



Evaluation of Math Supplemental Instruction, Spring 2019

Cosumnes River College
Office of Institutional Effectiveness
Fall 2019

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Background

At Cosumnes River College (CRC), the Supplemental Instruction (SI) Program provides course specific support for students in math. As part of the SI Program, student tutors (also referred to as SI tutors) attend a particular course for the full semester and organize help sessions outside of class. This allows the SI tutor to tailor support to the specific needs of students. In spring 2019, a total of 39 math courses at CRC were assigned an SI. As part of an ongoing attempt to improve access to and effectiveness of this program, the Office of Equity, Institutional Effectiveness, and Innovation at CRC conducts an evaluation on a term-by-term basis. The evaluation described here focused on three primary questions for SI in spring 2019: (1) do different student groups visit their SI more or less; (2) does support from an SI tutor lead to higher rates of course success; and, (3) does attending SI reduce disproportionate impact in success among student groups? To answer these questions, student SI visits were tracked throughout the fall semester. Note that for the purposes of this investigation, *course success* was defined as receiving an A, B, C, or P in a course.

Summary of Findings

1. Approximately 29.1% of students in courses with an SI tutor attended an SI session outside of class (*Table 1*, page 3). This was a 6.5% increase over fall 2018. Note that the number of sections with an SI increased from 33 in fall 2018 to 39 in spring 2019. Consequently, the number of students who participated in an SI session increased from 288 in fall 2018 to 398 in spring 2019.
2. Various factors predicted higher SI usage (*Table 1* and *Table 2*, page 3 and 4, respectively):
 - a. Female students were more likely to attend SI sessions compared to male students with the same age, race/ethnicity, and course.
 - b. When holding age, gender, and race/ethnicity constant, course was significantly associated with SI usage. Students in Math 335 and Math 125 were more likely to attend an SI session. This is similar to findings from fall 2018 where students in Math 335 were more likely to visit their SI tutor.
 - c. When holding age, gender, and course constant, race/ethnicity was significantly associated with SI usage. African American students had the highest usage rate compared to their peers.
 - d. Unlike previous evaluations, age was not a predictive factor. Younger students were statistically just as likely to attend as older students.
3. Students who attended SI sessions were more likely to succeed than students who did not attend SI sessions in the same class (e.g. Math 100) with the same race/ethnicity, age and gender (50.8% vs. 42.9%, respectively). This difference was smaller than fall 2018 (54.5% vs. 42.2%, respectively).
4. Statistically speaking, the differences in success across ethnicities did not change among the students who used SI. It is however worth noting that equity gaps were smaller for African American and Hispanic/Latino students who attended SI – if not statistically different.

Limitations

Students who seek help from their SI Tutor might be different from other students in motivation and/or other psychological factors. These factors may explain the impact of SI. However, a previous evaluation revealed that academic performance in math did not predict student help seeking¹. Additionally, an evaluation of help seeking in English found that high school GPA was not correlated with whether or not a student sought help from their student assistant. These findings suggest that help-seeking behavior is not simply a sign of an academically successful student taking advantage of available resources.²

¹ Meinz, P. (2016). Evaluation of Academic Support Programs at Cosumnes River College

² Meinz, P. (2019). Spring 2019 Evaluation of English Student Assistant Program.

Conclusions, Recommendations, and Future Directions

The improvement in success for students who visited their SI for help replicated previous evaluations³. Unlike the fall 2018 evaluation, gender and ethnicity were associated with differential usage rates such that African American and female students were more likely to visit their SI tutor for help. Additionally, equity gaps were not statistically reduced among students who used SI – even though data looked promising for African American and Hispanic/Latino students. With these findings in mind, the Office of Equity, Institutional Effectiveness, and Innovation makes the following recommendation:

- 1) Given several replicated studies on the effectiveness of SI, continue to add SI tutors to math courses at CRC.
- 2) If the aforementioned decline in equity gaps persists in fall 2019, investigate what changes in implementation have resulted in reduced equity gaps.

³ <https://employees.crc.losrios.edu/institutional-effectiveness/research/program-evaluations-and-reports>

Student Success and Retention for SI usage

Method

Visits to SI sessions were tracked on a daily basis. After the fall semester ended, these data were entered into a spreadsheet and grades/demographic information from the Los Rios Community College District PeopleSoft database were combined with attendance data. This final dataset was used to conduct analysis relevant to the three questions of the study: (1) do different student groups visit their SI more or less; (2) does support from an SI lead to higher rates of course success and retention; and, (3) does attending SI reduce disproportionate impact in success among student groups?

Student Population Description, Usage Rates, and Success/Retention

Demographics, usage rates, success/retention rates for students that used SI vs. those who did not are presented in *Table 1*. In terms of ethnicity, students who are African American had the highest usage rate (41.1%). Additionally, students who are older and female students were more likely to use SI. In *Table 2* usage rates and success rates for students who used SI vs. those who did not are presented for each math course. Students in Math 335 had the highest usage rate (44.1%). Statistical significance tests with regards to these descriptive differences are described in the next section.

Table 1. Demographics, Success, and SI Usage

Demographic	Usage			Success		
	Headcount	Visited SI	Visited %	Did Not Visit	Visited	Overall
Ethnicity^{U, S}						
African American	134	55	41.0%	27.8%	45.5%	35.1%
Asian	344	94	27.3%	47.6%	55.3%	49.7%
Filipino	70	26	37.1%	43.2%	42.3%	42.9%
Hispanic/Latino	448	123	27.5%	39.1%	48.8%	41.7%
Multi-Race	100	28	28.0%	43.1%	64.3%	49.0%
Native American	6	1	16.7%	20.0%	0.0%	16.7%
Pacific Islander	16	3	18.8%	46.2%	0.0%	37.5%
Unknown	2	1	50.0%	0.0%	0.0%	0.0%
White	248	67	27.0%	50.3%	53.7%	51.2%
Gender^{U, S}						
Female	687	220	32.0%	48.0%	55.0%	50.2%
Male	656	171	26.1%	37.9%	45.0%	39.8%
Unknown	25	7	28.0%	44.4%	57.1%	48.0%
Age^S						
24 or Younger	1112	307	27.6%	40.5%	49.8%	43.1%
25 or Older	256	91	35.5%	54.5%	53.8%	54.3%
Total	1368	398	29.1%	42.9%	50.8%	45.2%

U = Significant predictor of usage; S = Significant predictor of success

Table 2. Course, Success, and SI Usage

Course ^{U, S}	Usage			Success		
	Headcount	Visited SI	Visited %	Did Not Visit	Visited	Overall
MATH 100	258	57	22.1%	31.3%	50.9%	35.7%
MATH 120	326	73	22.4%	38.7%	35.6%	38.0%
MATH 125	107	45	42.1%	58.1%	62.2%	59.8%
MATH 20	64	19	29.7%	44.4%	47.4%	45.3%
MATH 30	83	27	32.5%	42.9%	51.9%	45.8%
MATH 300	76	8	10.5%	88.2%	100.0%	89.5%
MATH 335	270	119	44.1%	37.1%	47.9%	41.9%
MATH 400	61	16	26.2%	24.4%	31.3%	26.2%
STAT 300	123	34	27.6%	53.9%	76.5%	60.2%
Total	184	50	29.1%	42.9%	50.8%	45.2%

U = Significant predictor of usage; S = Significant predictor of success

Analysis (Technical Specifications)

Usage, Success, and Retention

Logistic regressions, assuming binomial error, were used to test for differences in SI **usage**. Ethnicity, gender, age, and course were entered into a logistic regression to test for differences in SI usage. Ethnicity was significantly associated with the likelihood of visiting the SI tutor for help, $\Delta\chi^2(6) = 14.25, p < .05$. This suggests that, when looking at students with the same gender, ethnicity, age, and course – some race/ethnicities were more likely to seek help. Additionally, gender was also significantly associated with SI usage, $\Delta\chi^2(2) = 9.35, p < .01$, such that female students were more likely to seek help compared to male students in the same class with the same age/ethnicity. Finally, when holding age, gender, and race/ethnicity constant, course was significantly associated with SI usage, $\Delta\chi^2(8) = 73.02, p < .001$.

Race/ethnicity ($\Delta\chi^2(6) = 17.72, p < .01$), age ($\Delta\chi^2(1) = 15.25, p < .001$), gender ($\Delta\chi^2(2) = 7.49, p < .05$), and course ($\Delta\chi^2(8) = 107.15, p < .001$) were significant predictors of student **success**. These variables were therefore entered as control variables when testing for differences between students that used SI vs. those who did not. Students who used SI were significantly more likely to succeed ($\Delta\chi^2(1) = 9.10, p < .01$) compared to students who did not – in the same course with the same ethnicity, gender, and age. Additionally, the number of times a student visited their SI for help significantly predicted success, $\Delta\chi^2(1) = 14.99, p < .001$. A student who visited their SI many times had a higher likelihood of succeeding than a student with the same race/ethnicity, age, gender, and math course who visited their SI less.

Next, in order to determine if **equity gaps in course success** were reduced for students who used SI, the interaction between ethnicity and SI usage was tested. If this interaction effect were significant, it would mean that the differences in course success across ethnicities changed within the SI usage group. Unfortunately, this interaction effect was not significant ($\Delta\chi^2(6) = 7.71, ns.$). Statistically speaking, this means that equity gaps did not shrink in the SI usage group. It should however be noted that when the interaction between the number of visits and ethnicity was tested, the effect was trending towards significant ($\Delta\chi^2(6) = 11.78, p < .10$). If this aforementioned decline in equity gaps persists in fall 2019, it may be prudent to investigate what changes in implementation have resulted in reduced equity gaps.