

The Effect of Supplemental Instruction on Undergraduate Class Grade,
Grade Point Average and Retention

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Abstract

Graduating from college in four years is still the most optimal arrangement for today's student (Neuman, 2013). Currently, there are many programs that claim to support these students to succeed academically and in a timely manner (Hodges, 2001). The purpose of this study was to investigate whether an academic support program identified as Supplemental Instruction impacted student class grade, grade point average and retention within an academic year in three distinctive college freshman classes: Biology, Education and Spanish. An analysis was conducted to determine if there was a difference between the students that utilized Supplemental Instruction and the students that chose not to utilize Supplemental Instruction. The null hypothesis was used in this study. The results did not find a significant difference between the treatment and non-treatment groups. Thus, the null hypothesis was retained. Further research should utilize a larger sample size and a pre-determined amount of sessions.

CHAPTER I

INTRODUCTION

Overview

Since the inception of higher education in America in the mid-seventeenth century, the type of student pursuing a college degree has slowly evolved. What once used to be only available to an elite, privileged class, post-secondary education is now accessible and sought after by a much broader and diverse population which, not surprisingly, exhibits an even wider variety of academic skills (Hodges, 2001). More and more, college students are coming to school unprepared for college-level work and subsequently struggle academically. They may end up taking courses over, taking lighter course loads or dropping out altogether, unable to emerge from insufficient grades and lack of credits (Ogden, Thompson, Russell & Simons, 2003). Public universities especially have been the main setting for the growth of higher education and a more diverse population (Dwyer, McCloud & Hodson, 2012). It was “because of emerging institutional needs” that California State University, Long Beach instituted a support program known as Supplemental Instruction in 1987, to specifically target the students “with the greatest support needs” (Ramirez, 1997, p. 2). In the mid-nineties, the University of Florida installed an academic tracking program to alleviate difficulties in deciphering class schedules and semester requirements, which in turn increased student satisfaction and retention (Capaldi, Lombard & Yellen, 2006.) More and more, colleges have come to understand the ever-increasing need for academic support that serves a varied population (Ogden et al., 2003).

Without support, especially a model in which students can feel connected on both an academic and social level, the desire to remain in college can suffer (Ogden et al., 2003). Research shows that the amount of students not finishing college has become a sobering social

problem (Dwyer et al., 2012). Public universities are experiencing high dropout rates due to “large class size and limited opportunities for faculty mentoring,” and private colleges, faced with a limited group of students able to pay their pricey tuition “have to make every effort to increase retention and completion” in order to maintain their desired number of students (p. 1138). Over time, in an attempt to combat this problem, both universities and colleges have offered several types of academic support, such as advising, tutoring, skills courses and test-taking clinics. It has been more recently shown, however, that the programs which concentrate on enhancing students’ learning strategies, especially those that emphasize “self-regulated learning and teach college-level cognitive and metacognitive strategies” (Ogden et al., 2003, p. 2), produced increased student success and retention. Supplemental Instruction, with a dual student goal of mastering course content and developing effective learning and study strategies, is this type of program and has been shown to have a definite benefit for students, especially those that may be underprepared for college level academics (Ramirez, 1997).

It is this type of student – one who may not be fully prepared or ready for college – that has seemed to slowly emerge into a distinct grouping at the college learning center where the data was collected. Situated in a small, private liberal arts college, the center served the entire student population, yet noticed that the number of students who had little or no knowledge about how to write a paper or manage due dates had increased. Subsequently, the need for additional academic support increased as well. As noted, there are several types of academic support programs that are utilized in an undergraduate curriculum; however, the peer-assisted support program, Supplemental Instruction, with its small, voluntary groups targeting high-risk courses (those that have at least a 30% of students with a D or F) “supplies a powerful stimulus to learning” in that it involves peers “reflecting on and making sense of information...and working as a group on

solving problematic issues” (Hoi & Downing, 2010, p. 922). In this approach, students foster a sense of “relatedness”, which can specifically support the new and sometimes alienated student. Challenged with a small staff and an even smaller budget, the leaning center constantly referred students to Supplemental Instruction due to its applicability to all students. Similarly, Supplemental Instruction has been employed more and more at colleges and universities across the country and has consequently shown a positive correlation between the use of Supplemental Instruction and academic achievement and retention (Hodges, 2001).

Statement of Problem

The point of this study is to determine whether the use of Supplemental Instruction, an academic support program offered to undergraduate students at a small, private liberal arts college, positively affected a student’s grade in their respective class, semester grade point average (GPA) and the likelihood of returning to college the following semester. The results from this study will be used to determine whether the continued use of Supplemental Instruction at this college is a valuable intervention for student success.

Hypothesis

The null hypothesis in this study is that there will be no effect on the grades and the retention rate of the students that utilized Supplemental Instruction offered for their class.

Operational Definitions

Supplemental Instruction was the independent variable and was defined as an academic support program consisting of small group, peer-assisted learning, offered to undergraduate college students.

Three separate dependent variables were utilized in this study: Grade Point Average (GPA) was used as a standard measurement of academic achievement, based on letter grades and

the accompanying numeric values. A GPA is calculated by dividing a student's total number of grade points (determined on a sliding scale where A is 4 and F is 0) by the number of credits.

The second variable, class grade, was defined as the final grade a student receives in a single class. The grading system at this college was as follows: A-excellent; B-good; C-satisfactory; D-poor; F-failing; FW-failed and didn't withdraw; P-pass; NP-no pass; I-incomplete; and A-audit.

The final variable, retention, was defined as a student progressing from successful academic achievement in one semester to the next academic semester, e.g. attending both the fall 2013 and spring 2014 semester sequentially.

CHAPTER II

REVIEW OF THE LITERATURE

Overview

There was a time, not long ago, that completing an undergraduate college degree in four years was a customary practice. With the advent of trendy monikers such as ‘super senior’ and the emerging uncertainty of whether a college degree is worth the current, hefty price tag, the practice of graduating on time is no longer the only accepted option. To the dismay of parents and higher institutions alike, many undergraduate students are choosing the five-year tract and beyond (Walker, 2006). However, most scholarships and loans don’t extend past four years, making the process of paying for an education complicated and arduous. As well, prospective employers and graduate admissions officers may look differently at applicants who take longer to graduate. Simply put, graduating in four years is still the most optimal arrangement. The purpose of this literature review is to examine the truth in that statement and the ways in which students can be supported to succeed academically and in a timely manner. The first section of this review will examine the process and benefits of graduating on time. Section two presents the obstacles which stand in the way for undergraduates, and section three explores supportive practices, specifically Supplemental Instruction.

The Importance of Graduating in Four Years

According to research on debt and graduation in American Universities, graduation from college is seen as a first, crucial step in the attainment of a middle-class lifestyle as well as “an investment in the future” (Dwyer et al., 2012, p. 1136). However, the attainment of this crucial goal should not be a life-long effort. Graduating later than four years adds more debt to an already expensive bill and can inject unnecessary delays for students attempting to begin the next

stage of their life (Neuman, 2013). In fact, just setting the goal to graduate on time as a freshman can be a positive step, as doing so can help with other positive decisions, achieving academically and the provision of the “intelligence and knowledge” students need to succeed (p. 4).

Additionally, by graduating on time, students show prospective employers that they are focused and able to meet deadlines, not someone whose college transcript shows “five or six years of dropped courses, inconsistent grades and transfers from one college or program to another” (p. 5). The process of systematic academic advising is equally important to students who plan to graduate on time. In a study which focused on the University of Florida, the implementation of a tracking system for students to facilitate the responsibility of fulfilling major and minor requirements greatly helped to improve their graduation rates and gave students “accessible information about programs and academic progress with focused personal help” (Capaldi et al., 2006, p. 7). In the end, going to college is really about finding a path in life that leads to employment and, hopefully, financial success. Staying on a timely course, without unnecessary side trips or distracting shortcuts, is the very basis of completing a degree on time.

Obstacles to Graduating on Time

As we have discussed, completing college, especially within the customary four-year time period, can be difficult. Many things can stand in a student’s way; for example, social factors such as race or ethnicity, economic circumstances and pre-college preparation all have been shown to prevent completion of a college degree on time (Capaldi et al., 2006). According to a recent article written about specific steps to finishing college in four years, another obstacle can be that many students don’t take college seriously and typically don’t study enough or blame professors and classes for low grades. The habit of “being careless and casual means being left behind...your education will move beyond your grasp until it is simply out of your sight”

(Neuman, 2013, p. 2). In addition to having an attitude of ambivalence, other issues, such as family and financial matters, can also get in the way of graduating on time (Walker, 2006). Some students have responsibilities at home that can delay or disrupt attendance to college. In fact, estimates show that only one in three students actually graduates in four years (Neuman, 2013). Other studies suggest that the incurrence of debt increases the likelihood of dropping out and often delays college completion (Dwyer et al., 2012). Lastly, students who don't know how to or refrain from asking for help can greatly diminish their chances of a timely graduation. The utilization of learning centers, tutoring and academic support programs can make the difference in a student's academic achievement. Studies by the National Center for Developmental Education have found that "tutoring has a positive impact on persistence and graduation, final course grades, course completion and student attitudes towards instruction" (Hodges, 2001, p. 2). As well, academic support programs such as Supplemental Instruction (SI), a program that "increases a student's academic performance and retention using collaborative learning strategies" (p. 2) has been shown to have a "statistically significant influence on graduation success" (Bowles, McCoy & Bates, 2008, p. 1). By not requesting assistance, whether it is a meeting with an academic coach, the use of private tutoring or attending SI weekly sessions, students will miss out on the important benefits of such practices, which emphasize "self-regulated learning and teach college-level cognitive and meta-cognitive strategies" (Ogden et al., 2003, p. 2).

Supplemental Instruction

When looking at the practices of successful undergraduate students who manage to maintain good grades and graduate in a four-year time period, as we have noted, academic support programs are an important piece of the puzzle. Supplemental Instruction was developed

in 1973 at the University of Missouri at Kansas City and is a program that specifically uses peer-assisted study sessions (Ogden et al., 2003). The sessions are offered free of charge to all students in historically challenging courses such as math, science and foreign language. Attendance at the weekly or semiweekly scheduled sessions is voluntary and consists of “informal review sessions in which students compare notes, discuss readings, develop organizational tools, and predict test items,” while working together to “integrate course content and study skills” (International Center for Supplemental Instruction, 2016, p. 1). The sessions are led by student leaders who have previously taken the class and done well. The center identifies three main functions of the program, which include: increased retention and grades within the course and increased graduation rates. The theoretical framework of the main component of SI, peer-assisted learning, is based in “constructivism, where the tutors take on the role of facilitators to help learners process information and construct their own knowledge, rather than the role of information giver” (Hoi & Downing, 2010, p. 921). Additionally, the International Center for Supplemental Instruction clearly points out that SI does not bear the stigma that other academic support programs may be attached to, “since the program targets high-risk courses rather than high-risk students” (2016, p.1).

The small-group study sessions that are the framework for SI can have a big impact on doing well academically and graduating on time. One study, which examined the effects of SI on graduating in four years, states that attending SI sessions “increased the probability of timely graduation by approximately 11%” (Bowles et al., 2008, p. 1). In fact, the benefit goes beyond its attendees as the student leaders that hold the sessions also receive a benefit, that of “increased understanding of the subject matter, greater self-confidence as a learner and development of closer relationships with faculty” (Lockie & Van Lanen, 2008, p. 3).

Summary

The importance of graduating from college in four years is evident, and taking advantage of the support that will see a student through is paramount. It's clear that the benefits of Supplemental Instruction are far-reaching and that the utilization of Supplemental Instruction is one of the ways in which a student can successfully manage their academic journey with a positive and fulfilling approach.

CHAPTER III

METHODS

The purpose of this study was to investigate whether an academic support program identified as Supplemental Instruction impacted student class grade, grade point average and retention within an academic year in three distinctive college freshman classes: Biology, Education and Spanish. The null hypothesis was used.

Design

This study consisted of a quasi-experimental design. Students came from a convenience sample and were divided into two, non-randomized groups of college students within one class. The independent variable was the academic support model known as Supplemental Instruction and the dependent variables were the student's grade earned in the class, the student's grade point average earned after one semester and retention of the students to the following academic semester. During the fall semester of 2013, the treatment group attended Supplemental Instruction sessions that were offered by the professor teaching the class. The non-treatment group attended the same class, but opted not to attend Supplemental Instructions sessions.

Participants

The participants used for this research included 48 undergraduate, full-time students enrolled in a small, private, co-educational, liberal-arts college located in the state of Maryland. Each student was enrolled in one of three separate classes that offered Supplemental Instruction as a form of voluntary, academic support offered outside of the regularly-scheduled class period at no additional monetary cost. The classes were: an introductory Biology class (BIO 104), which was 67% female and 33% male; an introductory Education class (ED 101), which was

75% female and 25% male; and an introductory Spanish class (SP 110), which was 71% female and 29% male. As well, each class contained a mix of freshman and sophomores: BIO 104 had 14 freshman and 1 sophomore; ED 101 had 8 freshman and 8 sophomores; and SP 110 had 13 freshman and 4 sophomores. Each class met three times a week for approximately 50 minutes. Within each class, there was a treatment group that attended Supplemental Instruction sessions and a non-treatment group, which did not attend Supplemental Instruction sessions. For BIO 104, the treatment group made up 47% of the class and the non-treatment group made up 53% of the class. For ED 101, the treatment group made up 50% of the class and the non-treatment group made up the remaining 50% of the class. Finally, in SP 110, the treatment group made up 29% of the class and the non-treatment group made up 71% of the class.

Instrument

The instruments used in this research were the students' official college transcripts, which recorded the students' final grade in the respective class and the grade point average (GPA) earned at the end of the semester in which the class took place. GPA for a college student is generally understood as a measure of academic achievement, or as "an indication of how well an individual has done in college" (Imose & Barber, 2015, p. 2). According to the college's course catalog, the credit hour value of a class is multiplied by the value of the earned grade to determine the quality points earned. The total number of quality points earned in the student's classes is divided by the total number of graded credit hours to come up with a semester GPA. The total number of sessions the students attended throughout the semester was also recorded from attendance sheets taken by the student facilitators leading the SI sessions.

Procedures

SI sessions were offered weekly on campus for one hour in the evening to all enrolled students in BIO 104, ED 101 and SP 110. The scheduled days and times were chosen by the students, and the student facilitators, upperclassmen who attended the class in a past semester, were chosen by the professor teaching the class to lead the sessions. The student facilitators were chosen based on their expertise gained from the class and grades earned. All student facilitators attended a training prior to the start of Supplemental Instruction sessions, which are meant to provide peer-assisted learning to reinforce and enhance course material taught during the class and improve students' overall study skills (Hoi & Downing, 2010). Questions that may come up for students outside of class time were raised during the sessions and students were encouraged to work cooperatively with the student facilitators and other session attendees to formulate answers. Sessions took place in a reserved classroom located in an academic building on campus and were offered between the hours of 5 and 10 pm. Session attendees were asked by the facilitators to write their name on attendance sheets, and these student names were sent to the professors weekly. Average attendance varied for each class, with no less than one and no more than four students in a session at any given time. The sessions ended the last week of classes before final exams. Ten sessions were held for BIO 104, 11 sessions for ED 101 and for SP 110, the only class to offer sessions twice a week, 24 sessions were offered.

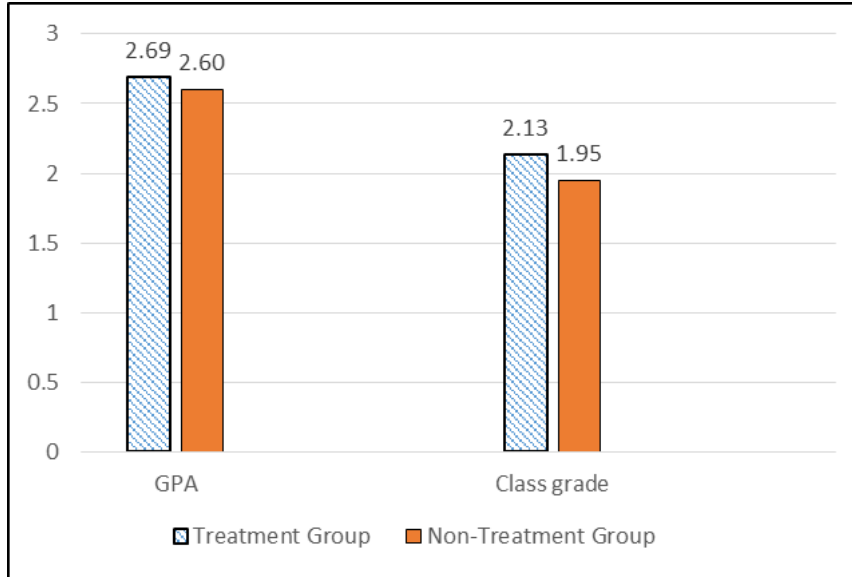
CHAPTER IV

RESULTS

The purpose of this study was to investigate whether an academic support program identified as Supplemental Instruction impacted student class grade, grade point average and retention within an academic year in three distinctive college freshman classes: Biology, Education and Spanish. An independent t-test was run for the GPAs and class grades, and a chi-square test was run for retention, to see if there was a significant difference between the students that utilized Supplemental Instruction sessions (the treatment group) and the students that opted not to utilize Supplemental Instruction sessions (non-treatment group). The subsequent figures compare the results obtained from each of the three classes, using a t-test on raw numbers. Course grades were converted to the following: A=4.0, A-=3.67, B+=3.33, B=3.0, B-=2.67, C+=2.33, C=2.0, C-=1.67, D+=1.33, D=1.0, D-=.067 and F=0. This allowed for the use of a t-test statistical analysis method. As shown, analysis of the data indicated only slight differences between the treatment and non-treatment groups.

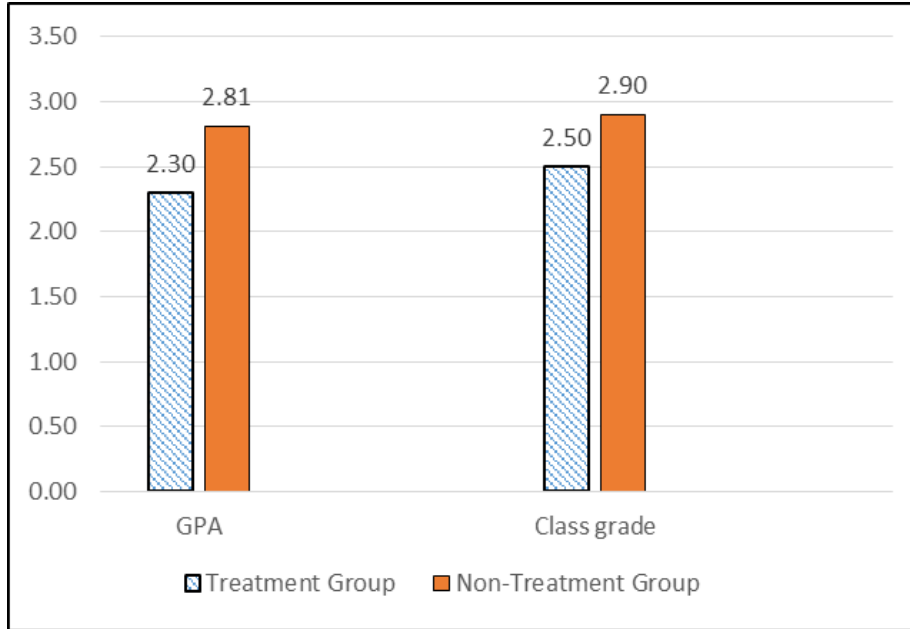
For the first class, BIO 104, the mean of the GPAs for the treatment group was 2.69, with a standard deviation of .54, while the non-treatment group was 2.60, with a standard deviation of .69. The mean of the final class grades for the treatment group was 2.13, with a standard deviation of 1.14, while the non-treatment group was 1.95, with a standard deviation of .51. The analysis of the results indicated no significant difference between the two groups for the GPA, $t(13) = .30, p = .77$. Additionally, results indicated no significant difference between the two groups for class grade, $t(11) = .38, p = .71$ (Figure 1).

Figure 1: *GPA and Class Grade Means for BIO 104*



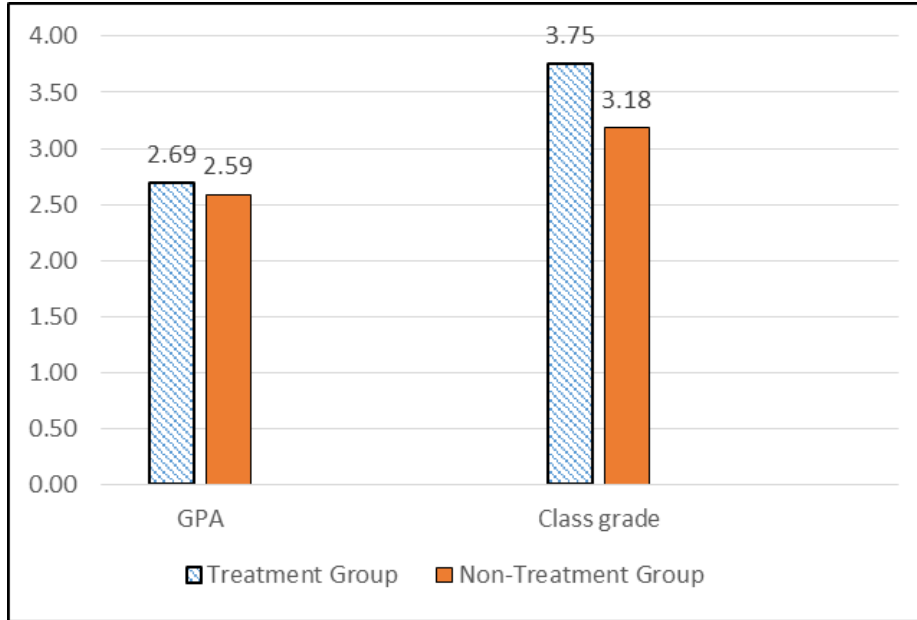
For the second class, ED 101, the mean of the GPAs for the treatment group was 2.31, with a standard deviation of 1.24, while the non-treatment group was 2.81, with a standard deviation of 1.26. The mean of the final class grades for the treatment group was 2.50, with a standard deviation of .96, while the non-treatment group was 2.90, with a standard deviation of 1.08. The analysis of the results indicated no significant difference between the two groups for GPA, $t(14) = -1, p = .43$. Additionally, results indicated no significant difference between the two groups for class grade, $t(11) = -1, p = .49$ (Figure 2).

Figure 2: *GPA and Class Grade Means for ED 101*



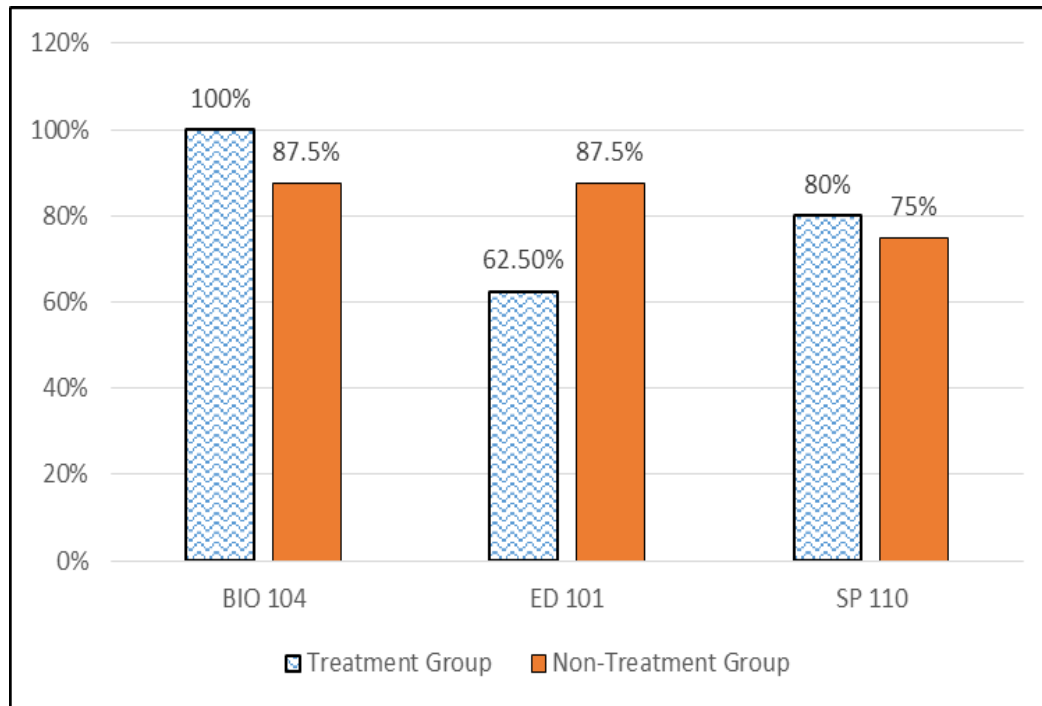
For the third class, SP 110, the mean of the GPAs for the treatment group was 2.69, with a standard deviation of 1.53, while the non-treatment group was 2.59, with a standard deviation of 1.27. The mean of the final class grades for the treatment group was 3.75, with a standard deviation of .32, while the non-treatment group was 3.18, with a standard deviation of .50. The analysis of the results indicated no significant difference for the GPA, $t(15) = .139$, $p = .89$. Additionally, results indicated no significant difference between the two groups for the class grade, $t(11) = 2.035$, $p = .06$ (Figure 3).

Figure 3: *GPA and Class Grade Means for SP 110*



Finally, for all three classes, BIO 104, ED 101 and SP 110, the results for student retention from the fall 2013 semester to the spring 2014 semester were evaluated, using a chi-square analysis. For BIO 104 and SP 110, retention rates were slightly higher for the treatment group, but not for ED 101, where the non-treatment group showed a higher percentage of retention. However, as shown in Figure 4, results indicated no significant difference in retention rate for BIO 104, $X^2(1, N=15) = .94$ $p = .33$. For ED 101, results indicated no significant difference in retention rate as well, $X^2(1, N=16) = .133$ $p = .25$. Finally, for SP 110, results again indicated no significant difference in retention rate results, $X^2(1, N=17) = .05$ $p = .83$ (Figure 4).

Figure 4: *Retention Rates: Fall 2013 to Spring 2014*



CHAPTER V

The purpose of this study was to investigate whether an academic support program identified as Supplemental Instruction impacted student class grade, grade point average and retention within an academic year in three distinctive college freshman classes: Biology, Education and Spanish.

DISCUSSION

The results for this study supported the null hypothesis which stated that the utilization of Supplemental Instruction would have no effect on the class grade, GPA and retention rate of the students that attended a class in which Supplemental Instruction was offered.

Implications of the Results

The results found that class grade, GPA and retention did not show significant differences between the treatment group (students that utilized Supplemental Instruction), and the non-treatment group (students who opted out of attending Supplemental Instruction sessions). Even though, in two of the three classes (for BIO 104 and SP 110), the grades and GPA were slightly higher for the treatment group (for BIO 104 there was a .10 difference between GPAs and a .18 difference between class grades and for SP 110 there was a .10 difference between GPAs and a .57 difference between class grade), the difference was not significant.

Theoretical Consequences

From these results it would seem that even though Supplemental Instruction is a widely used academic support program at many colleges and universities nationwide, even being named an “Exemplary Educational Program” by the U.S. Department of Education in 1981 (Lockie & Van Lanen, 2008) and, in 2009, found to have trained staff in more than 1500 institutions of higher learning in 29 countries (Dawson, van der Meer, Skalicky & Cowley, 2014), it should not

be thought of as a cure-all, or the ultimate, singular intervention, for the struggling student. Essentially, educators should view Supplemental Instruction as part of an overall support system that takes each individual student and their needs into consideration. That being said, Supplemental Instruction sessions are still considered a vital part of this support, since through the act of a student's voluntary attendance, the opportunity to structure a student's own learning is created, which naturally leads to a more independent and active learning process (Hoi & Downing, 2010). The results from this study show that such a learning process might take longer than one semester of attending Supplemental Instruction sessions offered for a challenging freshman course to show improvement in grades and GPA. It is this researcher's belief, obtained not from this study, but from witnessing student growth as part of a staff at a college learning center, that when Supplemental Instruction is combined with other types of key support, such as meeting with an academic coach and utilizing professors' office hours, these smaller parts make up the whole of an effective student support system.

Threats to Validity

The small size of the private college utilized in this study and, subsequently, the small class sizes within, represented an internal threat to the validity of the study. The total amount of each class never went above 20 students. To have had more students would have provided a larger sample, more data and possibly a greater ratio. Additionally, a student was recognized as utilizing Supplemental Instruction if they attended as little as one session or as many as four. With regard to a common number of sessions, according to a literature review which examined over 25 studies, "decisions for the cutoff number of sessions were largely arbitrary and unsubstantiated" (Dawson et al., 2014, p. 619). If the originators of the Supplemental Instruction program had selected a standard number of sessions required for the intervention to be realized,

it would have been easier to establish stricter guidelines for the study and the data may have been influenced.

An external threat to this study is the fact that the sample was not randomized. Class rosters were used as samples and split into the treatment and non-treatment groups. Randomization may have produced a more varied population, according to skill and prior knowledge.

Connections to Previous Studies/Existing Literature

The results generated from this study refute the findings from a study in 2008, in which Supplemental Instruction was shown “to increase a student’s academic performance and retention” (Bowles et al., p. 1). The researcher’s results also clearly contrast with a study completed in the early nineties, where it was found that students attending Supplemental Instruction sessions earned higher final grade averages (Congos & Schoeps, 1993). However, as to the suggestion that the utilization of Supplemental Instruction is positively connected to “affective variables such as self-efficacy, self-esteem and internal locus-of-control,” this researcher’s data cannot confirm or, more importantly, negate this idea. The study goes on to say that these students “received encouragement from the knowledge that others were also struggling with the learning process” (Ogden et al., 2003, p. 3). This important finding, while not distinguishable from grades or GPA alone, represents a solid basis to implement a future study, specifically on how Supplemental Instruction affects less measureable, but as important, traits of self-reliance and confidence in one’s own ability.

Implications for Future Research

This researcher’s recommendations for future research are two-fold. As discussed, the choice of which class to investigate is important, not just for size implications, but also for

consistency in class rank and prior knowledge. Both of these attributes will be hard to manipulate in a small college, since any student can enroll in freshman courses, which also greatly affects student preparedness and content knowledge. That said, it would be beneficial to select a much larger, freshman-only sample, since the admission process of the college is presumably the same for all students, and all freshman would conceivably share a minimum grade point average and desired prerequisite courses. Further, it would be important, as noted earlier, to determine an official standard number of attended sessions to realize the benefit of the intervention. This would greatly refine the treatment group and possibly affect the resulting data. Lastly, as mentioned above, it would also be important to study the effect of Supplemental Instruction not just on grades but on learning competence as well. One first-semester, freshman class may not be enough time to fully calculate academic success.

Conclusion

Supplemental Instruction has been shown, in countless studies over the past 40 years, to be a valuable academic support system; however, this study shows that, alone, it is not a singular remedy to success, but an intervention that can assist students in ways beyond a letter grade. By developing students' individual learning strategies (Ogden et al., 2003) and providing knowledge to assimilate to a higher standard of learning (Hoi & Downing, 2010), Supplemental Instruction goes beyond the rote memorization of facts. Additionally, it has also been shown to benefit the student leaders who offer the sessions, giving them greater confidence in the subject and a closer relationship with their professors (Lockie & Van Lanen, 2008). Even though this study, in the end, may not have confirmed immediate success for these students, these factors, and others that Supplemental Instruction ultimately touches, is evidence that this support is worth the consideration and the effort.

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