ASSESSING THE SUPPLEMENTAL INSTRUCTION (SI) PROGRAM:

Who are most likely to participate and who would receive the maximum benefits?

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Introduction

Supplemental Instruction (SI) programs were first developed by Deanna Martin, PhD at the University of Missouri-Kansas City in 1973. In 1981, SI programs were designated by the U.S. Department of Education as an Exemplary Educational Program.

In prior research, SI has been shown to improve students' academic achievement, such as course grade, retention and graduation. However, there is a lack of understanding on the factors that affect SI participation and the factors that moderate SI effects. This study will contribute to the current SI research by answering both questions.

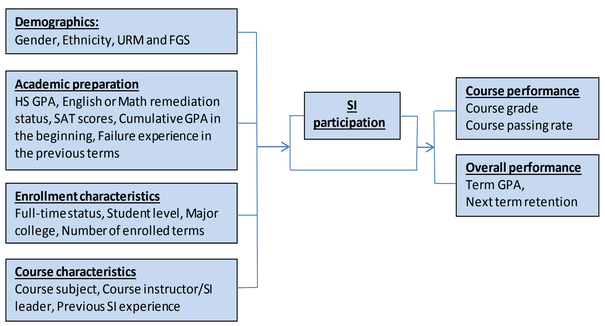
Methods

DATA

3205 students who enrolled in 14 SI courses in spring 2013. All courses are in the lower division and traditionally have high failure rates. 59% are female, 49% are URM, and 68% are FGS.

VARIABLES

SI participation is defined as that students had participated in SI sessions for three times or more.



TWO-STAGE SAMPLE SELECTION MODELING

Stage 1: SI participation model

A logistic regression model is employed to project the probability of students participating in SI. The projected probabilities are saved as the values of the sample selection correction factor (Lambda) and then incorporated into the SI effect model (Table 1).

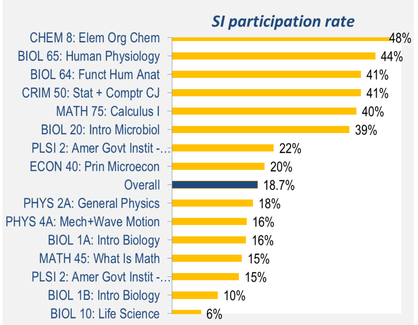
Stage 2: SI effect model

Multiple-way ANOVA is employed to estimate the effect of SI participation in students' course grades after adjusting for the self-selection bias and controlling other factors' influences. The interaction terms of 10 factors with SI participation are also included to explore how the effect of SI participation is moderated by these factors (Table 2).

Results

Chart 1

There are wide variations in SI participation among course instructors/SI leaders.



SI PARTICIPATION

Students who had better academic performance are more likely to participate in SI than students who did not.

Chart 2

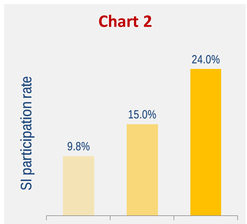


Chart 3

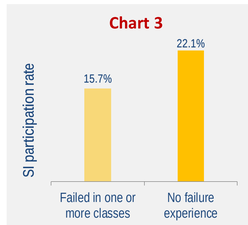


Table 1 Results from SI participation model

Dependent Variable: SI participation (Participated=1,

Variables	B	S.E.	Wald	Sig.	Exp(B)
Course instructors/SI leaders			220.3	0.000	
English remediation	0.666	0.125	28.37	0.000	1.945
Gender	0.505	0.114	19.76	0.000	1.657
Cumulative GPA group			17.84	0.000	
Student major (College)			10.96	0.204	
Student level			5.956	0.114	
Failure experience	-0.307	0.137	5.034	0.025	0.735
Math remediation	0.255	0.126	4.095	0.043	1.29
URM	0.203	0.107	3.634	0.057	1.225
Number of term enrolled	-0.055	0.043	1.651	0.199	0.946
New student type at entry	-0.264	0.233	1.289	0.256	0.768
FGS	-0.088	0.114	0.589	0.443	0.916
Full Time	0.136	0.218	0.391	0.532	1.146
Constant	-4.086	0.451	82.05	0.000	0.017

Chi-square=466.389, df=36, Sig. < 0.001.
-2 LL=2618.301, Nagelkerke R Square=0.219.

SI EFFECTS

Table 2 Results from SI effect model

Dependent Variable: Course grade (A=4, B=3, C=2, D=1 and F/WU=0)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Main effects						
Course instructors/SI leaders	407.686	14	29.12	25.75	0.000	0.105
Cumulative GPA group	106.98	2	53.49	47.29	0.000	0.03
Math remediation	34.159	1	34.16	30.2	0.000	0.01
English remediation	26.73	1	26.73	23.63	0.000	0.008
Student major (College)	23.036	8	2.879	2.546	0.009	0.007
Lambda	18.148	1	18.15	16.05	0.000	0.005
Gender	15.671	1	15.67	13.86	0.000	0.004
URM	13.695	1	13.7	12.11	0.001	0.004
Term units enrolled	11.418	1	11.42	10.1	0.002	0.003
SI Participation	10.293	1	10.29	9.1	0.003	0.003
Cumulative units earned	3.373	1	3.373	2.982	0.084	0.001
FGS	2.831	1	2.831	2.503	0.114	0.001
Interaction effects						
SI Participation * Course instructors/SI leaders	30.535	14	2.181	1.928	0.020	0.009
SI Participation * Student major (College)	7.936	8	0.992	0.877	0.535	0.002
SI Participation * Gender	4.907	1	4.907	4.339	0.037	0.001
SI Participation * Cumulative units earned	3.688	1	3.688	3.26	0.071	0.001
SI Participation * Cumulative GPA group	2.985	2	1.492	1.319	0.267	0.001
SI Participation * Math remediation	0.377	1	0.377	0.334	0.564	0
SI Participation * Term units enrolled	0.072	1	0.072	0.063	0.801	0
SI Participation * URM	0.039	1	0.039	0.034	0.854	0
SI Participation * FGS	0.012	1	0.012	0.011	0.917	0
SI Participation * English remediation	0.004	1	0.004	0.003	0.955	0
Intercept	22.367	1	22.37	19.78	0.000	0.006

F=40.884, Sig. <0.001.
R Squared = .459 (Adjusted R Squared = .448).

Chart 4

SI participation is one of significant factors affecting students' course grade.

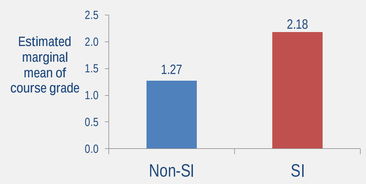


Chart 5

Course instructors/SI leaders is the strongest factor moderating SI effects.

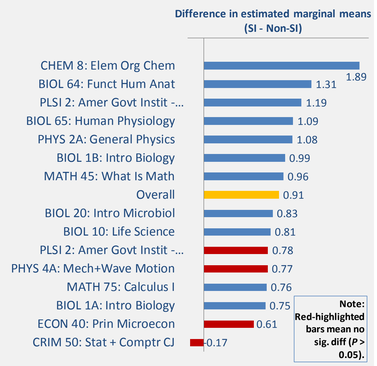


Chart 6

SI effects are moderated by Gender.

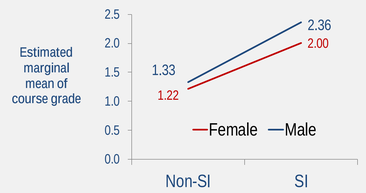
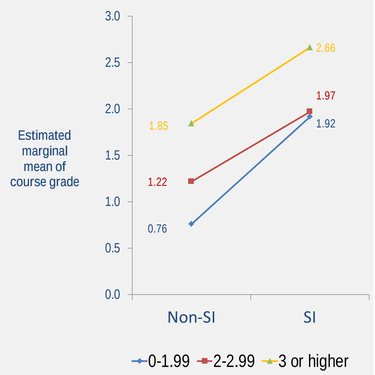


Chart 7

The effects of SI participation on students' course grade are different among three cumulative GPA groups.



Conclusion

SI significantly increases participants' course grade even adjusting for self-selection and controlling other factors' influences

Course instructors and SI leaders is the most important factor affecting SI participation and SI effects.

Students of all levels of academic performance benefitted from SI participation. The weakest students (whose cumulative GPA is below 2.0) received the largest benefits from SI but they are less likely to participate in SI than other students. This finding needs more explanatory study.

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Hongtao Yue, Research Analyst
California State University, Fresno

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