

# El Camino College: Summer Math Academy Report (Summer 2009 – 2013)

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## Summary

The El Camino College (ECC) Summer Math Academy (SMA) is a three-week program designed to equip students with the tools necessary to succeed in mathematics courses taken at ECC in order to graduate and/or transfer. One way that SMA assists students in achieving their goals sooner is by allowing students the opportunity to retake their math placement test at the conclusion of the SMA. The object is for students to place higher and be able to achieve their educational goal while taking fewer courses.

This report followed 371 SMA students to assess placement improvement and course success. At the conclusion of the program, more than half of all SMA students improved their math placement by one, two, or three levels. Compared to their peers, SMA students succeeded in their math classes at slightly higher rates (57% vs. 53%). Though this difference was not significant, it suggests that SMA students were not placed beyond their capabilities relative to other math students, and were able to save time on their progression through the basic math sequence. Participation in the SMA resulted in 87 semesters of math saved by those students. This report finds that the SMA is achieving its goals, though there is room for improvement. For example, more than one-third of all SMA students failed to enroll in a math class the following fall semester.

## Summer Math Academy

The El Camino College (ECC) Summer Math Academy (SMA) is a three-week program designed to equip students with the tools necessary to succeed in mathematics courses taken at ECC in order to graduate and/or transfer. A secondary goal of the SMA is to allow students the opportunity to retake their math placement test with the object being that students will place higher. A student who places into the most remedial math class offered at ECC (Math 12) is three levels below degree-credit and four levels below transfer credit courses. This translates to at least three terms of math before a student can take a course to satisfy the math requirement for a degree, and four terms of math before the student can take transfer-level math. By allowing students to retake their placement exam after completing the SMA, students are given the opportunity to place into a higher math class, which may put them one or more semesters closer to achieving their educational goal while taking fewer courses.

## Methodology

Students were recruited to participate in the SMA after taking their initial placement test in the preceding spring semester. Over the past several years, the SMA has increased its recruitment from only those placed into basic arithmetic (Math 12), to those placed into pre-algebra (Math 23), algebra (Math 33/40 and Math 73/80), and pre-calculus (Math 180). With the exception of Math 12, all students who were placed into the previously-mentioned courses were recruited for participation in the SMA. Given that the number of students placed into Math 12 was very large, only the top 75% of these students were recruited to participate in the SMA.

This report focuses on students who were enrolled in the SMA during the summers of 2009, 2011, 2012, and 2013. The Summer Math Academy did not operate in 2010. In Summer 2009, students were recruited from those who placed into Math 12, Math 23, Math 33, and Math 73. In Summer 2011 cohort, this pool was expanded to include students placed into Math 40. In Summer 2012 and 2013, recruitment expanded to include students placed into Math 60 and Math 180. Students are included in this report only if they had valid pre- and post-SMA math placement scores. Therefore, students who, for various reasons, did not take a pre- or post-SMA assessment are not included in this report. Enrollment in the subsequent Fall semester was examined to evaluate student placement, enrollment, and success. Student grades were used to compare success rates between students who participated in the SMA and students who did not. Success rates were calculated by taking the number of students succeeding (earning an A, B, C, IB, IC, or P) divided by the total number of students with records in the class (including those who dropped or withdrew, but not including ungraded students). Chi-square tests of independence with an  $\alpha = .05$  were used to examine statistical differences between the SMA and non-SMA groups.

## Summer Math Academy Students

### Improvement Rates

Across each of the four years examined in this report, the SMA served 371 students (60 in 2009, 69 in 2011, 125 in 2012, and 117 in 2013). Of these, 193 (52%) improved their math placement. This means that the 193 SMA students had the opportunity to save at least one semester in the basic math sequence. Table 1 shows the pre-test and post-test placement for SMA students. By class, the greatest rate of improvement was seen among students who originally placed into Math 40/60 (88% improving to a higher course). Of note, more than half of students who were originally placed into Math 12, Math 23, Math 40, and Math 170/180 improved their placement. More than two-thirds of students placed into Math 73/80 did not improve their math placement.

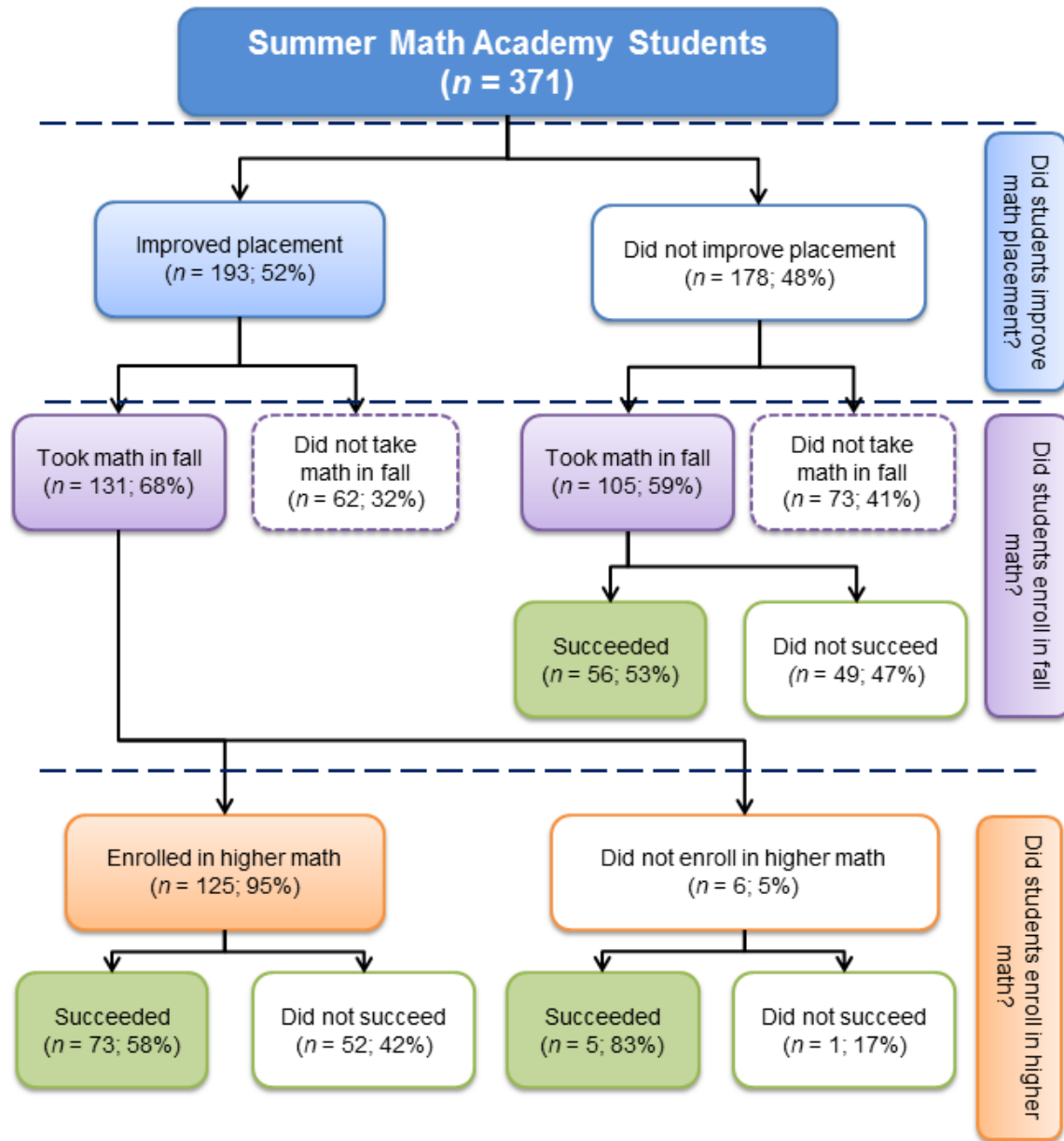
**Table 1. Pre- and Post-SMA Placement Tests, 2009-2013**

		Post-SMA Math Placement						Total	
		12	23	33	40 / 60	73 / 80	170 / 180		160 / 190
Pre-SMA Math Placement	<b>Math-12</b>	69 (43%)	73 (46%)	2 (1%)	11 (7%)	5 (3%)		160 (100%)	
	<b>Math-23</b>	1 (2%)	24 (45%)	5 (9%)	7 (13%)	16 (30%)		53 (100%)	
	<b>Math-33</b>		1 (100%)					1 (100%)	
	<b>Math-40/ Math-60</b>				3 (9%)	29 (88%)	1 (3%)	33 (100%)	
	<b>Math-73/ Math-80</b>				1 (1%)	67 (68%)	25 (26%)	5 (5%)	98 (100%)
	<b>Math-180</b>					1 (4%)	10 (38%)	15 (58%)	26 (100%)
	<b>Total</b>	<b>70</b>	<b>98</b>	<b>7</b>	<b>22</b>	<b>118</b>	<b>36</b>	<b>20</b>	<b>371</b>

### Fall Math Enrollment

As can be seen in Figure 1, of the 371 SMA students, 236 (64%) enrolled in a math class in the fall semester following the SMA. Fall math enrollment percentages were substantially lower in 2011 than in 2009, 2012, or 2013 (38% vs. 80%, 62%, and 73%, respectively). When compared to those who improved their math placement, students who did not improve were marginally less likely enroll in a math class in the subsequent fall semester (68% vs. 59%,  $p = .08$ ).

Figure 1. Summer Math Academy student flow diagram.



Note. Student success = grade of A, B, C, IB, IC, or P. Non-SMA student success rate: 53% (11,990/22,698).

**What Math Classes Did SMA Students Take Relative to Their Math Placement?**

Table 2 details SMA students fall math enrollment relative to their pre-SMA placement levels. Of the students who improved their math placement and enrolled in a fall math class, there were 96 students who took a class 1-level higher than their original placement, 22 students who took a class 2-levels higher than their original placement, and 6 students who took a class 3-levels above their original math placement.

**Table 2. Fall Enrollment by Pre-SMA Math Placement: Improvers**

	Pre-SMA Math Placement					Total	
	12	23	40 / 60	73 / 80	180		
Fall Math Class Enrollment	<b>No Fall Math</b>	35 (38%)	11 (41%)	8 (27%)	6 (20%)	2 (13%)	62 (32%)
	<b>Math-23</b>	35 (38%)	1 (4%)				36 (19%)
	<b>Math-33</b>	2 (2%)	5 (19%)				7 (4%)
	<b>Math-40</b>	9 (10%)	1 (4%)	1 (3%)			11 (6%)
	<b>Math-73</b>	3 (3%)	5 (19%)	7 (23%)			15 (8%)
	<b>Math-80</b>	3 (3%)	3 (11%)	13 (43%)	1 (3%)		20 (10%)
	<b>Math-180</b>			1 (3%)	16 (53%)		17 (9%)
	<b>Math-190</b>				2 (7%)	12 (80%)	14 (7%)
	<b>Other Math</b>	4 (4%)	1 (4%)		5 (17%)	1 (7%)	11 (6%)
	<b>Total</b>	<b>91</b>	<b>27</b>	<b>30</b>	<b>30</b>	<b>15</b>	<b>193</b>

Note. Numbers represent SMA students who improved their math placement. To ensure student privacy, courses with fewer than 5 SMA students enrolled were grouped into "Other Math" courses. These included Math 12, Math-50D, Math-60, Math-150, Math-160, and Math-170.

There were 10 students who took a class below their post-SMA math assessment level. However, 4 of these students placed two levels above their pre-SMA math assessment and chose to enroll one level above their initial assessment. For example, one student placed into Math 23 at their pre-SMA assessment. After the SMA, the student placed into Math 73 (two levels higher), but enrolled in Math 33 (one level higher). Whereas the student did not take the highest class allowed, he or she is still one semester ahead of where they would have been without the SMA. Therefore, of the 131 students who improved their math placement and enrolled in a math course in fall, 125 (95%) enrolled in a math course higher than their pre-SMA math placement level – 53% of the 236 SMA students who enrolled in a fall math class.

### Did SMA Students Succeed in Their Math Classes?

Overall, the success rate for SMA students was 57%, with students who improved their math placement performing marginally better than students who did not improve their math placement (58% vs 53%, respectively). This was not a statistically significant difference. There were 73

SMA students (31% of the 236 SMA students who enrolled in a fall math class) who enrolled in a higher math class and succeeded.

Success rates varied by the number of math levels that the student advanced: 61% 1-level (59/96); 50% 2-levels (11/22); and 33% 3-levels (2/6). Whereas the low success rate of those who advanced three levels is concerning, it is difficult to draw any strong conclusions from only 6 students. Regardless, caution should be used when considering such a large change from a student's original math placement. Students who improved their math placement and succeeded in the higher classes *saved a total of 87 semesters of math* over the 4 years studied.

### SMA Students Compared With Their Classmates

Among math classes enrolled in by SMA students, the success rate of non-SMA students was 53% (Table 3). This is the same success rate as SMA students who did not improve their math placement (53%), and is slightly lower than students who did improve their math placement testing (58%). Though these success rates were not statistically different, they are conceptually meaningful. These success rates suggest that students who advanced in their math placement were not arriving to their higher-level class unprepared. SMA students who improved their class placement were just as, if not slightly more, likely to succeed as students who did not participate in the SMA. Appendix A details success rates for SMA and non-SMA students by class.

**Table 3. Success Rates of SMA and Non-SMA Students**

Row Labels	Success Rate	Success	Not Success	Grand Total
Not SMA	53%	11,990	10,708	22,698
SMA	57%	139	103	242
<b>Grand Total</b>	<b>53%</b>	<b>12,129</b>	<b>10,811</b>	<b>22,940</b>

Note. Student success = grade of A, B, C, IB, IC, or P.

### Conclusion

More than half of all SMA students improved their math placement by one, two, or three levels. SMA students were able to save time on their progression through the math sequence. In total, SMA students saved 87 semesters of math. Compared to their peers, SMA students succeeded in their math classes at slightly higher rates (57% vs. 53%). Though this difference was not significant, it suggests that SMA students were not placed beyond their capabilities relative to other math students.

This report finds that the SMA is achieving its goals, though there is room for improvement. For example, more than one-third of all SMA students failed to enroll in a math class the following fall semester. It is unclear why so many SMA students fail to take a math class in fall, but this may be connected to the reduction in course offerings during the recession.

## Appendix A – Comparison of Success Rates Between SMA and Non-SMA Students, by Class, Fall 2009, 2011, 2012, and 2013.

Course	Success Rate	Success	Not Success	Total
<b>Math-12</b>	<b>54%</b>	<b>1,950</b>	<b>1,662</b>	<b>3,612</b>
Not SMA	54%	1,928	1,647	3,575
SMA	59%	22	15	37
<b>Math-23</b>	<b>53%</b>	<b>2,041</b>	<b>1,835</b>	<b>3,876</b>
Not SMA	52%	2,006	1,815	3,821
SMA	64%	35	20	55
<b>Math-33</b>	<b>64%</b>	<b>244</b>	<b>136</b>	<b>380</b>
Not SMA	63%	232	135	367
SMA	92%	12	1	13
<b>Math-40</b>	<b>49%</b>	<b>1,375</b>	<b>1,432</b>	<b>2,807</b>
Not SMA	49%	1,369	1,425	2,794
SMA	46%	6	7	13
<b>Math-73</b>	<b>54%</b>	<b>3,458</b>	<b>2,990</b>	<b>6,448</b>
Not SMA	54%	3,444	2,975	6,419
SMA	48%	14	15	29
<b>Math-80</b>	<b>50%</b>	<b>1,201</b>	<b>1,217</b>	<b>2,418</b>
Not SMA	50%	1,178	1,194	2,372
SMA	50%	23	23	46
<b>Math-180</b>	<b>61%</b>	<b>420</b>	<b>264</b>	<b>684</b>
Not SMA	62%	409	252	661
SMA	48%	11	12	23
<b>Math-190</b>	<b>53%</b>	<b>347</b>	<b>308</b>	<b>655</b>
Not SMA	53%	339	301	640
SMA	53%	8	7	15
<b>Other Math</b>	<b>53%</b>	<b>1,093</b>	<b>967</b>	<b>2,060</b>
Not SMA	53%	1,085	964	2,049
SMA	73%	8	3	11
<b>Total</b>	<b>53%</b>	<b>12,129</b>	<b>10,811</b>	<b>22,940</b>

To ensure student privacy, courses with fewer than 5 SMA students enrolled were grouped into "Other Math" courses. These included Math 37, Math-50D, Math-60, Math-67, Math-150, Math-160, and Math-170.