Cañada College Division of Science and Technology

CALSTEP Briefs

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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".

	Female	Male	Total	Ethnicity (%)
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 wilcoxan 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

Group	n	Math Tasks Efficacy Pre Math Jam Mean score	Math Tasks Efficacy After Math Jam Mean score	Change in Efficacy (Tasks)	p
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

Group	n	College Courses Efficacy Pre Math Jam Mean Score	College Courses Efficacy Post Math Jam Mean Score	Change in Efficacy (Courses)	p
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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