STEM Study Groups/Embedded Tutoring Effectiveness Report Winter 2018

Introduction

The purpose of this report is to evaluate the effectiveness of Study Groups (SG). What follows are descriptive statistics, success rates, and statistical analyses for each course offered under SG in Fall 2017.

Study Groups are just one activity Citrus College has implemented with the goal of facilitating student learning and ultimately student success. Study Groups provide regularly scheduled out-of-class review sessions for students who may want additional help. All the mathematics classes in this analysis also have Embedded Tutors which provide additional support during class.

In Winter 2018 Study Groups (SG) were offered for five mathematics courses for a total of 287 students. There were 78 students that attended at least one Study Group session, resulting in a 27% overall Study Group participation rate.

Table 1 Course Enrollment and SG Participation

Courses	# of SG Supported Sections	Enrollment	SG Participants Count	SG Participation Rate
MATH025*	2	62	35	56%
MATH029*	3	77	14	18%
MATH030*	2	70	11	16%
MATH140*	2	40	7	18%
MATH150*	1	38	11	29%
Total	**10**	**287**	**78**	**27%**

*These courses included an in-class Embedded Tutor

Success Rates based on SG Participation

Chi-square tests were used to examine if students who participated in study group sessions (SG) were more likely to be successful in each course compared to students who did not participate. Success was defined as students earning a final course grade of A, B, or C. Students earning a final course grade of D, F, FW, or W were considered unsuccessful.

Table 2 Success Rates by Course and SG Participation

Course	SG Participant			Non-Participant		
	Success Count	Total	Success Rate	Success Count	Total	Success Rate
MATH025	28	35	80%	17	27	63%
MATH029	13	14	93%	51	63	81%
MATH140	5	11	45%	36	59	61%
MATH030	7	7	100%	27	33	82%
MATH150	11	11	100%	22	27	81%
Total	**64**	**78**	**82%**	**153**	**209**	**73%**

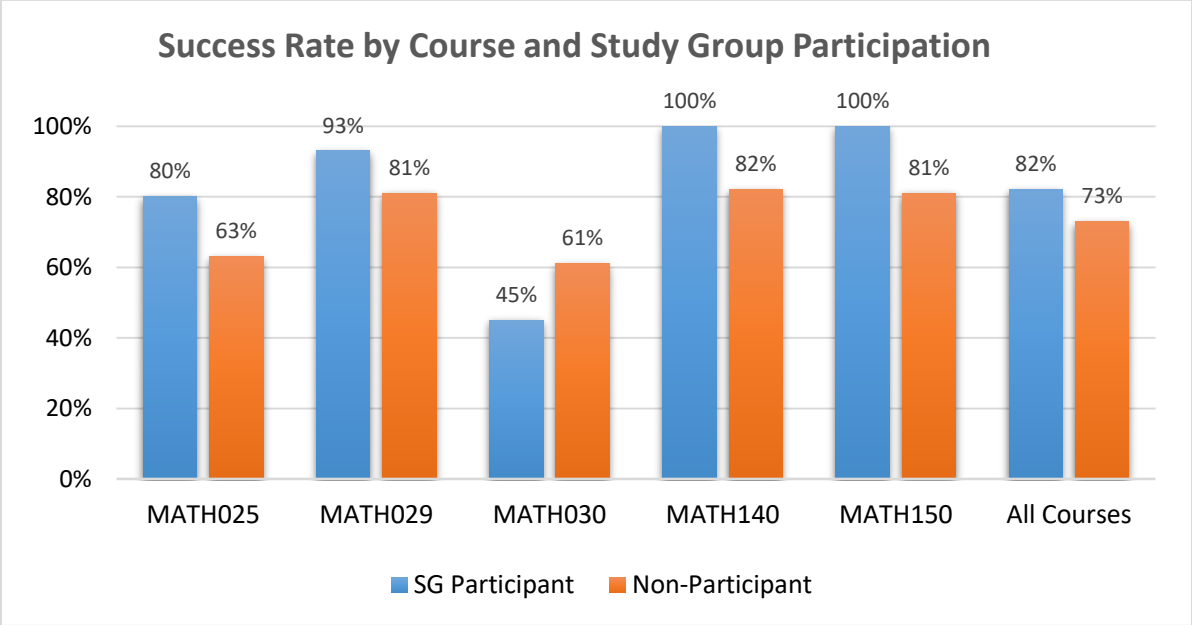

Figure 1

* Indicates statistically significant differences at $p \leq .05$. No significance was found.

With the exception of students in MATH140, students who attended Study Group sessions had higher success rates than students who did not. However, the results of several chi-square tests revealed there was not a statistically significant association between SG Participation and success when examining all courses combined, $X^2(1, N=287) = 2.41$, $p = .121$, or when disaggregating by each course. In other words, the success rate of Study Group participants did not significantly differ from non-participants.

Success Rates Disaggregated by Dosage of SG Participation

To further compare differences among participant groups, Study Group participation was broken down into two categories: Low Dose (i.e. students attending 1 – 4 SG sessions) and High Dose (i.e. students attending 5 or more SG sessions). Students that did not attend any SG sessions were considered Non-SG participants.

Overall, students who attended five or more SG sessions (i.e. High Dose participants) had the highest course success rate (100%), followed by students who attended 1-4 sessions (77%). Students who did not attend any SG session had the lowest final course grades (73%).

When courses were disaggregated, a similar pattern was found for MATH025 and MATH029 in which High Dose participants had the highest course success rates while non-participants had the lowest. There were no students in MATH030 or MATH140 that fell into the High Dose category.

The results of several chi-square analyses (which measured success as a binary variable: successful or unsuccessful) revealed statistically significant differences between high dose, low dose, and non-SG participants, $X^2(2, N=287) = 6.50$, $p=.039$.

When disaggregated by course, the success rate of high dose, low dose, and non-SG participants in MATH025 significantly differed from one another. The success rates in all other course were not statistically significant.

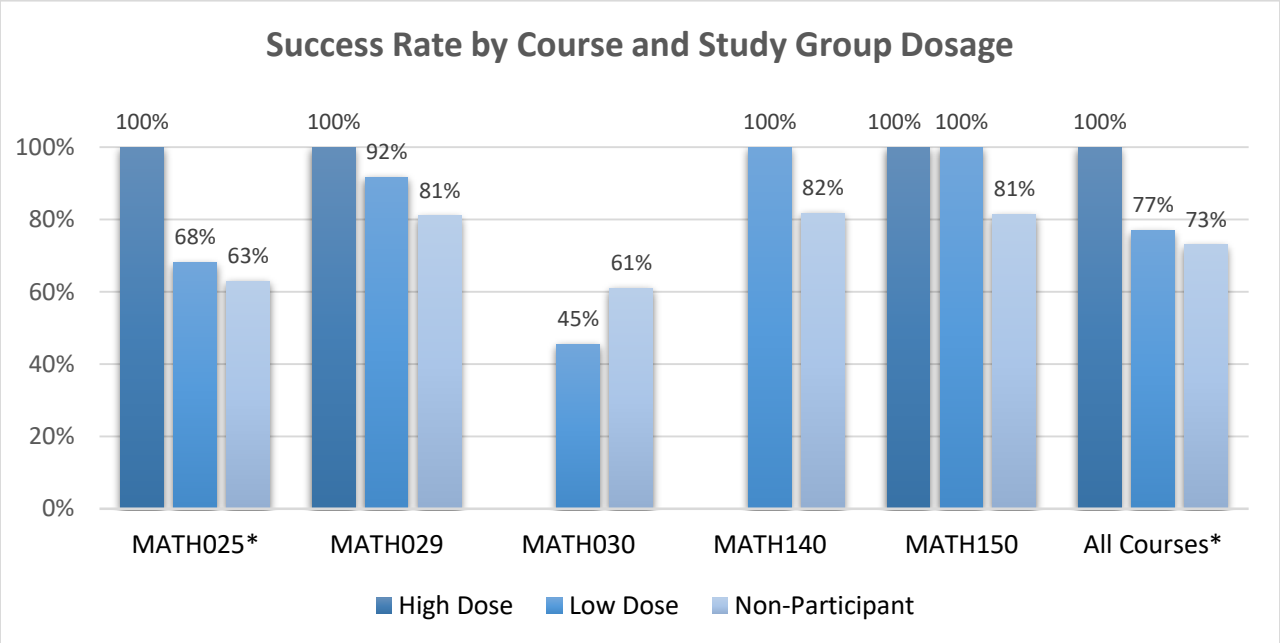

Figure 2

* Indicates statistically significant differences at $p \leq .05$.

No students in MATH030 or MATH140 that fell into the High Dose category.

One-way ANOVA analyses were conducted to measure success using students' final course grade. Grades were converted into a continuous variable using the following scale: A=4, B=3, C=2, D=1, and F/FW/W=0. Results showed that there was no statistically significant differences of mean final course grade between high dose, low dose, and non-SG participants.

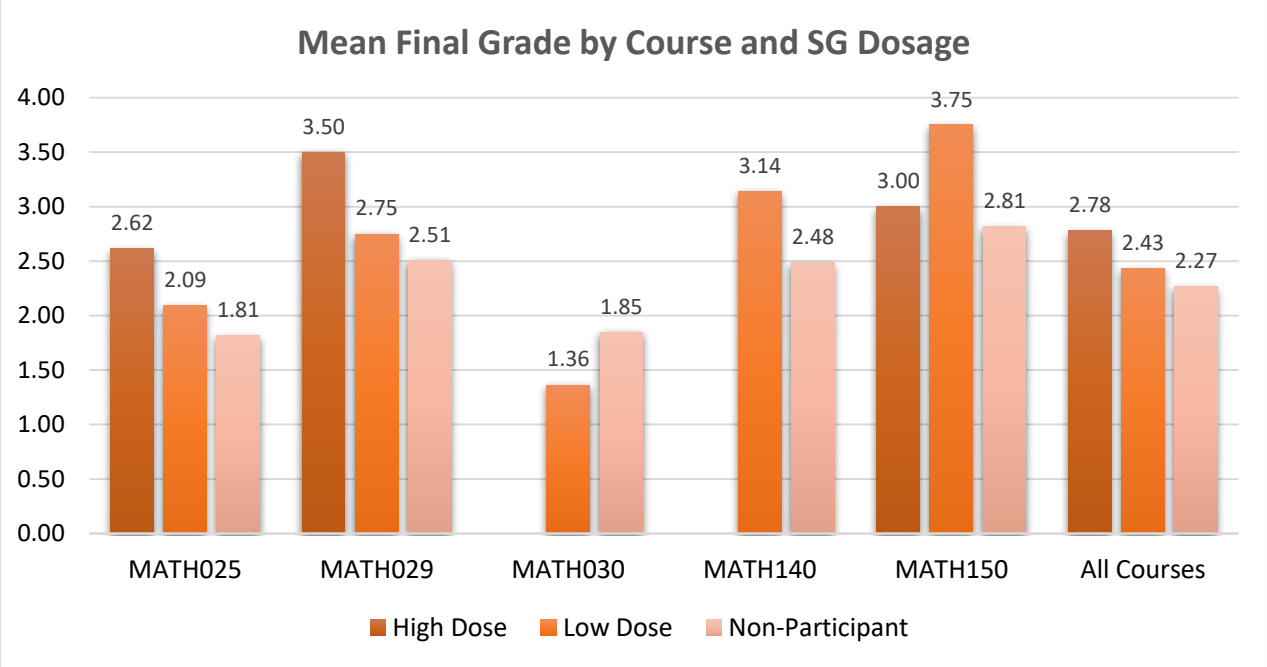

Figure 3
*Indicates statistically significant differences at $p \leq .05$. No significance was found.

Table 3 Summary of one-way ANOVA Results

Course	*df*	*N*	*F*	*p*
MATH025	2	62	2.65	.084
MATH029	2	77	.669	.515
MATH030	2	70	1.08	.302
MATH140	2	40	1.51	.227
MATH150	2	38	2.39	.107
All Courses	2	287	2.83	.068

*Indicates significance at $p \leq .05$. No significance was found.

Success Rates by Demographics

The success rates for all courses broken down by gender and ethnicity are shown in Figure 2 and Figure 3.

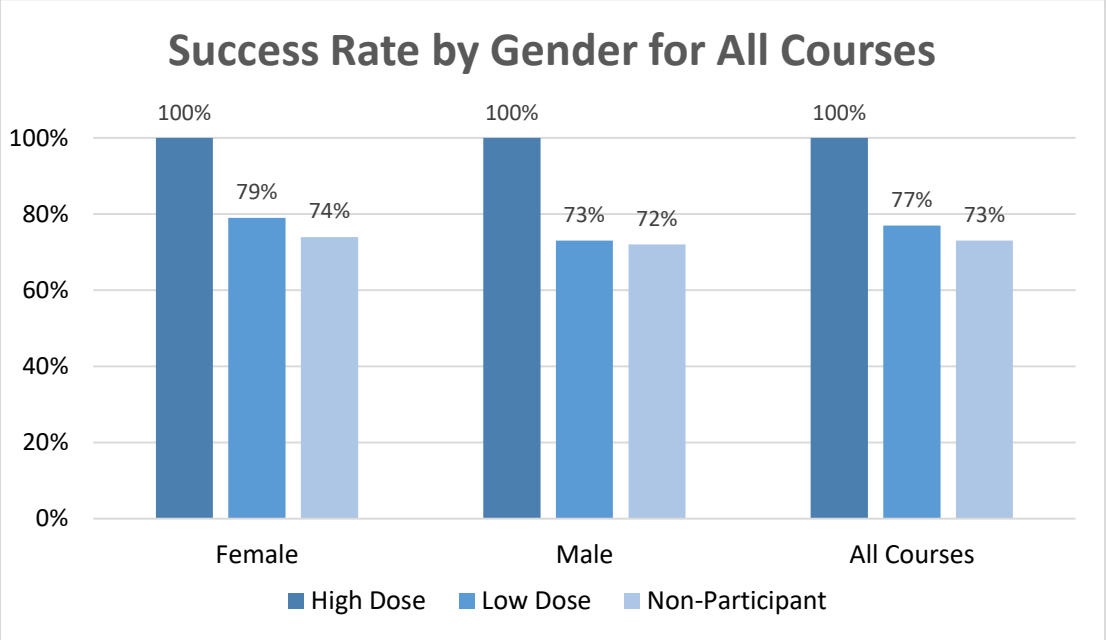

Figure 4
*Indicates significance at $p \leq .05$. No significance was found.

Females who attended five or more Supplemental Instruction sessions had higher success rates (100%) than those who attended fewer (79%) or did not attend at all (74%). A similar pattern was found for male students in which males who attended five or more Supplemental Instruction sessions had higher success rates (100%) than those who attended 1-4 sessions (73%) or did not attend at all (72%).

As evident by chi-square analyses, the differences in these success rates were not statistically significant for females, $X^2(2, N=151) = 4.18$, $p=.124$ or for males, $X^2(2, N=134) = 2.33$, $p=.312$. Two students were excluded from the gender analysis because they did not disclose their gender.

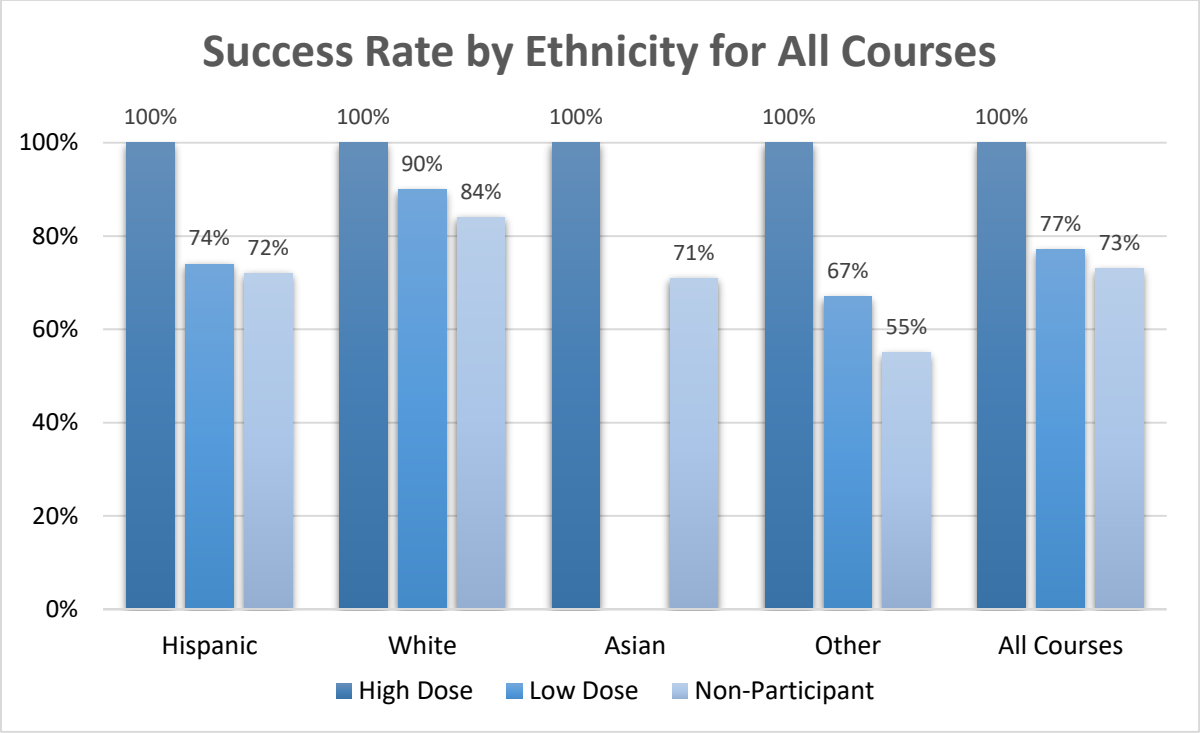

Figure 5

*Indicates significance at $p \leq .05$. No significance was found.
No Asian students fell into the low dose category

When examining success rates across all courses by ethnicity, students who attended five or more Supplemental Instruction sessions had higher success rates overall than those who attended fewer or did not attend at all. There were no Asian students who fell into the low dose category. The results of several one-way chi-square analyses revealed that the differences in these success rates were not statistically significant for Hispanic students, $X^2(2, N=212) = 5.19$, $p=.075$, White students, $X^2(2, N=43) = 0.367$, $p=.832$, Asian students, $X^2(2, N=9) = 0.735$, $p=.391$, or for students of other ethnicity, $X^2(2, N=23) = 2.16$, $p=.339$.

Exam Review SG Participants

Overall, 54 out of the 78 students who attended study groups participated in at least one exam review session, yielding a 69% Exam Review participation rate. The lowest exam review participation rate was 14% for MATH140; the highest was 89% for MATH025.

Table 4 Exam Review Participation

Courses	Study Group Participants	Exam Review Participants	Exam Review Participation Rate
MATH025	35	31	89%
MATH029	14	8	57%
MATH030	11	7	64%
MATH140	7	1	14%
MATH150	11	7	64%
Total	**78**	**54**	**69%**

Course success rates for students who attended exam review sessions are shown in the table below. Overall, students who participated in exam review study group sessions had a higher success rate (80%) than those who did not attend (75%). However, this difference in success rates was not significant, $X^2(2, N=287) = 0.583$, $p = .445$.

Table 5 Success Rates by Course and Exam Review Participation

Course	Exam Review Participants			Non-Exam Review Participants		
	Success Count	Total	Success Rate	Success Count	Total	Success Rate
MATH025	24	31	77%	21	31	68%
MATH029	7	8	88%	57	69	83%
MATH030	4	7	57%	37	63	59%
MATH140	1	1	100%	33	39	85%
MATH150	7	7	100%	26	31	84%
Total	**43**	**54**	**80%**	**174**	**233**	**75%**

Conclusion

Overall, students who attended study group sessions had higher success rates than students who did not. When broken down at the course level, a similar pattern was found with the exception of students in MATH140 in which non-study group participants had higher success rates. Similarly, students who attending study groups for exam review had higher success rates than those that did not attend exam review sessions. However, the results of several chi-square tests showed there was not a statistically significant association between SG Participation and course success, nor exam review participation and course success.

To further compare differences among participant groups, study group participation was broken down into two categories: Low Dose (i.e. students attending 1 – 4 SG sessions) and High Dose (i.e. students attending 5 or more SG sessions). Students that did not attend any SG sessions were considered non-SG participants.

Overall, students who attended five or more SG sessions (i.e. High Dose participants) had the highest course success rate, followed by students who attended 1-4 sessions, and lastly students who did not attend any SG sessions. The results of several chi-square analyses (which measured success as a binary variable: successful or unsuccessful) revealed statistically significant differences between high dose, low dose, and non-SG participants, $X^2(2, N=287) = 6.50, p=.039$.

When disaggregated by course, the success rate of high dose, low dose, and non-SG participants in MATH025 significantly differed from one another. The differences in success rates for the three groups in the other math courses were not statistically significant.