



Research Brief

Relationship of Supplemental Instruction (SI) to Course Success for Students in the HSI STEM SI Program

Prepared by Lorena Guadiana

About this Brief

This brief is a revision to previous Supplemental Instruction (SI) research (RRN 606). It summarizes the relationship between SI and classroom achievement for HSI STEM students in the SI program at Crafton Hills College. The results include demographic information which has been disaggregated by ethnicity, gender and age.

Summary of Findings

- 72 students attended one or more SI sessions and earned a Grade on Record (GOR) in Fall 2012
- 65% of students who attended a SI session attended two or more sessions
- 49% of the students who were enrolled in a section where SI was offered attended a SI session at least once
- Students who attended one or more SI sessions had a statistically significant and substantially higher success rate (74%) than students in the same section who did not attend at least one SI session (55%)
- Students who attended two or more SI sessions had a statistically significant and substantially higher success rate (79%) than students in the same section who did not attend at least one SI session (55%)
- Hispanic students who attended two or more SI sessions had a substantially higher success rate (55%) than Hispanic students who did not attend SI (37%)
- Male students who attended two or more SI sessions also had a statistically significantly and a substantially higher success rate (88%) than male students in the same section who did not attend SI (53%)

Findings

An examination of the students who did not attend SI and those who attended a session one or more times or two or more times was performed. Students who attended one or more SI sessions had a statistically significant ($p=.013$) and substantially higher ($ES=0.40$) success rate (74%) than students in the same section who did not attend at least one SI session (55%). Similarly, students who attended two or more SI sessions had a statistically significant ($p=.006$) and substantially higher ($ES=0.50$) success rate (79%) than students who did not attend at least one SI session (see *Figure 1, Tables 1 - 2, and 4*).

Hispanic Students

Student success rates were disaggregated by ethnicity, gender and age. Hispanic students who attended two or more SI sessions had a substantially ($ES=0.36$) higher (55%), but not a statistically significant ($p=.330$) success rate than Hispanic students in the same section who did not attend SI (37%) (see *Figure 2 and Table 3*).

Gender

Male students who attended two or more SI sessions also had a statistically significantly ($p<.001$) and a substantially ($ES=0.73$) higher success rate (88%) than male students in the same section who did not attend SI (53%). The results illustrate that female students who participated in two or more SI sessions were not statistically significantly ($p=.599$) nor substantially ($ES=0.18$) more likely to successfully complete their courses than female students in the same course sections. However, a limitation is that the sample size for male students is greater than for female students.

Age

The data also illustrates that students who were in the 20-24 year-old age category and whom attended two or more SI sessions were statistically significantly ($p=.017$) and substantially ($ES=0.55$) more likely to successfully complete their course, but it is important to mention that the sample size for this particular age category is also considerably higher than the other categories.

Figure 1: Fall 2012 STEM Students Success Rate by Number of Sessions Attended.

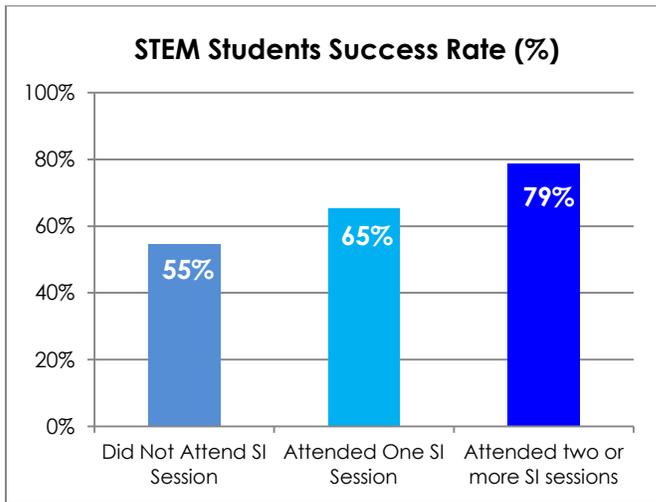


Table 1: Fall 2012 Success Rate of Students Who Did Not Attend and Attended One or More SI Sessions by Course.

SI Course	Success Rate							ES	P-Value
	Did Not Attend SI Session			Attended One or More SI Sessions					
	#	N	%	#	N	%			
MATH-250	28	49	57	12	16	75	0.36	.208	
MICRO-102	14	28	50	22	34	65	0.30	.250	
PHYSIC-200	0	0		20	23	87			
Total	42	77	55	54	73	74	0.40	.013	

Table 2: Fall 2012 Success Rate of Students Who Did Not Attend and Attended Two or More SI Sessions by Course.

SI Course	Success Rate							ES	P Value
	Did Not Attend SI Session			Attended Two or More SI Sessions					
	#	N	%	#	N	%			
MATH-250	28	49	57	8	10	80	0.46	.183	
MICRO-102	14	28	50	10	15	67	0.33	.306	
PHYSIC-200	0	0		19	22	86			
Total	42	77	55	37	47	79	0.50	.006	

Note: Students were included even if they were not enrolled in a section where SI was offered.

Figure 2. Fall 2012 Hispanic Students Success Rate by Number of Sessions Attended.

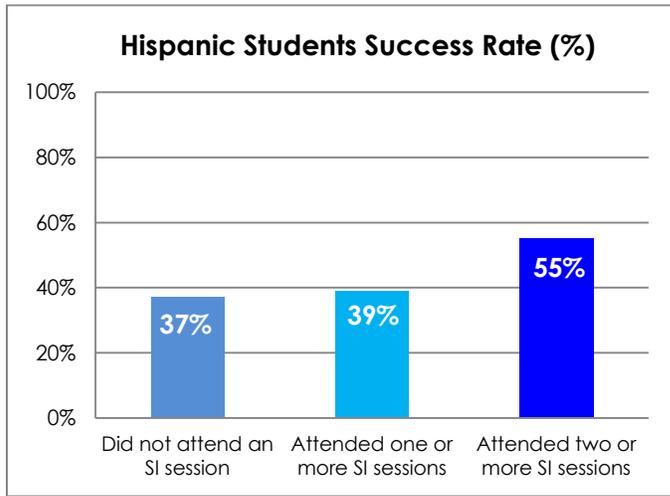


Table 3: Fall 2012 Student Success Rates Disaggregated by **Ethnicity, Gender and Age**.

Ethnicity	Did not attend an SI session			Attended one or more SI sessions			Attended two or more SI sessions			Effect Size (ES)	P-Value
	#	N	%	#	N	%	#	N	%		
Hispanic	11	30	37	11	28	39	6	11	55	0.36	.330
African American	4	7	57	5	7	71	3	4	75	0.35	.592
Asian	2	7	29	9	10	90	8	9	89	1.21	.014
Native American/Alaskan Native	0	0	-	1	1	100	1	1	100		
Caucasian	24	32	75	24	26	92	18	20	90	0.38	.155
Total	41	76	54	50	72	69	36	45	80	0.54	.002
Gender	#	N	%	#	N	%	#	N	%		
Female	15	27	56	15	27	56	9	14	64	0.18	.599
Male	26	49	53	36	45	80	28	32	88	0.73	p<.001
Age	#	N	%	#	N	%	#	N	%		
19 or younger	5	12	42	5	7	71	4	5	80	0.75	.145
20-24	26	50	52	26	38	68	19	24	79	0.55	.017
25-29	5	5	100	11	15	73	8	9	89	0.42	.337
30-34	4	6	67	3	6	50	2	4	50	0.32	.653
35-39	0	1	-	2	2	100	1	1	100	1.41	
40-49	1	2	50	3	3	100	2	2	100	1.00	.423
50 and above	0	0	-	1	1	100	1	1	100		

Methodology

The success rate¹ of students who utilized SI was compared to students in the same section who did not utilize SI. Students who attended a SI session one or more times or two or more times were compared to students who did not attend a SI session and were enrolled in the same section. Because SI benefits are more likely to occur with students who participate in SI two or more times, students who attended two or more times were also compared with students who did not attend at least one SI session.

The effect size statistic was used to indicate the size of the difference on success between those who did and did not attend SI. A method of interpreting effect size was developed by Jacob Cohen, a renowned

1. Success rate is defined as earning a grade of A, B, C, or P divided by the number of grades earned on record (GOR; A, B, C, D, F, P, NP, I and W).

statistician and psychologist. Jacob Cohen defined "small", "medium", and "large" effect sizes. He explained that an effect size of .20, .50, and .80 can be small, medium, and large, respectively. An effect size of .20 or higher is considered meaningful. It is important to mention that the number of students in each group does not influence effect size; whereas, when statistical significance is calculated, the number of students in each group does influence the significance level (i.e. "p" value being lower than .05).

Participation

In Fall 2012, 72 students attended at least one SI session. Of those, 72 (100%) students earned a GOR in one of the sections in which SI was offered. Moreover, 47 of the 72 (65%) students attended two or more SI sessions.

Table 4 illustrates the number of students who attended at least one SI session and earned a GOR in one of the sections where SI was offered. Students were excluded if they attended an SI session for a section where SI was not offered. Accordingly, 49% of the students who were enrolled in a section where SI was offered attended a SI session at least once.

Table 4: Percent and Number of **Students Attending One or More SI Sessions** by Course Section.

Course Section	Percent of Students who Used SI		
	#	N	%
MATH-250-15	1	32	3
MATH-250-50	15	33	45
MICRO-102-35	13	23	57
MICRO-102-36	17	30	57
MICRO-102-38	1	2	50
MICRO-102-39	3	7	43
PHYSIC-200-20	6	6	100
PHYSIC-200-21	4	4	100
PHYSIC-200-22	1	1	100
PHYSIC-200-23	5	5	100
PHYSIC-200-24	7	7	100
Total	73	150	49

Note: The data accounts for those same students who attended more than one section and some students who attended SI even though they were not in a section that offered SI. Note "#" represents the number of students who attended at least one SI session and earned a GOR, "N" represents the total number of GOR earned in the SI section, and "%" represents the percent of students who attended at least one SI session.