Crafton Hills College

Institutional Effectiveness, Research & Planning

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Research Brief

Relationship of Supplemental Instruction (SI) to Course Success for Students in the HSI Title III STEM SI Program for the Fall 2013 and Spring 2014 Terms

Prepared by Benjamin Gamboa

Purpose of Brief

This brief analyzes the relationship of supplemental instruction (SI) to course success for students utilizing the HSI Title III Science, Technology, Engineering and Mathematics (STEM) SI program in the Fall 2013 and Spring 2014 terms.

Summary of Findings

- Students who attended two or more SI sessions were substantially (ES = .33) and statistically significantly (p = .003) more likely to successfully complete the course (75%) than students in the same section who did not attend any SI sessions (60%).
- Hispanic students who attended two or more SI sessions were substantially (ES = .38) and statistically significantly (p = .017) more likely to successfully complete the course (71%) than Hispanic students in the same section who did not attend any SI sessions (53%).
- Students 19 years or younger who attended two or more SI sessions were also substantially (ES = .62) and statistically significantly (p = .012) more likely to successfully complete the course (78%) than students 19 years or younger in the same section who did not attend any SI sessions (47%).

Overview

In response to the third deficit identified in the HSI Title III STEM Grant, Crafton Hills College (CHC) developed an SI program as an alternative learning strategy aimed at improving students' math, technical and conceptual science skills. In the Fall 2013 and Spring 2014 terms, CHC offered supplemental instruction for students enrolled in the following course sections: CHEM-150-20, CHEM-150-21, CHEM-150-22, CHEM-150-25, CHEM-150-26, CHEM-150-27, MATH-103-35, MICRO-102-15, MICRO-102-16, MICRO-102-35, MICRO-102-36, PHYSIC-250-25, PHYSIC-250-27, and PHYSIC-250-90. Table 1 illustrates the participation rate (%) of students participating in SI (#) as a percentage of total students in the same sections with a grade on record (N). 227 students (54%) of 419 students attended at least one SI session.

Table 1: Participation rate of students in SI program.

Term	Course	#	N	%
Fall 2013	CHEM-150-20	12	25	48.0
	CHEM-150-21	17	22	77.3
	CHEM-150-22	5	14	35.7
	MATH-103-35	10	35	28.6
	MICRO-102-15	16	27	59.3
	MICRO-102-16	8	10	80.0
	MICRO-102-35	18	26	69.2
	MICRO-102-36	3	11	27.3
	PHYSIC-250-25	16	17	94.1
Spring 2014	CHEM-150-25	14	25	56.0
	CHEM-150-26	8	26	30.8
	CHEM-150-27	4	13	30.8
	MATH-103-35	6	38	15.8
	MICRO-102-15	8	22	36.4
	MICRO-102-16	4	10	40.0
	MICRO-102-35	17	27	63.0
	MICRO-102-36	7	14	50.0
	PHYSIC-250-25	23	23	100.0
	PHYSIC-250-27	14	17	82.4
	PHYSIC-250-90	17	17	100.0
	TOTAL	227	419	54.2

Methodology

The success (a grade of A, B, C or P) of students who utilized SI was compared to students with a grade on record (a grade of A, B, C, D, F, P, NP, W or I) in the same section who did not utilize SI. Additionally, success rates were also compared between students who attended one or more SI sessions and those who attended two or more SI sessions. Results were disaggregated by ethnicity, gender, and age categories to illustrate success among certain groups and categories of students. Finally, analysis of variance tests and effect size calculated using Cohen's d methodology were used to measure the strength and relationship of SI success in the course and grade points earned.

The effect size (ES) statistic is commonly used in meta-analyses. A meta-analysis uses quantitative techniques to determine the average effect of a given technique over multiple studies. Noticing that even small differences can be statistically significant when large pools of data are analyzed, Jacob Cohen developed one method of interpreting effect size. Cohen defined "small," "medium," and "large" effect sizes and explained that an effect size of .20 can be considered small, an effect size of .50 can be considered medium, and an effect size of .80 can be considered large. Effect size is calculated by dividing the difference of the two means by the pooled standard deviation. 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 less than .05). Accordingly, using Cohen as a guide, a substantial effect would be .20 or higher.

Findings

Table 2 compares the success rates of students who attended at least on SI session and those who did not attend any sessions. Students who attended one or more SI sessions were substantially (ES = .23) and statistically significantly (p = .018) more likely to successfully complete the course (71%) than students in the same section who did not attend any SI sessions (60%). **There was an 11% increase in success for students who attended one or more SI sessions.**

Table 2: Success rates of students in course sections with SI.

	Did Not Attend Any SI Sessions			Attended One or More SI Sessions			Effect Size			p-value
	#	N	%	#	N	%	ES	Lower Bound	Upper Bound	
Successful	115	192	59.9	161	227	70.9%	0.23	0.04	0.43	0.018

Table 2a compares the success rates of students who attended two or more SI sessions and those who did not attend any sessions. Students who attended two or more SI sessions were substantially (ES = .33) and statistically significantly (p = .003) more likely to successfully complete the course (75%) than students in the same section who did not attend any SI sessions (60%). **There was a 15% increase in success for students who attended two or more SI sessions.**

Table 2a: Success rates of students in course sections with SI.

	Did Not Attend Any SI Sessions			Attend Two or More SI Sessions			Effect Size			p-value
	#	N	%	#	N	%	ES	Lower Bound	Upper Bound	
Successful	115	192	59.9	132	177	74.6	0.33	0.11	0.52	0.003

Table 3 displays success rates disaggregated by the students' ethnicities, genders, and age. Hispanic students who attended two or more SI sessions were substantially (ES = .38) and statistically significantly (p = .017) more likely to successfully complete the course (71%) than Hispanic students in the same section who did not attend any SI sessions (53%). Male students who attended two or more SI sessions were substantially (ES = .41) and statistically significantly (p = .003) more likely to successfully complete the course (78%) than male students in the same section who did not attend any SI sessions (59%). Students 19 years or younger who attended two or more SI sessions were also substantially (ES = .62) and statistically significantly (p = .012) more likely to successfully complete the course (78%) than students 19 years or younger in the same section who did not attend any SI sessions (47%). Students 25-29 years old who attended two or more SI sessions were also substantially (ES = .56) and statistically significantly (p = .037) more likely to successfully complete the course (83%) than students 25-29 years old in the same section who did not attend any SI sessions (58%).

Table 3: Disaggregated student success rates

	Did Not Attend Any SI Sessions			Attended One or More SI Sessions			Attended Two or More SI Sessions			Two or More with Did Not Attend[a]	
	#	N	%	#	N	%	#	N	%	ES	p-value
Hispanic	42	80	52.5	68	101	67.3	56	79	70.9	0.38	0.017
Caucasian	54	77	70.1	57	76	75.0	47	59	79.7	0.22	0.203
African American	8	16	50.0	13	22	59.1	11	17	64.7	0.29	0.410
Asian	8	16	50.0	14	18	77.8	11	15	73.3	0.47	0.193
Native American/Alaskan	3	3	100.0	9	10	90.0	7	7	100.0	0.00	1.000
Female	53	87	60.9	69	100	69.0	57	81	70.4	0.20	0.199
Male	61	104	58.7	91	126	72.2	74	95	77.9	0.41	0.003
19 or younger	16	34	47.1	24	33	72.7	21	27	77.8	0.62	0.012
20-24	75	113	66.4	84	121	69.4	62	87	71.3	0.11	0.460
25-29	15	26	57.7	31	41	75.6	29	35	82.9	0.56	0.037
30-34	5	11	45.5	12	18	66.7	12	16	75.0	0.60	0.139
35-39	2	4	50.0	2	2	100.0	0	0		0.97	0.158
40-49	1	2	50.0	7	10	70.0	7	10	70.0	0.41	0.710
50 and above	1	2	50.0	1	2	50.0	1	2	50.0	0.00	1.000

a. Age group 35-39 compares "Attended one or more SI Sessions" to "Did Not Attend Any SI Sessions".

Any questions regarding this report can be directed to the Office of Institutional Effectiveness, Research, and Planning at (909) 389-3390 or you may send an email to bgamboa@craftonhills.edu: RRN 848 SI Performance FA13_SP14.docx; Grades_CHC_GOR_20140605_STEM_SI_1314.sav.