

August 2013 Math Jam Review

The 2013 Cañada College Math Jam was a week long intensive math preparation program. The program had two primary purposes:

- 1) To assist students to improve their math placement test results.
- 2) To prepare students for their next math course.

Method

The program provided students the opportunity to improve their math skills in a supportive, self paced, non-judgmental environment. Program participants were placed in cohorts based on their current math level. Each of the cohorts was led by a Cañada College math faculty member and several student tutors who supported the participants. The primary tool used was the MyMathTest software by Pearson Education, Inc. On the first day, each student took an on-line evaluation test for his/her math level. MyMathTest then provided the students a list of the areas that the student should work on. The students then systematically worked through the list. The instructor and the assigned tutor monitored the student’s progress and made themselves available to answer questions or work through problems with the students. Faculty and tutors also facilitated activities designed to increase student engagement and interaction.

Participant Demographics

Consistent with previous Math Jams, more of the 2013 August Math Jam participants choose “Hispanic” as their ethnicity than any other ethnic designation (45.7% of the total). The majority (55.2%) of the participants also indicated their gender as “female”.

	<u>Female</u>	<u>Male</u>	<u>Total</u>	<u>Ethnicity (%)</u>
American Indian	0	1	1	.8%
Asian	5	6	11	8.7%
Black	1	3	4	3.1%
Filipino	0	1	1	.8%
Hispanic	33	25	58	45.7%
Multi Race	8	7	15	11.8%
Pacific Islander	1	1	2	1.6%
Unknown	1	0	1	.8%
White	22	12	34	26.8%
	71	56	127	100%

Results

MyMathTest

Among students who completed both the MyMathTest pre-test and post-test (n=61), 88.5% improved their results on the test (54 / 61).

Math Jam Program Completion

Participants were only considered to have completed the program if they attended at least 3 of the 5 days the program was offered. Overall, 83 percent (83%) of the participants completed the program (105 of 127).

Student Self Efficacy

In an effort to describe the effect of Math Jam on participant self-efficacy (the participant's belief in their capability to complete specific tasks or goals) a self efficacy instrument was administered. On the first day of the program each participant answered an online survey which included the 34 question Mathematics Self Efficacy Scale developed by Nancy Betz and Gail Hackett to measure student self-efficacy related to math. As Betz and Hackett explain:

... as originally proposed by Bandura (1977), self-efficacy expectations refer to a person's beliefs concerning his/her ability to successfully perform a given task or behavior. They are postulated by Bandura (1977) to be the major mediators of behavior and behavior change. Low self-efficacy expectations regarding a behavior or behavioral domain lead to avoidance of those behaviors, and increases in self-efficacy expectations should increase the frequency of approach versus avoidance behavior. Thus, they can be useful in understanding and predicting behavior. (P4, 1993).

At the conclusion of the program the students again completed the 34 question Mathematics Self Efficacy questionnaire.

Sample

Seventy-Five of the students participating in the Math Jam completed the self-efficacy instrument both before and after the program.

Data Analysis

The survey responses were exported into the Statistical Package for the Social Sciences (SPSS). A paired samples t-test* was administered to compare the pre and post test responses for each of the self efficacy dimensions (Self Efficacy in Math Tasks and Self Efficacy in Math Courses).

**Students answered questions using a 0 - 9 slider with "0" being completely unconfident and "9" being completely confident. An argument could be made that this could be treated as scale data rather than interval data and a sign test or wilcoxon test run.*

Findings

Student self-efficacy in both categories of efficacy (ability to perform math tasks and ability to be successful in college courses) increased after students participated in Math Jam.

- Females had initial self-efficacy much lower than their male counterparts
- Hispanic students had initial self-efficacy lower than their counterparts from other ethnic groups
- The increases in self efficacy were larger for female students than males
- The increases in self efficacy were larger for Hispanic students than students from other ethnic groups

Table 1.2 Change in participant self efficacy, Math tasks

<u>Group</u>	<u>n</u>	<u>Math Tasks Efficacy</u> <u>Pre Math Jam</u>	<u>Math Tasks Efficacy</u> <u>After Math Jam</u>	<u>Change in Efficacy</u> <u>(Tasks)</u>	<u>p</u>
		<u>Mean score</u>	<u>Mean score</u>		
All pairs	75	6.41	7.31	0.90	.000
Male	34	7.21	7.65	0.43	
Female	41	5.74	7.03	1.28	
Hispanic	28	5.74	7.03	1.29	
Asian / White	30	6.63	7.21	0.59	
Others	17	6.72	7.48	0.76	

Table 1.3 Change in participant self efficacy, Math courses

<u>Group</u>	<u>n</u>	<u>College Courses</u> <u>Efficacy Pre Math Jam</u>	<u>College Courses</u> <u>Efficacy Post Math Jam</u>	<u>Change in Efficacy</u> <u>(Courses)</u>	<u>p</u>
		<u>Mean Score</u>	<u>Mean Score</u>		
All with pre and post	75	5.34	5.86	0.52	.006
Male	34	5.98	6.43	0.45	
Female	41	4.80	5.38	0.58	
Hispanic	28	5.19	6.00	0.81	
Asian / White	30	5.21	5.65	0.44	
Others	17	5.48	5.65	0.17	

Discussion

Consistent with previous Math Jams the majority of the participants were female (56%) and Hispanics were the single largest ethnic group (45.7%). Math Jam appears to be serving students who are disproportionately underrepresented in STEM.

Also consistent with previous Math Jams the vast majority of the students (83%) completed the program, and the vast majority (88.5%) of the students who completed the pre and post test (at the beginning and end of the program) improved their test scores.

The results of the Math Self efficacy study showed that females and Hispanic students had lower initial self-efficacy scores than their peers. Females and Hispanic students also had larger increases in self-efficacy than their peers. This finding suggests that Math Jam has a disproportionate effect on female and Hispanic students. Previous research has suggested that engagement has a positive effect for all students but that the effect is even greater for minority students (Kuh). Future administrations of the self-efficacy instrument (to students who are participating in Math Jam repeatedly) may provide insights into the degree to which the increase in self-efficacy persists over time.

About CALSTEP

The "California Alliance for the Long-term Strengthening of Transfer Engineering Programs" (CALSTEP) is sponsored by the US Department of Education through the Hispanic-Serving Institution Science, Technology, Engineering, and Mathematics (HSI-STEM) program. The CALSTEP project promotes an understanding and appreciation of STEM careers through outreach activities for middle school, high school, and community college students. It addresses the main barriers to the retention and success of students in Science, Technology, Engineering, and Mathematics (STEM) through a combination of intensive preparation for college-level work, multiple entry points and accelerated pathways for students into STEM education, and previously proven academic support strategies.

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Summary

The 2013 Math Jam provided 141 Cañada College students the opportunity to improve their math skills in a supportive, self paced, non-judgmental environment. Although the program is open to all Cañada College students the majority of the participants came from groups which have been traditionally disadvantaged in STEM with 53.2% of the 2013 Math Jam participants indicating “Hispanic” as their ethnicity and 53.9% of the participants indicating “female” as their gender.

The purpose of Math Jam is to assist students to improve their math placement exam results, and prepare for their next math course. The results of the 2013 Math Jam suggest the program is accomplishing those objectives. Over 90% of the participants who completed the pre and post test instrument (MyMathTest) at math jam showed improvement in their scores. Additionally, the majority of students (54%) who took the math placement test at the end of the 2013 Math Jam became eligible to enroll in a higher level math course*.

**Note: Previous research suggests that math jam participants who “jump” a level of math, as a result of improving their placement scores, perform as well or better than their peers in their subsequent math course. Additionally previous research indicates that Math Jam participants have higher success rates in their subsequent Math courses than their peers (see CALSTEP Brief 1).*

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