

NECC College Math Tutoring Center Results Spring 2010

The College Math Tutoring Center at Northern Essex Community College opened its doors to students in the Spring 2009 semester. In Spring 2010, 1,133 students enrolled in one or more college level math courses¹ during the term, 241 of which sought math tutoring services through the Center.

As displayed in Table 1 below, the 241 students who participated in math tutoring in Spring 2010 averaged 5 total contacts with the Center and 555 contact minutes (slightly over 9 contact hours). Spring 2010 saw an increase in the number of students enrolled in college math courses who sought tutoring services from Spring 2009 and Fall 2009, but averages (mean and median) for the number of contacts, minutes and hours decreased between the terms.

Table 1

		Tutoring Activity			
		Spring '09	Fall '09	Spring '10	Fall '09 - Spring '10 % Change
# of Contacts	N	128 ²	152 ³	241	58.6%
	Mean	8	7	5	-28.6%
	Median	5	4	3	-25.0%
	Mode	1	1	1	0.0%
	Sum	1,040	1,034	1,317	27.4%
Contact Minutes	N	103	150	241	60.7%
	Mean	771	718	555	-22.7%
	Median	390	329	256	-22.2%
	Mode	60	59	91	54.2%
	Sum	79,455	107,773	133,673	24.0%
Contact Hours	N	103	150	241	60.7%
	Mean	13	12	9	-25.0%
	Median	7	5	4	-20.0%
	Mode	1	1	1	0.0%
	Sum	1,324	1,796	2,228	24.1%

¹ College level math courses include the following: Advanced Algebra & Trigonometry, Applied Technical Mathematics, Calculus for Business/Social/Life Sciences, Calculus I, II, & III, College Algebra & Trigonometry, College Algebra, Contemporary Math I & II, Differential Equations, Mathematical Ideas I & II, Mini-Trigonometry, and Statistics.

² Of the 128 students enrolled in college level math in Spring 2009 who participated in math tutoring, 25 had zero contact minutes recorded.

³ Of the 152 students enrolled in college level math in Fall 2009 who participated in math tutoring, 2 had zero contact minutes recorded.

College Math Student Profile

In Spring 2010 more males enrolled in college level math courses and more males than females sought tutoring. These differences were not statically significantly⁴.

Table 2

Tutoring Status by Gender						
	No Tutoring		Tutoring		Total	
Gender	N	%	N	%	N	%
Female	372	45.6%	51	33.6%	423	43.7%
Male	444	54.4%	101	66.4%	545	56.3%
Total	816	100.0%	152	100.0%	968	100.0%

As seen in Table 3 below, there was no significant difference between the race/ethnicity distributions for those who received tutoring services and those that did not. The majority of all college math students were White/Caucasian (64%) followed by Hispanic (approximately 20%).

Table 3

Tutoring Status by Race/Ethnicity						
	No Tutoring		Tutoring		Total	
Race/Ethnicity	N	%	N	%	N	%
African-American/Black	22	2.5%	13	5.4%	35	3.1%
American Indian/Alaskan Native	2	0.2%	3	1.2%	5	0.4%
Asian	23	2.6%	6	2.5%	29	2.6%
Hispanic	183	20.5%	46	19.1%	229	20.2%
Multi-Racial	4	0.4%	1	0.4%	5	0.4%
Native Hawaiian/Pacific Islander	1	0.1%	0	0.0%	1	0.1%
Non-Resident Alien	5	0.6%	2	0.8%	7	0.6%
Unknown	77	8.6%	22	9.1%	99	8.7%
White/Caucasian	575	64.5%	148	61.4%	723	63.8%
Total	892	100.0%	241	100.0%	1,133	100.0%

⁴ Chi square tests were used to determine levels of significance and had an Alpha of .01.

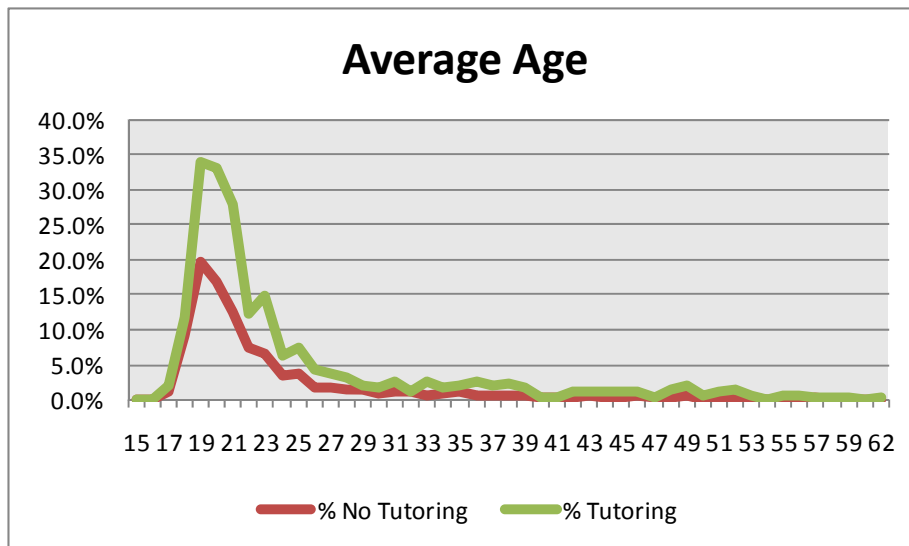
The vast majority of students accessing math tutoring services were continuing students, consistent with the overall composition of students enrolled in college math courses (see Table 4). This difference was approaching statistical significance⁵.

Table 4

Tutoring Status by Student Status						
Student Status	No Tutoring		Tutoring		Total	
	N	%	N	%	N	%
Continuing	769	86.2%	224	92.9%	993	87.6%
New	43	4.8%	6	2.5%	49	4.3%
Readmit	55	6.2%	9	3.7%	64	5.6%
Transfer	17	1.9%	2	0.8%	19	1.7%
Unknown	8	0.9%	0	0.0%	8	0.7%
Total	892	100.0%	241	100.0%	1,133	100.0%

As displayed in the chart below, students seeking math tutoring services had a significantly⁶ higher average age than those who did not.

Chart 1



Age in Years	No Tutoring	Tutoring	Total
N	884 ⁷	241	1,125
Mean	23.3	26.5	23.9
Median	20.7	22.0	20.8
Mode	18.5	18.8	17.8

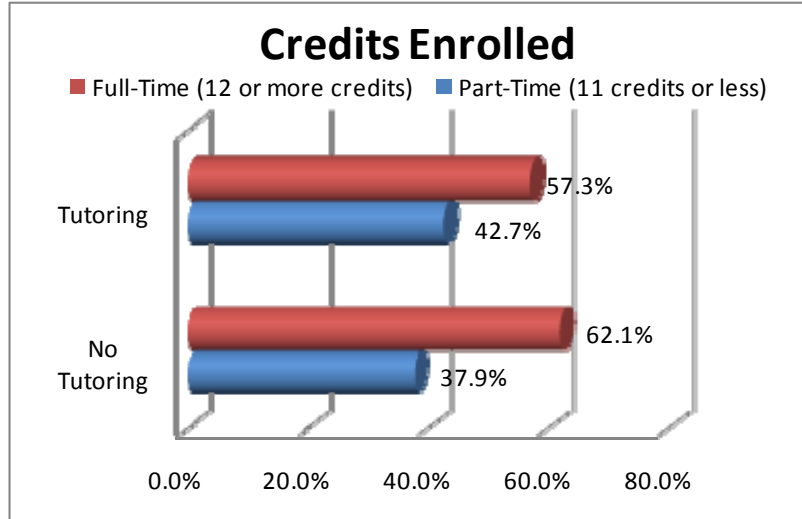
⁵ $\chi^2=8.82$, $p = .066$

⁶ $t = 5.75$, $p = .000$

⁷ Eight students did not report age.

The majority of both college math students who received tutoring and those that did not were enrolled in 12 or more credits. On average (median) students were enrolled in 12 credits (see Chart 2). The differences were not statistically significant.

Chart 2



Credits Enrolled	No Tutoring	Tutoring	Total
N	884 ⁸	241	1,125
Mean	11.0	11.3	11.1
Median	12.0	12.0	12.0
Mode	12.0	12.0	12.0

Students who participated in math tutoring had earned, on average, more credit hours than those who did not seek tutoring (see Table 5). This difference was statistically significant⁹.

Table 5

Tutoring Status by Earned Credit Hours			
	No Tutoring	Tutoring	Total
N	830 ¹⁰	235 ¹¹	1,065
Mean	31.3	41.7	33.6
Median	25	39	28
Mode	12	12	12

⁸ Eight students did not report age.

⁹ $t = -5.58, p = .000$

¹⁰ Sixty-two students did not have earned credit data.

¹¹ Six students did not report age.

Prior to Spring 2010, the majority of students had taken two prior math courses. Those who received tutoring had a slightly higher average of 2.5 courses compared to those who did not receive tutoring (see Table 6).

Table 6

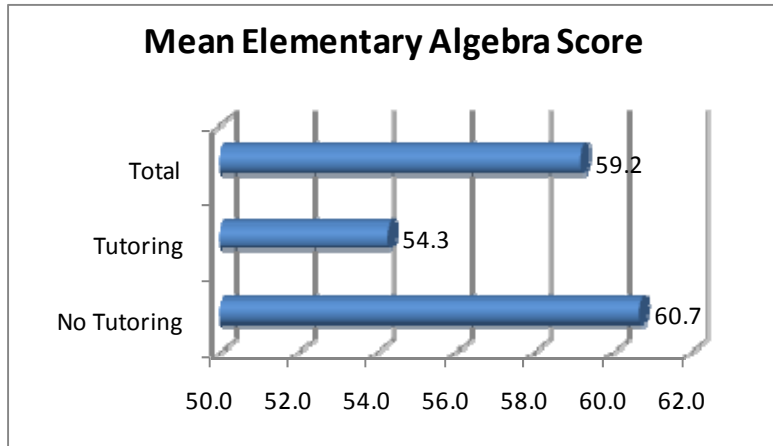
Tutoring Status by Math Courses Attempted			
	No Tutoring	Tutoring	Total
N	705	217	922
Mean	2.0	2.5	2.1
Median	1.0	2.0	1.0
Mode	1.0	1.0	1.0

Of the college math students who sought tutoring in Spring 2010, 46.1% had initially assessed into developmental math. This proportion is approximately 2% higher than those who did not seek tutoring, however this difference is not statically significant.

Table 7

Tutoring Status by Math Placement						
Math Placement	No Tutoring		Tutoring		Total	
	N	%	N	%	N	%
Assessed into Developmental Math	391	43.8%	111	46.1%	502	44.3%
Assessed into College Math	219	24.6%	50	20.7%	269	23.7%
Unknown	282	31.6%	80	33.2%	362	32.0%
Total	892	100.0%	241	100.0%	1,133	100%

Chart 3



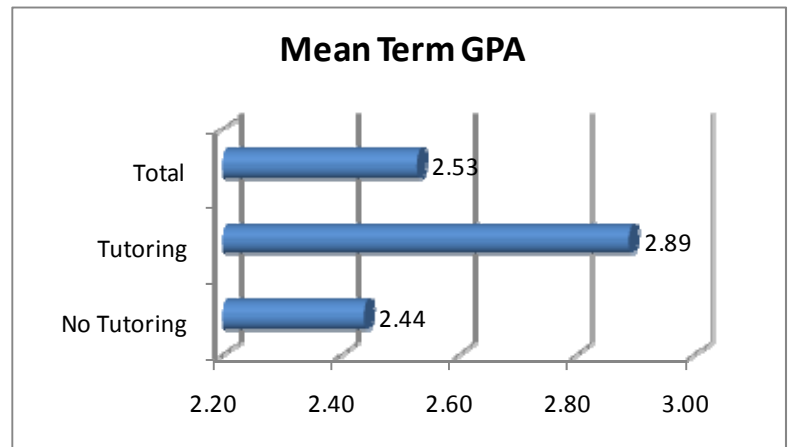
Students who participated in math tutoring received a lower average Elementary Algebra test score than those who did not seek tutoring. The difference (60.7 versus 54.3) was statistically significant¹².

Elementary Algebra Score	No Tutoring	Tutoring	Total
N	719	208	927
Mean	60.7	54.3	59.2
Median	59.1	50.3	56.0
Mode	0.0	0.0	0.0

College Math Outcomes

The final GPA for the Spring 2010 term was, on average, significantly¹³ higher for college math students who accessed tutoring services than those who did not (see Chart 4).

Chart 4



Term GPA	No Tutoring	Tutoring	Total
N	892	241	1,133
Mean	2.44	2.89	2.53
Median	2.72	3.06	2.83
Mode	0.00	4.00	0.00

¹² $t = 2.94, p = .003$

¹³ $t = -5.34, p = .000$

A total of 1,156 college math grades were distributed among 1,133 individual students during the Spring 2010 semester. Students who sought tutoring services achieved notably higher A – C and A – D completion rates in college math than those who did not seek tutoring. This difference was statistically significant¹⁴ for both A – C and A – D completion rates.

Table 8

Tutoring Status by Final College Math Grade						
Final Grade	No Tutoring		Tutoring		Total	
	N	%	N	%	N	%
A	159	17.5%	67	26.8%	226	19.6%
A-	77	8.5%	28	11.2%	105	9.1%
B+	53	5.8%	10	4.0%	63	5.4%
B	90	9.9%	28	11.2%	118	10.2%
B-	55	6.1%	19	7.6%	74	6.4%
C+	47	5.2%	12	4.8%	59	5.1%
C	72	7.9%	20	8.0%	92	8.0%
C-	30	3.3%	11	4.4%	41	3.5%
D+	26	2.9%	1	0.4%	27	2.3%
D	31	3.4%	7	2.8%	38	3.3%
F	84	9.3%	17	6.8%	101	8.7%
FW	25	2.8%	4	1.6%	29	2.5%
I	28	3.1%	13	5.2%	41	3.5%
NW	75	8.3%	5	2.0%	80	6.9%
W	54	6.0%	8	3.2%	62	5.4%
Total	906	100.0%	250	100.0%	1,156	100.0%
A - C Completion	553	61.0%	184	73.6%	737	63.8%
A - D Completion	640	70.6%	203	81.2%	843	72.9%

¹⁴ $\chi^2=13.38$, $p = .000$ and $\chi^2=11.06$, $p = .001$, respectively

As displayed previously in Table 7, there were no significant differences in the distribution of math placement results between those who sought tutoring and those who did not. When the math placement groups were combined with completion rates, those who sought tutoring services had the greatest percentage increase for A – C completion rates for those that tested one level below and two levels below college level (18.3% higher and 33.3% higher, respectively) than their non-tutored counterparts. In terms of A – D completion rates, those who sought tutoring services had the greatest percentage increase for those that tested at college level, one level below and two levels below college level (14.3% higher, 12.2% higher, and 26.7% higher, respectively).

Table 9

Tutoring Status by Math Placement Groups & Completion Rates			
		A - C Completion Rates	A - D Completion Rates
Tutoring	No Assessment Data	69.2%	78.2%
	Tested at College Level	69.8%	81.1%
	Tested 1 Level Below College Level	78.9%	83.5%
	Tested 2 Levels Below College Level	60.0%	80.0%
	Tested 3 Levels Below College Level	100.0%	100.0%
	Did Not Take	75.0%	75.0%
	Total	73.6%	81.2%
No Tutoring	No Assessment Data	63.6%	73.8%
	Tested at College Level	60.5%	66.8%
	Tested 1 Level Below College Level	60.6%	71.3%
	Tested 2 Levels Below College Level	26.7%	53.3%
	Tested 3 Levels Below College Level	100.0%	100.0%
	Did Not Take	60.0%	66.7%
	Total	61.0%	70.6%

Correlations

A correlation exists when two variables are linked closely enough that knowing the values for one variable lets us predict with some accuracy the values of a second variable. Correlation does not prove causation, only that there is a relationship. While a correlation coefficient with an absolute value of 1 (-1 or +1) indicates a perfect association, an absolute value of .2 or higher is typically worth noting.

For students who sought tutoring, there was no significant relationship found between the total minutes spent in tutoring and A – C completion rates.

Controlling for gender, results showed that tutoring had a stronger impact on females than males. Females who participated in tutoring had a moderately weak relationship ($G = .171$) with A – C completion rates whereas males had a virtually non-existent relationship ($G = .041$).

The relationship between age and college math grades was much more pronounced for A – C completion rates. Students who participated in tutoring that were over 25 years of age had a moderately weak positive relationship ($G = .227$) with A – C completion rates. Students who did not participate in tutoring also demonstrated a weak relationship ($G = .214$), however this relationship was stronger for those who participated in tutoring.

When controlling for race (excluding students who had an unknown race/ethnicity), minorities (American Indian, Asian, Black non-Hispanic, and Hispanic) demonstrated a stronger relationship between tutoring and final college math grades than the majority (White non-Hispanic) ($G = .140$ for A – C and $G = .267$ for A – D).

Summary

College math students who accessed tutoring services were significantly different from those who did not seek tutoring in terms of age, earned credit hours, final grades, and end of term GPA. A higher proportion of those who participated in tutoring were older, had more earned credit hours, had higher A – C and A – D completion rates, and had higher end of term GPAs.

An association between math tutoring and successful course completion was revealed through correlation analysis; the relationship between these two variables increased for female students, minority students, and students over age 25.

Tests for significance also determined an unremarkable difference in the distribution of math placement results between those who sought tutoring and those who did not. Results showed higher completion rates for several categories of placement groups for those who received tutoring in comparison to their counterparts in the same placement groups. These results are indicative of tutoring increasing the likelihood of successful completion of college math courses for students who test at college level, one level below and two levels below college level.