for a total of 244 students for the categories described below, include the following:

- 1) Zero sessions attended – 89 students – 32% (29 students) received D or F
- 2) One session attended – 32 students – 21% (6) received D or F
- 3) Two sessions attended – 15 students – 26% (4) received D or F
- 4) 3 to 14 sessions attended – 95 students – 9% (10) received D or F
- 5) 15 to 26 sessions attended – 10 students – 10% (1) received D or F
- 6) 27 to 35 sessions attended – 2 students – none received D or F
- 7) 36 to 46 sessions attended – 1 student – none received D or F

Note: For categories 6) and 7) the number of students attending SI sessions was insufficient to base a judgment upon. This may have been a marked error, and in order to avoid making erroneous assumptions, the data were not included for analyses.

Comparisons by Course

Computer Sciences (CS) -142 – total 142 students

Students attended at least one SI session – 112 (78%)

Students did NOT attend any SI sessions – 30 (21%)

Computer Sciences (CS) -144 – total 185 students

Students attended at least one SI session – 118 (64%)

Students did NOT attend any SI sessions – 67 (21%)

Math-120 – total 222 students

Students attended at least one SI session – 120 (54%)

Students did NOT attend any SI sessions – 102 (46%)

<i>Avg. GPA vs. SI sessions attended</i>	CS - 142	CS - 144	Math - 120
At least one SI session	2.84 (B-)	2.89 (B-)	2.27 (C+)
No SI sessions	2.14 (C+)	2.75 (B-)	2.20 (C+)

Breakdown of SI sessions attended by course

Based on the distribution of students within the different categories of SI sessions attended, the researchers performed further analyses to look for any differences between students who attended no SI sessions and those grouped by 1-2 sessions, 3-14 sessions, and 15 or more sessions by course overall (see Appendices C, D, and E). The overall results remain the same as when looking at the data as a whole course versus breakdown by CS-142, CS-144, or Math-120 courses.

The results remained the same when looking at CS-142 and CS-144 separately, either by grouping students in one of the categories mentioned above, or in one of the two categories discussed earlier (at least one SI session vs. none). As noted earlier, the number of students who attended at least one SI session was more than those who did not attend any SI sessions.

However, for Math 120 the disparity between final GPA scores were smaller than typically found for the other two courses, 0.04 GPA points, based on the number of students who attended one to two SI sessions (Average GPA = 2.47) and those who did not attend any SI

sessions (Average GPA = 2.43). Only slightly higher grades for those who attended between 3-14 SI sessions (Average GPA = 2.65).

End-of-Term SI Satisfaction Survey Results

Depending if the student attended at least one SI session or none, the student answered different questions in addition to two shared items. Please see Appendix F to view the SI Survey administered in Fall 2004. The survey was administered at the end of the semester. The components ranged from assessing final grade expected by student, knowledge about subject matter prior to taking the course, rating how helpful SI sessions were or why they didn't attend any SI sessions, etc.

Results for SI attendees

Grade expected

In Fall 2004, over 95% of 132 students, who responded to this component, indicated that they expected to receive at least a passing grade of C or more on the course for which they had SI sessions available. Only 3% of the students reported that they expected to receive a failing grade of D, and no students expected to receive an F. However, 11.3% of the students received a failing grade, and 20.0% of these failures were from students who did not attend any SI sessions. In Fall 2004, about 43% of the students who responded to this item attended more than six SI sessions.

Knowledge prior to course

About 52% of the 137 students that responded to this item indicated that they had some knowledge (45%) or were very knowledgeable (6%), prior to taking the course. In Fall 2004, about 44% of the students who responded to this item attended more than six SI sessions.

SI sessions were helpful

Over 95% of 138 students who answered this question agree that SI sessions were helpful (46%) or very helpful (50%). Only about 3.6% of the students responded negatively to this item. Also, in Fall 2004, about 44% of the students who responded to this item attended more than six SI sessions.

Plan to take additional courses in this subject

About 70% of the 136 students responded positively to this item, leaving about 30% or students who do not plan to take additional courses in the subject. Again, in Fall 2004, 45% of these students attended more than 6 SI sessions.

Reasons SI is helpful

Of the 129 students, who gave their feedback to this item, about 37% shared that SI sessions were most helpful for test and quiz preparations. About 60% of the students found SI sessions to be most helpful for preparing their homework and projects. In Fall 2004, about 43% of these students attended more than 6 SI sessions.

Results for Non-SI attendees

The reasons why the students did not attend any SI sessions are as follows: about 20% said they either wanted to but had conflict in schedule or intended to but could not find the time to attend the SI sessions; 17.0% said it was not necessary; and about 2.0% said they either used similar kinds of study sessions and they did not find them helpful or they did use SI sessions previously for other courses and did not find them helpful. As mentioned earlier, survey respondents provided written comments about the SI program, SI leader, or SI session. However, the comments were only transcribed, and therefore are not discussed or presented in this report due to confidentiality of respondents.

Chapter V: Discussion

The current study evaluated the effectiveness of the Supplemental Instruction program, which is funded by the Access to Learning fund. This program, aims at helping students enrolled in target courses, which have brought upon attrition concerns at the University of Wisconsin-Stout. General concerns include at-risk freshman of failing their courses and dropping out of college or having to re-take the course. Because it is a public university, attrition of students affects all stakeholders not only students and the administration of the University, but also loan companies which students use, expenses which parents/caregivers accumulate and all taxpayers of Wisconsin.

In order to support the needs of this program, the Stout Student Association affirmed a vote for self-tax to form a budget which would be used to upkeep laboratories, offer childcare services, offer graduate assistantships and Supplemental Instruction. All program individually aiming at providing optimal learning conditions for the students. The data shows that on average, students who attend SI sessions have higher grades for the course versus those who did not attend.

The program leaders should make sure that in order to give everyone the opportunity to experience the program, depends on how much they offer it, and how well it is marketed on campus. And if the students are still not attending SI sessions in sufficient numbers, then the office hours should be change to accommodate those who are working or have other responsibilities, which keep them from having a regular school schedule, thus are prevented from attending the SI sessions. Finding that students who attended three to 14 SI sessions had the highest GPA across all courses is the most contributing finding for many reasons. It gives us important notice that the more frequently students attend SI sessions, the higher the final grades are for the course.

Students who have chosen to attend the SI sessions were doing so with the aim to either receive a better grade, pass the course, needed help with a certain project or homework versus exams, etc. However, we have to assume that different students that chose to attend any SI sessions chose to do for different reasons, not necessarily because they had no knowledge on the subject. For example, of the students who indicated that they had some knowledge or were very

knowledgeable about the subject prior to attending the course, about 17% of them attended 6 or more SI sessions.

Again, for those who attended one to five SI sessions, about 3% said they did not find the SI sessions to be helpful at all. Yet, about 36% of students who attended only one to five sessions, reported that they plan to take additional courses on the subject. As one will quickly notice, the percent distribution of those who have received a letter grade of C or more increases as the number of SI sessions increases. Hence, in research terms there is a positive relationship. Those students who have not attended any SI sessions, are a comparable number to the number of students attending 3-14 sessions, and therefore have increased meaning in the percent of final grades received.

The number of students who attended one session only was almost double compared to number of students who attended two sessions, yet looking at the percentage of students receiving a final letter grade of D or less in the course is very similar. The number of students attending 15 or more sessions is significantly reduced compared to the fewer-session categories. Most importantly, to bring on the ability to analyze the data by comparing students who did not attend any sessions to anywhere from 3 to 14 sessions, is a more direct, meaningful and simpler description. The reason is the number of students, who were categorized in this group, is comparable with the number of students who did not attend any sessions (95 and 89 students, respectively). This way the reader may understand the impact of the SI sessions on the students' ability to do well in the course. The author also looked for differences in letter grades between students who attended at least one SI session and none. Of the 273 students enrolled in Computer Sciences 142 (*sections 001 through 003*), Computer Sciences 144 (*sections 001 through 005*), or Math 120 (*sections 001 through 003*), about 163 (59%) students attended at least one SI session.

About 56% of all students who filled out the survey, attended one to five SI sessions. And about 55% of students who attended one to five SI sessions, expected to receive a final grade of C or higher. However, those students who did not attend any SI sessions, chose to do so, because they either didn't think it was going to be helpful, didn't feel they needed the help, did not have the time to meet with the group, had conflict of schedule with the sessions, did not necessarily, etc.

The SI program overall is a great success story for the University of Wisconsin - Stout. With areas for improvement being identified, and more to be identified in the forthcoming annual evaluations, the administration with the support of faculty and staff involved in the SI Program should focus on implementing changes that students need in order to be able to take advantage of SI. Also, there should be placed focus on expanding SI to other courses and classmen.

When searching for a pattern or significant differences between students' performance in the above listed courses, one has to keep in mind several limitations or possible sources for skewed results. For example, the grade point average for students who attended at least one SI session for the course of Computer Science 142 or 144 seems to be higher than for those who did not attend any SI Sessions. However, a factor that could be skewing this data is that the majority of students did attend at least one SI session (78% and 64%, respectively). So, when comparing the results, it is not clear it is truly due to the nature and difference in the setting (SI vs. Non-SI) or due to the incomparable number of attendees. As for Math 120, there was no real difference between the two compared groups, which do in fact hold about the equal number of students.

Limitations

In addition to the variables discussed thus far, another variable that would assure the results to be accurate and the researchers would have controlled for is the pre-test versus post-test scores on the general course information prior to and post of the semester to gauge how prepared the students are for the course prior to enrolling and after attending lectures with respect to number of SI sessions attended, if any. Therefore, the inconsistency in data collection limited the evaluators. Also, in addition to the End-of-Term SI Satisfaction survey, which was administered at the end of the semester, there should be another similar instrument used to measure students' perception of the effectiveness of SI.

In attempt to assess how familiar the students are with the SI the program, and their expectations of how much the program would help them in receiving the desired grade if they were to attend.

Conclusion

The University of Wisconsin-Stout implemented the SI program to reduce and prevent attrition of undergraduate students, especially freshmen and sophomores. Included in the academic tuition, students pay for the service including other programs designed to provide

optimal learning conditions for students. The researchers assessed the effectiveness of the program with respect to students' academic GPA in the course targeted and number of SI sessions attended. The hypotheses imply that the more SI sessions are attended by students, the higher final grades they would receive for the course, and the less attrition would take place and this would lead to the lessening of the drop-out rate of mostly college freshmen and sophomore. Using archival data, such as number of SI sessions attended throughout the semester, the number of SI sessions offered throughout the semester, grades received in course exams including the final GPA for the semester, data were populated and analyzed statistically. In addition to the research question at hand, the researcher used a survey developed by SI Coordinator to measure student perception of the SI program survey, calibrating possible areas of improvement in the program, with regards to hours offered. Results suggest that students who attended at least one SI session had a likelihood of receiving a higher final grade for the course than if they did not attend any SI sessions, if they felt that they needed the assistance.

Recommendations

We may conclude that the SI program at UW-Stout is a process showing successful results thus far and should continue by implementing certain changes that would lead to a more reliable and calculated effort for data collection and as well as measuring the program's variables discussed previously, such as the pre- and post- semester students' knowledge of the subject matter taught in the course. The standardization of data collection is crucial to not only evaluating the effectiveness of the program, but reflecting on different areas and opportunities for improvement in the process as a whole. Not only should the students' success in the classroom be monitored by the professors but they should also monitor the frequency of sessions attended by students. So if the student is performing poorly on tests, quizzes, etc. (getting less than satisfactory grades), the teacher should encourage the student to continue or begin attending SI sessions. SI leaders should provide teachers with an attendance sheet and progress on each student (by measuring with quizzes and simple observation).

Marketing the SI program is essential not only for successfully helping students in the courses the program is targeted toward, but also, in order to expand the program to other students in other courses that are not necessarily Computer Science or Math courses, but do need the equal approach and support. SI program could also be targeted towards students who are

soon graduating, with an approach to help them prepare for post-graduation, finding a job, writing resumes, cover letters, conducting an interview, public speaking, etc.

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Appendix A. Frequency and percent distribution of SI sessions attended by final letter

Number of SI sessions by Final Grade	0	1	2	3-14	15-26	27-35	36-46
A	17 (24%)	11 (16%)	3 (4%)	35 (50%)	4 (6%)	0	0
B	27 (35%)	10 (13%)	4 (5%)	30 (43%)	5 (6%)	1 (1%)	0
C	16 (33%)	5 (10%)	4 (18%)	20 (41%)	0	1 (2%)	1 (2%)
D	13 (59%)	1 (4%)	3 (13%)	4 (18%)	1 (4%)	0	0
F	16 (57%)	5 (18%)	1 (3%)	6 (21%)	0	0	0
Total of students (244)	89	32	15	95	10	2	1

Appendix B. Ratings of SI program by SI attendees, by number of sessions attended

Number of SI sessions	1-5	6-10	11+
Grade expected			
A	20	8	12
B	39	16	10
C	14	3	6
D	2	1	1
F	0	0	0
Total	75	28	29
Knowledge prior to course			
Very knowledgeable	7	1	1
Some knowledge	41	12	9
No knowledge	29	16	21
Total	77	29	31
How helpful were SI sessions			
Very Helpful	23	19	27
Helpful	49	10	5
Not Helpful	5	0	0
Total	77	29	32
Do you plan to take additional courses in this subject			
Yes	50	22	24
No	25	7	8
Total	75	29	32
What part of SI sessions was most useful			
Test & Quiz Prep	37	8	3
Help with HW & Projects	33	20	24
Other	4	0	0
Total	74	28	27

Appendix C. CS 142- 001, 002, 003, Computer Programming for Multi-media

Term	Student enrollment	# attended at least one SI session	Number of SI sessions attended	Avg. Course grade by SI sessions attended	% with a grade of C- or above by SI sessions attended
Fall 2004	75	59 (78%)	<i>0 sessions: 16 (21%)</i> <i>1-2 sessions: 18 (24%)</i> <i>3-14 sessions: 37 (49%)</i> <i>15+ sessions: 4 (5%)</i>	<i>0 sessions: 2.64 (<B-)</i> <i>1-2 sessions: 2.78 (<B)</i> <i>3-14 sessions: 2.86 (<B)</i> <i>15+ sessions: 2.94 (<B)</i>	<i>7 (43%)</i> <i>12 (66%)</i> <i>34 (92%)</i> <i>3 (75%)</i>

Appendix D. CS-144-001, 002, 003, 004 and 005, Computer Science I

Term	Student enrollment	# at tended at least one SI session	Number of SI sessions attended	Avg. Course grade by SI sessions attended	% with a grade of C- or above by SI sessions attended
Fall 2004	83	49 (59%)	<i>0 sessions: 21 (43%)</i> <i>1-2 sessions: 10 (20%)</i> <i>3-14 sessions: 34 (69%)</i> <i>15+ sessions: 5 (10%)</i>	<i>0 sessions: 2.61 (<B-)</i> <i>1-2 sessions: 2.86 (>B-)</i> <i>3-14 sessions: 2.94 (<B)</i> <i>15+ sessions: 2.97(<B)</i>	13 (62%) 7 (70%) 31(91%) 5 (100%)

Appendix E. Math 120 - 001, 002, 003, College Math I

Term	Student enrollment	# attended at least one SI session	Number of SI sessions attended	Avg. Course grade by SI sessions attended	% with a grade of C- or above by SI sessions attended
Fall 2004	115	55 (48%)	<i>0 sessions: 60 (52%)</i> <i>1-2 sessions: 21 (38%)</i> <i>3-14 sessions: 30 (54%)</i> <i>15+ sessions: 4 (7%)</i>	<i>0 sessions: 2.43 (>C+)</i> <i>1-2 sessions: 2.47 (>C+)</i> <i>3-14 sessions: 2.65 (<B-)</i> <i>15+ sessions: 2.44 (>C+)</i>	40 (66%) 18 (86%) 24 (80%) 4 (100%)

Appendix F. End-of-Term Supplemental Instruction Survey*(This information is for research purposes only, and will in no way influence your final grade.)*Course Name/Section/Term:

Student Name (Print Clearly) _____

ID _____

If you are interested in becoming an SI leader for CS or Math 120 courses, please complete the following:

Email _____ Name of course: _____

We appreciate your comments or suggestions about the SI program, leader or sessions:

_____**All Students, please complete the following:**

1. What grade do you expect to make in this course?

A B C D F

2. How would you rate your knowledge of this subject PRIOR to this course?

A. No Knowledge B. Some Knowledge C. Very knowledgeable

If you attended even one SI session, please complete the following:

3. How many sessions did you attend?

A. 1-5 B. 6-10 C. 11+

4. How helpful were the SI sessions?

A. Not helpful B. Helpful C. Very Helpful

5. What part of the SI Session was most useful?

- A. Test & Quiz Prep
- B. Help with homework & Projects
- C. Other, please explain _____

6. Do you plan to take additional courses in this subject area?

- A. Yes
- B. No

If you did NOT attend any SI sessions, please complete the following:

7. Did you fill out the time schedule questionnaire for SI sessions at the beginning of the term?

- A. Yes
- B. No
- C. Can't remember

8. Indicate the reason(s) you did not attend any sessions:

- A. I wanted to but couldn't. The session schedule conflicted with work or other classes.
- B. I didn't feel it was necessary.
- C. I have used similar kinds of study sessions for other courses and did not find them helpful.
- D. I have been to SI sessions for other courses and did not find them helpful.
- E. I intended to, but couldn't find the time.