

**Exploring the Fringe Benefits of Supplemental Instruction**

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National Survey of Student Engagement

Authors' Note

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### **Abstract**

Supplemental Instruction (SI) is an academic support program geared toward promoting engagement and effective study skills among students in “high-risk” courses. Despite knowledge of the positive relationship between SI and student achievement and retention, little is known about how SI relates to other forms of effective educational practices and what type of student populations are more or less likely to engage in SI. Using data from the 2011 NSSE, this session provides insights into the types of SI experiences students are having and whether participation in these experiences are related to higher engagement scores, deep approaches learning, and self-reported gains.

### **Exploring the Fringe Benefits of Supplemental Instruction**

Supplemental Instruction (SI) is an academic support program geared toward promoting engagement and effective study skills among students in “high-risk” courses (Hurley, Jacobs, & Gilbert, 2006). Often, SI is the answer to courses with high rates of drop-outs, failures, or withdrawals (DFWs) (Latino & Unite, 2012) or large class enrollments (Drake, 2011). Although campus leaders may structure SI differently depending on the educational context (Painter, Bailey, Gilbert, & Prior, 2006), most preserve its key feature of peer-assisted learning where undergraduate students serve as discussion leaders and help their peers grasp difficult course concepts. Typically, discussion leaders are selected by faculty and knowledgeable in the topic area, usually having taken the course themselves and having excelled in it academically.

In general, supplemental instruction sessions are participatory and collaborative in nature, striving to break down traditional classroom hierarchy and dependence on the instructor (Hurley, Jacobs & Gilbert, 2006). By participating in collaborative experiences, students exhibit an increased openness to diversity (Cabrera et al., 2002; Cruce, Wolniak, Seifert, & Pascarella, 2006) and are more likely to achieve academically (Colbeck, Campbell, & Bjorklund, 2000). Latino and Unite (2012) suggested that this learner-centered approach not only emphasizes content knowledge but also teaches students to “take responsibility for their own learning” (p. 34). Students are encouraged to apply new study strategies and use higher-order thinking rather than rely on rote or memorization skills (Hurley, Jacobs, & Gilbert, 2006; McGuire, 2006).

The key component of SI is largely based in cognitive development theory which recognizes the role of the student in constructing knowledge (Arendale, 1993). When peers emerge as suitable sources of knowledge, students begin to expand their thinking and approaches to learning (Evans, Forney, & Guido-DiBrito, 1998). Through these interactions, students

acquire coping skills and begin to see themselves as sources of knowledge, resulting in a greater sense of ownership over the learning process (Bean & Eaton, 2001; Blanc, DeBuhr & Martin, 1983; Braxton & McClendon, 2001).

The effectiveness of this program has been well-documented since its conception by Dr. Deanna Martin in the early-70s (Martin & Hurley, 2005). Congos (2001) conclude SI is a “wise investment” because of its impact on student retention. Many institutions rely on academic support services like supplement instruction to improve retention and success (Blanc, DeBuhr & Martin, 1983; Martin & Hurley, 2005). Besides improved retention and graduation rates, there are other positive outcomes associated with supplemental instruction. Students report positive perceptions of the learning environment and reduced feelings of intimidation (Longfellow, May, Burke, & Marks-Maran, 2008) and embarrassment or inadequacy (Arendale, 1993). These sessions have also been found to have a positive effect on learning competence and academic performance (Blanc, DeBuhr, & Martin, 1983; Ning & Downing, 2010). Additionally, faculty gain valuable feedback from the supplemental instruction leaders on the struggles students in the course may be experiencing which can help them better produce student learning in the classroom (Blanc, DeBuhr, & Martin, 1983).

Yet, despite knowledge of the positive relationship between SI and student achievement and retention, little is known about how SI relates to other forms of effective educational practices. Further, it is important to know what student populations are more or less likely to take advantage of SI. To date, few empirical studies, if any, have examined the relationship between SI and other forms of effective educational practices such as deep approaches to learning; student-faculty interactions; active and collaborative learning; academic challenge; perceptions

of supportive campus environment; and self-report gains in personal and social responsibility, practical skills, and general education.

The specific research questions for this study are:

1. What types of SI experiences are students having, and what types of students are having these experiences?
2. Do students that participate in SI experiences differ from students that do not participate in SI experiences in terms of other forms of engagement?
3. Are SI experiences related to other forms of engagement, and does this engagement differ for specific subpopulations of students?

The overall aim of this study is to provide a broader picture of the associated benefits of SI, particularly among first-year and senior students. A better understanding of the associated benefits and the students who invest their time in SI will help leaders to effectively implement the program on their campus.

## **Methodology**

### **Data Source and Sample**

Data for this study comes from the 2011 administration of the National Survey of Student Engagement (NSSE). NSSE was designed to measure student behaviors and the time and energy they invest in activities that relate to student learning and development. More specifically, NSSE asks students how often they engage in various effective educational practices as well as their perceptions of their college environment and various gains while in college. The 2011 NSSE was administered to a sample of first-year and senior students at over 700 participating colleges and universities. Students attending 48 of these institutions were given an additional item set at the end of the survey asking about their participation in SI activities. The sample for this current

study consists of over 9,000 first-years and 13,000 seniors, with around half of these students reporting participating in SI experiences. For additional information about student demographics and institutional characteristics see Table 1.

Table 1

*Sample Statistics of Student and Institution Characteristics*

		Demographics of Student Sample		Demographics of Students with SI Experiences	
		First-Years (%)	Seniors (%)	First-Years (%)	Seniors (%)
<b>Female</b>		66	65	65	64
<b>Transfer student</b>		8	49	7	49
<b>Full-time enrollment</b>		95	82	97	83
<b>Fraternity or Sorority member</b>		9	11	10	12
<b>Student-athlete</b>		10	5	10	6
<b>Living on campus</b>		60	13	63	12
<b>First generation</b>		47	49	45	48
<b>Traditional age</b>		93	58	94	57
<b>Race or ethnicity</b>	African American/Black	11	9	10	10
	Asian/Pacific Islander	7	7	7	8
	Caucasian/White	59	62	61	26
	Hispanic/Latino	12	9	11	9
	Other	6	7	6	7
<b>Primary major field</b>	Arts & Humanities	14	15	12	14
	Biological Sciences	9	7	11	8
	Business	12	18	12	19
	Education	9	10	9	9
	Engineering	7	7	9	8
	Physical Science	3	3	4	4
	Professional	13	10	15	11
	Social Science	13	16	12	16
<b>Grades</b>	Mostly A's	44	47	45	49
	Mostly B's	44	44	43	45
	Mostly C's	12	9	12	6
<b>Institution Characteristics</b>					
<b>Control</b>	Public	72		73	
<b>Carnegie Classification</b>	Doctoral	39		42	
	Master's	36		33	
	Baccalaureate	25		25	

## **Variables**

Several scales and collections of items serve as variables in this study alongside various student-level and institution-level demographic items. Although all items in the Supplemental Instruction experimental item set (Appendix A) administered at the end of the NSSE were examined in this study, the last six items of the set were used to create the Supplemental Learning Strategies scale (SLS). Student engagement was measured with four of NSSE's Benchmark of Effective Educational Practice: Level of Academic Challenge, Active and Collaborative Learning, Student-Faculty Interaction, and Supportive Campus Environment. Engagement was also measured with three scales of deep approaches to learning: Higher Order Learning, Integrative Learning, and Reflective learning; and students' self-reports of gains: Gains in Practical Competence, Gains in General Education, and Gains in Personal and Social Development (see Appendix B through D for the component items and reliability coefficients of the scales and NSSE benchmarks used in this study). The same variables that were used to report student demographics and institutional characteristics (Table 1) were used as controls in the regression analyses.

## **Analysis**

For all research questions, first-year and senior data were analyzed separately in order to present distinct results reflective of the first-year and senior experience in college. Frequencies of reported participation were used to answer the first research question about the types of SI experiences students are having and what types of students are having those experiences. Frequencies of the demographics of students that reported participating in SI experiences were compared to frequencies of the demographics of all students in the sample. To answer the second research question about whether or not students that participate in SI experiences differ

from students that do not in terms of other forms of engagement, *t*-tests and effect sizes were computed comparing these two groups of students' scores on the NSSE benchmarks, deep approaches to learning scales, and student-reported gains scales. To answer the final research question about whether or not SI experiences are related to other forms of engagement and if this engagement differs for specific subpopulations, first, correlations between the Supplemental Learning Strategies scale (SLS) and the NSSE benchmarks were examined. Next, multivariate OLS regressions were used to determine the relationship between students' SLS scale scores and the dependent measures of deep approaches to learning and student-reported gains. Models included all student-level demographics and institution-level characteristics reported earlier as controls. All continuous independent and dependent variables were standardized before being entered into the regression analyses so that the unstandardized coefficients could be interpreted as effect sizes. Additional regression analyses were examined with a variety of interaction terms to look at how SI experiences affect different types of students.

### **Results**

Students' descriptions of SI experiences were roughly the same for both classes. Around a third of both first-years and seniors that participated in SI reported that they "often" or "very often" attended such sessions. The smallest portions of students in both classes were taking part in SI activities that focused on developing study skills or connecting course content with learning strategies. More often students were participating in activities that focused on preparing for examinations or reviewing course content and readings. According to Table 2, slightly more often first-years were experiencing SI led by an experienced student, and seniors were slightly more often experiencing SI led by their course instructor. The demographics of students

reporting that their courses provided supplemental instruction were similar to the demographics of students in the sample (Table 1) suggesting that SI experiences are reaching a variety of students despite the finding that only 57% of first-years and 48% of seniors have courses that provide supplemental instruction.

Table 2

*Percent of Students Participating in Various SI Experiences*

Description of SI Experiences	First-Years (%)	Seniors (%)
An experienced student led supplemental instruction	40	30
My course instructor led supplemental instruction	34	40
Classmates worked collaboratively in small groups	32	40
Activities focused on developing study skills	15	11
Activities focused on reviewing course content and readings	30	27
Activities focused on connecting course content with learning strategies	13	13
Activities focused on preparing for examinations	31	31

Students that participated in SI experiences had significantly ( $p < .001$ ) higher engagement, deep approaches to learning, and self-reported gains scores than students that had not participated in SI experiences. Effect sizes for these differences were noticeable, particularly for senior students. The Cohen's  $d$  effect size differences when comparing the scores of students with SI experiences to students that did not are in Table 3. Although the differences are practically small to medium, these findings do suggest that SI experiences may contribute to important outcomes such as other forms of engagement and students' perceptions of gains while in college.

Table 3

*Comparison of Students with SI Experiences to Students Without*

	First-Years (Cohen's <i>d</i> )	Seniors (Cohen's <i>d</i> )
Level of Academic Challenge	.21	.32
Active and Collaborative Learning	.21	.27
Student-Faculty Interaction	.24	.34
Supportive Campus Environment	.24	.32
Higher Order Thinking	.18	.29
Integrative Learning	.18	.29
Reflective Learning	.15	.24
Gains in Practical Competence	.29	.33
Gains in Personal and Social Development	.22	.30
Gains in General Education	.20	.24

Relationships between the SLS scales and other forms of engagement were positive, significant ( $p < .001$ ), and strongest for students' self-reports of gains and perceptions of campus support. This finding further supports the previous findings that supplemental instruction can contribute to other important college outcomes. Correlations between NSSE benchmarks and the SLS scale were weakest for Active and Collaborative Learning and Student-Faculty Interaction which is interesting given the questions' focus on working with others. Controlling for a wide variety of student-level demographics and institution-level characteristics, another surprising weak relationship was found between the SLS scale and forms of deep approaches to learning, particularly Reflective Learning. Relationship information can be found in Table 4. The additional regression analyses with interaction effects revealed very few significant interactions with no particular noteworthy findings. This does not suggest that SI experiences would not

affect different students in different ways so much as it may suggest that the types of SI experiences examined here are equally beneficial to all students.

Table 4

*Relationship Between the SLS Scale and Outcomes*

	First-Years (Pearson's <i>r</i> )	Seniors (Pearson's <i>r</i> )
Level of Academic Challenge	.42	.39
Active and Collaborative Learning	.36	.37
Student-Faculty Interaction	.39	.37
Supportive Campus Environment	.43	.45
	First-Years (unstandardized B)	Seniors (unstandardized B)
Higher Order Thinking	.37	.32
Integrative Learning	.38	.36
Reflective Learning	.27	.24
Gains in Practical Competence	.48	.45
Gains in Personal and Social Development	.48	.48
Gains in General Education	.45	.39

### Discussion

Increasing student retention and graduation rates are challenging tasks for many colleges and universities. The extent to which institutions invest resources in instruction and academic support services has a positive influence on retention rates and academic performance (Gansemer-Topf & Schuh, 2003). Findings from this study confirm the wide use of one type of academic support service on college campuses -- supplemental instruction. Many students from different institutions and disciplinary areas appear to be participating in and equally benefiting from SI. In general, students who participate in SI typically engage in effective educational

practices and report higher self-reported gains in practical skills, personal and social development, and general education than students who do not. However, what is not clear from this study is if SI helps students to become more engaged or if highly engaged students tend to seek out SI programs. More research is needed to better understand the causal relationship. Nonetheless, this study provides empirical evidence that SI is positively related to many forms of engagement practices.

Despite prominence on college campuses and positive relationships to a host of engagement measures, this study also highlights areas for potential improvements. In theory, SI is intended to emphasize new study strategies that encourage students to use higher-order thinking rather than rote or memorization (Hurley, Jacobs, Gilbert, 2006), yet in practice this may be better identified as a goal rather than the norm. Here, first-year and senior students reported they were less likely to participate in activities that focused on developing study skills and connecting the course content to learning strategies. They were more likely to report SI courses focused on preparing for examinations and reviewing course content and readings. These results may partly explain why we saw a weak relationship with students' deep approaches to learning. To encourage deep learning, SI leaders need to place more emphasis on developing students' meta-cognition so that they become intentional learners (Huber & Hutchings, 2004). By encouraging SI participants to reflect on the course material and integrate new information with what they already know, they may be able to move beyond surface level knowledge (Marton & Säljö, 1976). This approach not only allows students to personalize the material, it helps them to code the information in a way so they retain it for a longer period of time (Huber & Hutchings, 2004; Svensson, 1977).

One of the key features of SI is peer-assisted learning in which undergraduate students serve as discussion leaders and help their peers grasp difficult course concepts. Students begin to expand their thinking and approaches to learning when they see their peers as a suitable source of knowledge (Evans, Forney, & Guido-DiBrito, 1998). Further, interactions with peers in academic setting are known to have important implications for student retention (Tinto, 1997). According to this study, we found instructor-led SI courses may be as prevalent as peer-led courses, particularly among seniors. A higher portion of seniors said they were taught by their instructors which makes logical sense because faculty tend to select students who have already taken the course themselves. In other words, upper-level SI courses are less likely taught by a fellow student because it's taken near the end of the one's undergraduate career. A better understanding is needed about the differences in SI experiences by class level. How effective is it to use faculty time to teach SI courses? Further, do students receive the same gains if the SI leader is an instructor versus a peer? These questions are important not only for future researchers but also academic support centers that are implementing the programs.

### **Conclusion**

In conclusion, findings from this study provided insights into a popular academic support program on college campuses. It explored the relationship with engagement measures and self-reported gains and found additional evidence to support its wide use. However, there are also areas where improvement may be needed such as incorporating teaching strategies that promote deep learning and retention. Additionally, a better understanding is needed about the implication of using instructors, rather than students, from a student learning and cost/benefit perspective.

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## Appendix A

### NSSE 2011 Beta Item Set for Supplemental Instruction

NSSE 2011 Supplemental Instruction Experimental Items
During the current school year, did any of your courses provide supplemental instruction (extra course content instruction and/or study strategy sessions linked to a difficult course)? ( <i>No, Yes</i> )
How often did you attend supplemental instruction sessions? ( <i>Never, Sometimes, Often, Very Often</i> )
<i>Which of the following best describes your supplemental instruction experience(s)? (Select all that apply):</i>
An experienced student led supplemental instruction
My course instructor led supplemental instruction
Classmates worked collaboratively in small groups
Activities focused on developing study skills
Activities focused on reviewing course content and readings
Activities focused on connecting course content with learning strategies
Activities focused on preparing for examinations
<i>To what extent did your supplemental instruction experience(s) provide opportunities for each of the following: (Very little, Some, Quite a bit, Very much)</i>
Understanding fundamental concepts in the course
Completing course readings and/or assignments
Working effectively with others
Learning effectively on your own
Spending significant amounts of time studying and on academic work
Providing the support you need to help you succeed academically

## Appendix B

### Component Items and Reliability Coefficients for Deep Approaches to Learning Subscales

Higher Order Learning (Cronbach's $\alpha$ = .82 for first-year students and $\alpha$ = .83 for seniors)
<i>During the current school year, how much has your coursework emphasized... (very much, quite a bit, some, very little)</i>
Analyzing the basic elements of an idea, experience, or theory, such as examining a particular case or situation in depth and considering its components
Synthesizing and organizing ideas, information, or experiences into new, more complex interpretations and relationships
Making judgments about the value of information, arguments, or methods, such as examining how others gathered and interpreted data and assessing the soundness of their conclusions
Applying theories or concepts to practical problems or in new situations
Integrative Learning (Cronbach's $\alpha$ = .70 for first-year students and $\alpha$ = .72 for seniors)
<i>During the current school year, how much has your coursework emphasized... (very much, quite a bit, some, very little)</i>
Worked on a paper or project that required integrating ideas or information from various sources
Included diverse perspectives (different races, religions, genders, political beliefs, etc.) in class discussions or writing assignments
Put together ideas or concepts from different courses when completing assignments or during class discussions
Discussed ideas from your readings or classes with faculty members outside of class
Discussed ideas from your readings or classes with others outside of class (students, family members, co-workers, etc.)
Reflective Learning (Cronbach's $\alpha$ = .80 for first-year students and $\alpha$ = .80 for seniors)
<i>During the current school year, how much has your coursework emphasized... (very much, quite a bit, some, very little)</i>
Examined the strengths and weaknesses of your own views on a topic or issue
Tried to better understand someone else's views by imagining how an issue looks from his or her perspective
Learned something that changed the way you understand an issue or concept

## Appendix C

### Component Items and Reliability Coefficients for Self-reported Learning Gains

Gains in Practical Competence (Cronbach's $\alpha$ =.83 for first-year students and $\alpha$ =.82 for seniors)
<i>To what extent has your experience at this institution contributed to your knowledge, skills, and personal development in... (very much, quite a bit, some, very little)</i>
Acquiring job or work-related knowledge and skills
Working effectively with others
Using computing and information technology
Analyzing quantitative problems
Solving complex real-world problems
Gains in General Education (Cronbach's $\alpha$ =.84 for first-year students and $\alpha$ =.84 for seniors)
<i>To what extent has your experience at this institution contributed to your knowledge, skills, and personal development in... (very much, quite a bit, some, very little)</i>
Writing clearly and effectively
Speaking clearly and effectively
Acquiring a broad general education
Thinking critically and analytically
Gains in Personal and Social Development (Cronbach's $\alpha$ =.87 for first-year students and $\alpha$ =.88 for seniors)
<i>To what extent has your experience at this institution contributed to your knowledge, skills, and personal development in... (very much, quite a bit, some, very little)</i>
Developing a personal code of values and ethics
Understanding yourself
Understanding people of other racial and ethnic backgrounds
Voting in local, state, or national elections
Learning effectively on your own
Contributing to the welfare of your community
Developing a deepened sense of spirituality

## Appendix D

### Component Items and Reliability Coefficients for NSSE Benchmarks of Effective Educational Practice

Level of Academic Challenge (Cronbach's $\alpha$ =.73 for first-year students and $\alpha$ =.76 for seniors)
<i>During the current school year, about how much reading and writing have you done (None, 1-4, 5-10, 11-20, more than 20)</i>
Number of assigned textbooks, books, or book-length packs of course readings
Number of written papers or reports of 20 pages or more
Number of written papers or reports between 5 and 19 pages
Number of written papers or reports of fewer than 5 pages
<i>During the current school year, how much has your coursework emphasized... (very much, quite a bit, some, very little)</i>
Analyzing the basic elements of an idea, experience, or theory, such as examining a particular case or situation in depth and considering its components
Synthesizing and organizing ideas, information, or experiences into new, more complex interpretations and relationships
Making judgments about the value of information, arguments, or methods, such as examining how others gathered and interpreted data and assessing the soundness of their conclusions
Applying theories or concepts to practical problems or in new situations
<i>In your experience at your institution during the current school year, about how often have you done... (very often, often, sometimes, never)</i>
Worked harder than you thought you could to meet an instructor's standards or expectations
<i>About how many hours do you spend in a typical 7-day week doing...(0, 1-5, 6-10, 11-15, 16-20, 21-25, 26-30, more than 30)</i>
Preparing for class ( studying, reading, writing, doing homework or lab work, analyzing data, rehearsing, and other academic activities)
<i>To what extent does your institution emphasize... (very much, quite a bit, some, very little)</i>
Spending significant amounts of time studying and on academic work
Active and Collaborative Learning (Cronbach's $\alpha$ =.67 for first-year students and $\alpha$ =.67 for seniors)
<i>In your experience at your institution during the current school year, about how often have you done... (very often, often, sometimes, never)</i>
Asked questions in class or contributed to class discussions
Made a class presentation
Worked with other students on projects during class
Worked with classmates outside of class to prepare class ass
Tutored or taught other students (paid or voluntary)
Participated in a community-based project (e.g., service learning) as part of a regular course
Discussed ideas from your readings or classes with others outside of class (students, family members, co-workers, etc.)

**Appendix D (cont.)****Component Items and Reliability Coefficients for NSSE Benchmarks of Effective Educational Practice**

Student-Faculty Interaction (Cronbach's $\alpha=.71$ for first-year students and $\alpha=.74$ for seniors)
<i>In your experience at your institution during the current school year, about how often have you done... (very often, often, sometimes, never)</i>
Discussed grades or assignments with an instructor
Discussed ideas from your readings or classes with faculty members outside of class
Talked about career plans with a faculty member or advisor
Received prompt written or oral feedback from faculty on your academic performance
Worked harder than you thought you could to meet an instructor's standards or expectations
<i>Which...have you done or do you plan to do before you graduate from your institution (done, plan to do, do not plan to do, have not decided)</i>
Work on a research project with a faculty member outside of course or program requirements
Supportive Campus Environment (Cronbach's $\alpha=.79$ for first-year students and $\alpha=.80$ for seniors)
<i>To what extent does your institution emphasize... (very much, quite a bit, some, very little)</i>
Providing the support you need to thrive socially
Providing the support you need to help you succeed academically
Helping you cope with your non-academic responsibilities (work, family, etc.)
<i>Mark the box that best represents the quality of your relationships with people at your institution</i>
Relationships with other students ( <i>unfriendly, unsupportive, sense of alienation...friendly, supportive, sense of belonging</i> )
Relationships with faculty members ( <i>unavailable, unhelpful, unsympathetic...available, helpful, sympathetic</i> )
Relationships with administrative personnel and offices ( <i>unhelpful, inconsiderate, rigid...helpful, considerate, flexible</i> )