

Achieving the Dream Report Series



February 8, 2010

College Math Tutoring Center Results Fall 2009

The College Math Tutoring Center at Northern Essex Community College opened its doors to students in the Spring 2009 semester. In Fall 2009, 968 students enrolled in one or more college level math courses¹ during the term, 152 of which sought math tutoring services through the Center.

As displayed in Table 1 below, the 152 students who participated in math tutoring in Fall 2009 averaged 7 total contacts with the Center and 718 contact minutes (12 contact hours). Fall 2009 saw an increase in the number of students enrolled in college math courses who sought tutoring services from Spring 2009, but averages (mean and median) for the number of contacts, minutes and hours decreased between the two terms.

Table 1

		Tutoring Activity		
		Spring '09	Fall '09	% Change
# of Contacts	N	128	152	18.8%
	Mean	8	7	-12.5%
	Median	5	4	-20.0%
	Mode	1	1	0.0%
	Sum	1,040	1,034	-0.6%
Contact Minutes	N	103	150 ²	45.6%
	Mean	771	718	-6.9%
	Median	390	329	-15.6%
	Mode	60	59	-1.7%
	Sum	79,455	107,773	35.6%
Contact Hours	N	103	150	45.6%
	Mean	13	12	-7.7%
	Median	7	5	-28.6%
	Mode	1	1	0.0%
	Sum	1,324	1,796	35.6%

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, Mathematical Ideas I & II, Mini-Trigonometry, and Statistics.

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

College Math Student Profile

Although there were a higher percentage of males enrolled in college level math courses in Fall 2009, significantly³ more males than females sought tutoring⁴.

Table 2

Tutoring Status by Gender						
Gender	No Tutoring		Tutoring		Total	
	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 students were White/Caucasian (68%) followed by Hispanic (approximately 18%).

Table 3

Tutoring Status by Race/Ethnicity						
Race/Ethnicity	No Tutoring		Tutoring		Total	
	N	%	N	%	N	%
African-American/Black	18	2.2%	7	4.6%	25	2.6%
American Indian/Alaskan Native	4	0.5%	0	0.0%	4	0.4%
Asian	22	2.7%	3	2.0%	25	2.6%
Hispanic	145	17.8%	26	17.1%	171	17.7%
Multi-Racial	2	0.2%	0	0.0%	2	0.2%
Native Hawaiian/Pacific Islander	2	0.2%	0	0.0%	2	0.2%
Non-resident Alien	4	0.5%	1	0.7%	5	0.5%
Unknown	66	8.1%	11	7.2%	77	8.0%
White/Caucasian	553	67.8%	104	68.4%	657	67.9%
Total	816	100.0%	152	100.0%	968	100.0%

³ Chi square tests were used to determine levels of significance and had an Alpha of .01.

⁴ $\chi^2=631.84, p = .000$

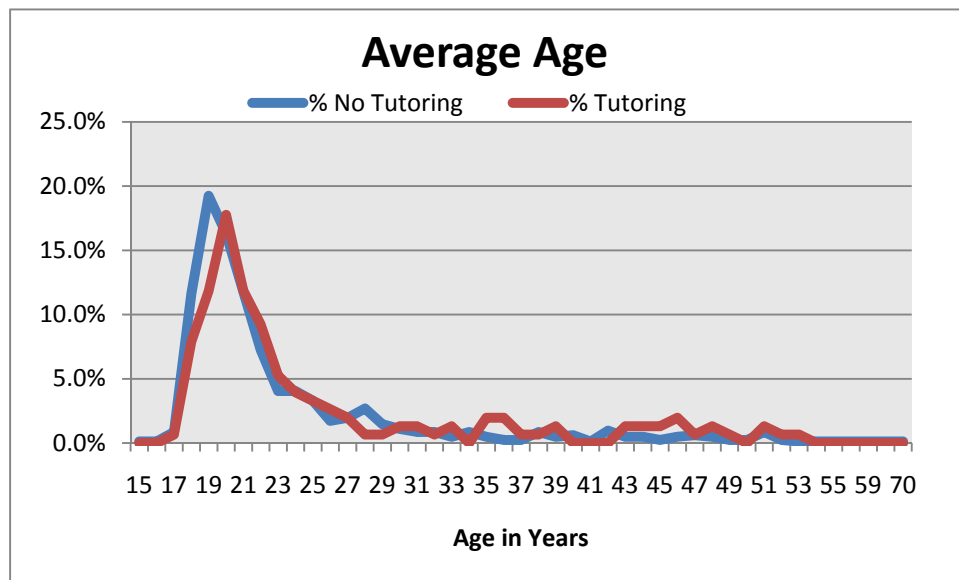
The vast majority of students accessing math tutoring services were continuing students, consistent with the overall composition of students enrolled in college math courses (see Table 4). New NECC students enrolled in college math courses made up approximately 21% of all students in this cohort, however only 11% sought tutoring services. This difference was statistically significant⁵.

Table 4

Tutoring Status by Student Status						
Student Status	No Tutoring		Tutoring		Total	
	N	%	N	%	N	%
Continuing	506	62.0%	114	75.0%	620	64.0%
New	181	22.2%	17	11.2%	198	20.5%
Readmit	100	12.3%	19	12.5%	119	12.3%
Readmit Grad NECC	1	0.1%	0	0.0%	1	0.1%
Transfer	28	3.4%	2	1.3%	30	3.1%
Total	816	100.0%	152	100.0%	968	100.0%

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

Chart 1



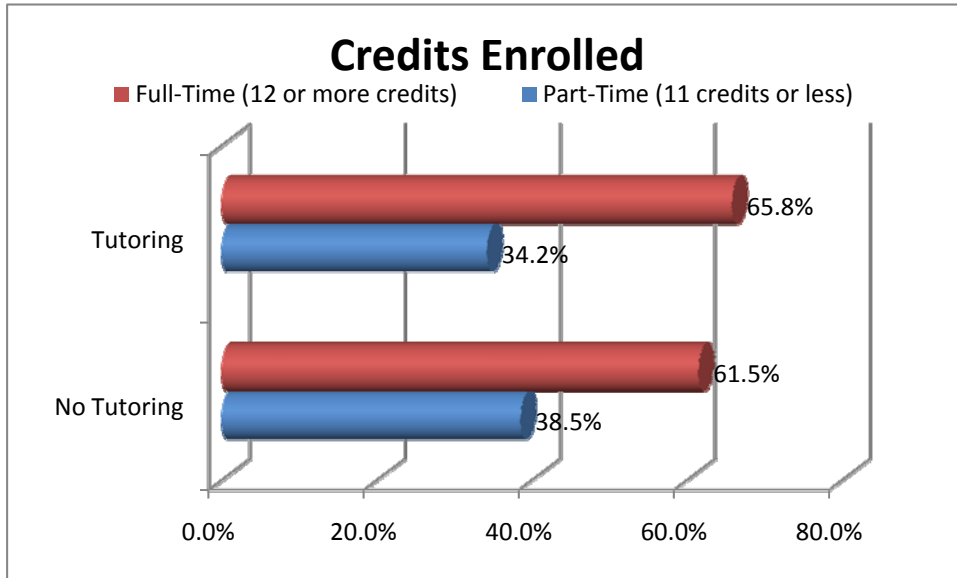
Age in Years	No Tutoring	Tutoring	Total
N	816	152	968
Mean	23.6	25.6	23.9
Median	21.0	21.5	21.0
Mode	19.0	20.0	19.0

⁵ $\chi^2=13.00, p = .010$

⁶ $t = -2.67, p = .008$

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	815	152	967
Mean	11.2	11.7	11.2
Median	12.0	12.0	12.0
Mode	12.0	12.0	12.0

Students who participated in math tutoring had earned, on average, significantly⁷ more credit hours than those who did not seek tutoring (see Table 5).

Table 5

Tutoring Status by Earned Credit Hours			
	No Tutoring	Tutoring	Total
N	815	152	967
Mean	27.9	37.2	29.4
Median	23.0	33.0	25.0
Mode	0.0	0.0	0.0

⁷ $t = -3.96, p = .000$

Prior to Fall 2009, the majority of students had taken two prior math courses. Those who received tutoring had a slightly higher average of 2.7 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	513	118	631
Mean	2.2	2.7	2.3
Median	2.0	2.0	2.0
Mode	1.0	2.0	2.0

Of the college math students who sought tutoring in Fall 2009, 67.5% had initially assessed into developmental math. This proportion is approximately 3% higher than those who did not seek tutoring; however this difference is not statically significant.

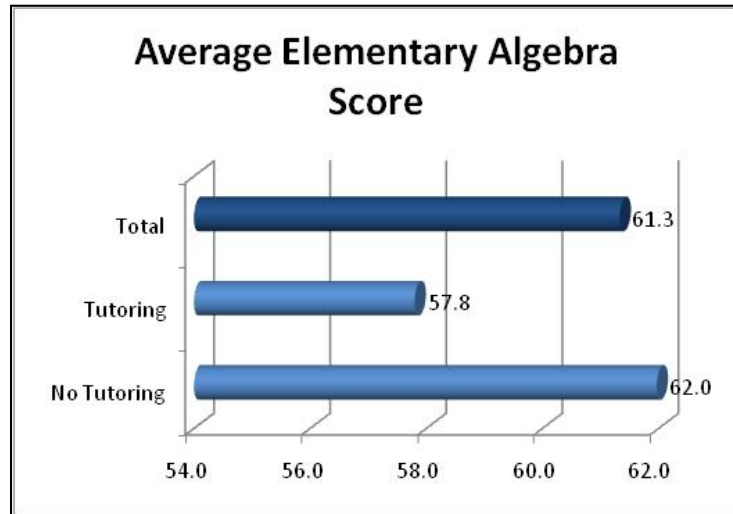
Table 7

Tutoring Status by Math Placement						
Math Placement	No Tutoring		Tutoring		Total	
	N	%	N	%	N	%
Assessed into Developmental	441	64.8%	85	67.5%	526	65.2%
Assessed into College Level	204	30.0%	34	27.0%	238	29.5%
Unknown	36	5.3%	7	5.6%	43	5.3%
Total	681	100.0%	126	100.0%	807	100.0%

Note: For students who were tested more than once, results from the most recent test were used.

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 (62.0 versus 57.8) was not statistically significant.

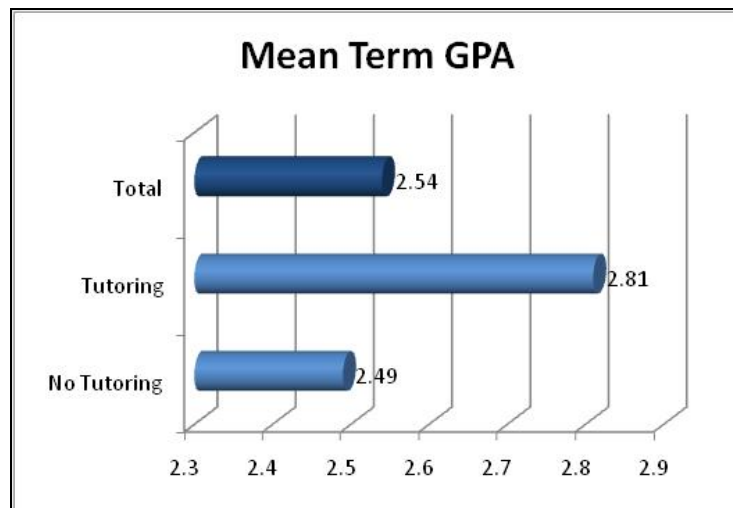


Elementary Algebra Score	No Tutoring	Tutoring	Total
N	678	126	804
Mean	62.0	57.8	61.3
Median	61.0	51.9	59.7
Mode	0.0	27.0	0.0

College Math Outcomes

The final GPA for the Fall 2009 term was, on average, significantly⁸ higher for college math students who accessed tutoring services than those who did not (see Chart 4).

Chart 4



⁸ $t = -3.09, p = .002$

Term GPA	No Tutoring	Tutoring	Total
N	816	152	968
Mean	2.5	2.8	2.5
Median	2.8	3.0	2.8
Mode	0.0	4.0	0.0

A total of 982 college math grades were distributed among 968 individual students during the Fall 2009 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 approaching statistical significance⁹ for 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	118	14.3%	43	27.4%	161	16.4%
A-	53	6.4%	21	13.4%	74	7.5%
B+	59	7.2%	5	3.2%	64	6.5%
B	69	8.4%	10	6.4%	79	8.0%
B-	58	7.0%	12	7.6%	70	7.1%
C+	36	4.4%	6	3.8%	42	4.3%
C	94	11.4%	10	6.4%	104	10.6%
C-	23	2.8%	4	2.5%	27	2.7%
D+	18	2.2%	3	1.9%	21	2.1%
D	32	3.9%	5	3.2%	37	3.8%
F	55	6.7%	9	5.7%	64	6.5%
FN	44	5.3%	3	1.9%	47	4.8%
FW	34	4.1%	6	3.8%	40	4.1%
I	17	2.1%	5	3.2%	22	2.2%
NW	61	7.4%	4	2.5%	65	6.6%
W	54	6.5%	11	7.0%	65	6.6%
Total	825	100.0%	157	100.0%	982	100.0%
A - C Completion	510	61.8%	111	70.7%	621	63.2%
A - D Completion	560	67.9%	119	75.8%	679	69.1%

⁹ $\chi^2=4.21$, $p = .040$ and $\chi^2=3.73$, $p = .054$, 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 (17.3% higher and 10.3% 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 (7.4% higher, 13.2% higher, and 4.4% higher, respectively).

Table 9

		Tutoring Status by Math Placement Groups & A - C Completion Rates	
		A- C Completion Rates	A - D Completion Rates
No Tutoring	Did Not Take	50.0%	58.3%
	Tested at College Level	64.2%	69.1%
	Tested 1 Level Below College Level	60.3%	67.1%
	Tested 2 Levels Below College Level	64.7%	70.6%
	Tested 3 or More Levels Below College Level	50.0%	50.0%
	Total	61.1%	67.3%
Tutoring	Did Not Take	42.9%	42.9%
	Tested at College Level	64.7%	76.5%
	Tested 1 Level Below College Level	77.6%	80.3%
	Tested 2 Levels Below College Level	75.0%	75.0%
	Tested 3 or More Levels Below College Level	20.0%	20.0%
	Total	69.8%	74.6%

Students enrolled in college math in Spring 2009 had an 80% retention rate from Spring 2009 to Fall 2009. This rate was almost identical between those who sought tutoring in Spring 2009 and those who did not (see Table 9).

Table 10

	Spring 09 College Math Students	Graduates AY 2008-2009	Transfer to 4-Year College	Fall 09 Remaining Students	Retention Spring 09 - Fall 09
College Math Cohort	940	59	114	579	80%
Tutoring	128	7	16	78	79%
No Tutoring	812	52	98	501	80%

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 a moderately weak relationship ($G = 2.45$) between the total minutes spent in tutoring and A – C completion rates. The more time spent with tutoring resulted in a higher A – C completion rates for college math.

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 ($G = .297$) with A – C completion rates whereas males had a virtually non-existent relationship ($G = .091$).

The relationship between age and college math grades was much more pronounced for A – D completion rates. Students who participated in tutoring that were over 25 years of age had a moderately weak positive relationship ($G = .227$) with A – D completion rates. Students who did not participate in tutoring demonstrated a negative weak relationship ($G = -.113$) indicating that as age decreased, A – D completion rates increased slightly.

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) ($G = .357$ versus $G = .300$, respectively).

Summary

College math students who accessed tutoring services were significantly different from those who did not seek tutoring in terms of gender, student status, age, earned credit hours, final grades, and end of term GPA. A higher proportion of those who participated in tutoring were male, continuing students, 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 students who spent more time at tutoring, 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.

Interpretations of these findings as well as suggestions for further analysis are always welcome. Please direct questions and comments to Thomas Fallon, Dean of Institutional Research and Planning, via phone at 978-556-3866 or email at tfallon@necc.mass.edu.



<http://www.necc.mass.edu/irp/planning/dream.php>