NECC

Northern Essex Community College

NECC College Math Tutoring Center Results

Spring 2011

Office of Institutional Research & Planning

The College Math Tutoring Center at Northern Essex Community College opened its doors to students in the Spring 2009 semester. In Spring 2011, 1,064 grades were distributed to 1,049 students enrolled in college level math courses[1] during the term, 208 of which sought math tutoring services through the Center.

As displayed in Table 1 below, the 208 students who participated in math tutoring in Spring 2011 averaged 8 total contacts with the Center and 842 contact minutes (slightly over 14 contact hours). Spring 2011 saw a decrease in the number of students enrolled in college math courses who sought tutoring services from previous terms, but averages for the number of contacts, minutes and hours increased dramatically between the terms.

Table 1

Tutoring Activity

		Spring 2009	Spring 2010	Spring 2011	Spring 2010 - Spring 2011 % Change
# of Contacts	N	128[2]	241	208[3]	-13.7%
	Mean	8	5.5	7.7	40.0%
	Median	5	3.0	4.5	50.0%
	Mode	1	1.0	1.0	0.0%
	Sum	1,040	1,317.0	1,591.0	20.8%
Contact Minutes	N	103	241	207	-14.1%
	Mean	771	554.7	842.0	51.8%
	Median	390	256.0	733.4	186.5%
	Mode	60	91.0	60.0	-34.1%
	Sum	79,455	133,673.0	151,807.0	13.6%
Contact Hours	N	103	241	207	-14.1%
	Mean	13	9.0	12.2	35.6%
	Median	7	4.1	7.4	80.5%
	Mode	1	1.3	1.0	-23.1%
	Sum	1,324	2,228.3	2,530.1	13.5%

[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] In Spring 2011, 4 tutoring records were omitted due to unreliable data. This term also marked the implementation of the center's new time tracking software.

College Math Student Profile

In Spring 2011 more males enrolled in college level math courses and more males than females sought tutoring. These differences were not statically significantly[4].

Table 2

Tutoring Status by Gender						
	No Tutoring		Tutoring		Total	
Gender	N	%	N	%	N	%
Female	387	46.0%	108	51.9%	495	47.2%
Male	454	54.0%	100	48.1%	554	52.8%
Total	841	100.0%	208	100.0%	1,049	100.0%

Table 3 depicts the race/ethnicity distributions for those who received tutoring services and those that did not. There were no significant differences between the distribution and tutoring participation.

Table 3

Tutoring Status by Race/Ethnicity						
	No Tutoring		Tutoring		Total	
Race/Ethnicity	N	%	N	%	N	%
African-American/Black	26	3.1%	9	4.3%	35	3.3%
American Indian/Alaskan Native	1	0.1%	0	0.0%	1	0.1%
Asian	11	1.3%	3	1.4%	14	1.3%
Hispanic	173	20.6%	45	21.6%	218	20.8%
Multi-Racial	5	0.6%	2	1.0%	7	0.7%
Native Hawaiian/Pacific Islander	12	1.4%	1	0.5%	13	1.2%
Non-Resident Alien	3	0.4%	3	1.4%	6	0.6%
Unknown	19	2.3%	9	4.3%	28	2.7%
White/Caucasian	591	70.3%	136	65.4%	727	69.3%
Total	841	100.0%	208	100.0%	1,049	100.0%

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

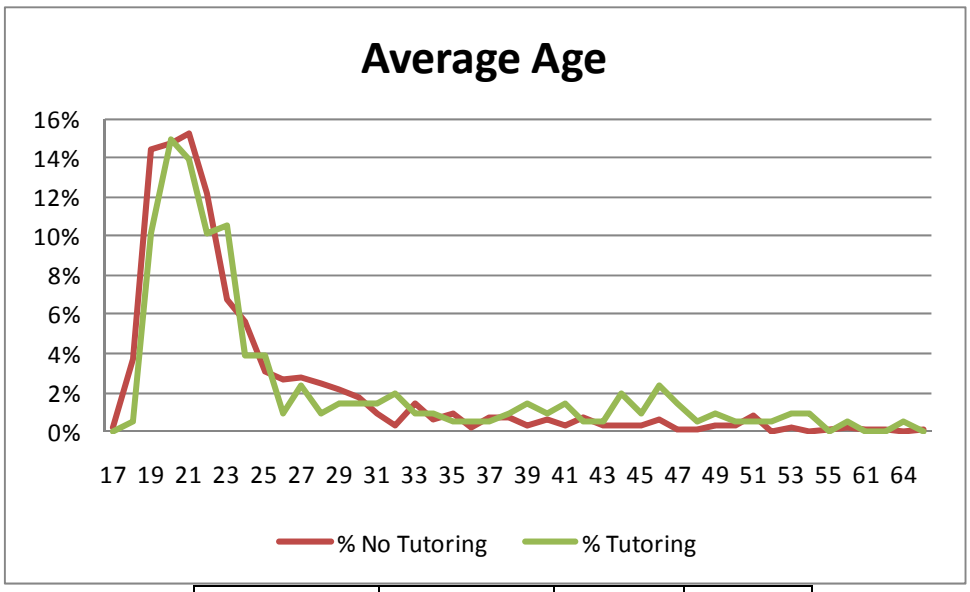
The vast majority of students accessing math tutoring services were continuing students, which was significantly[5] higher than the overall composition of students enrolled in college math courses (see Table 4).

Table 4

Tutoring Status by Student Status						
	No Tutoring		Tutoring		Total	
Student Status	N	%	N	%	N	%
Continuing	701	83.4%	192	92.3%	893	85.1%
New	55	6.5%	4	1.9%	59	5.6%
Readmit	67	8.0%	7	3.4%	74	7.1%
Transfer	16	1.9%	5	2.4%	21	2.0%
Unknown	2	0.2%	0	0.0%	2	0.2%
Total	841	100.0%	208	100.0%	1,049	100.0%

As displayed in the chart below, students seeking math tutoring services had a significantly[6] higher average age than those who did not.

Chart 1

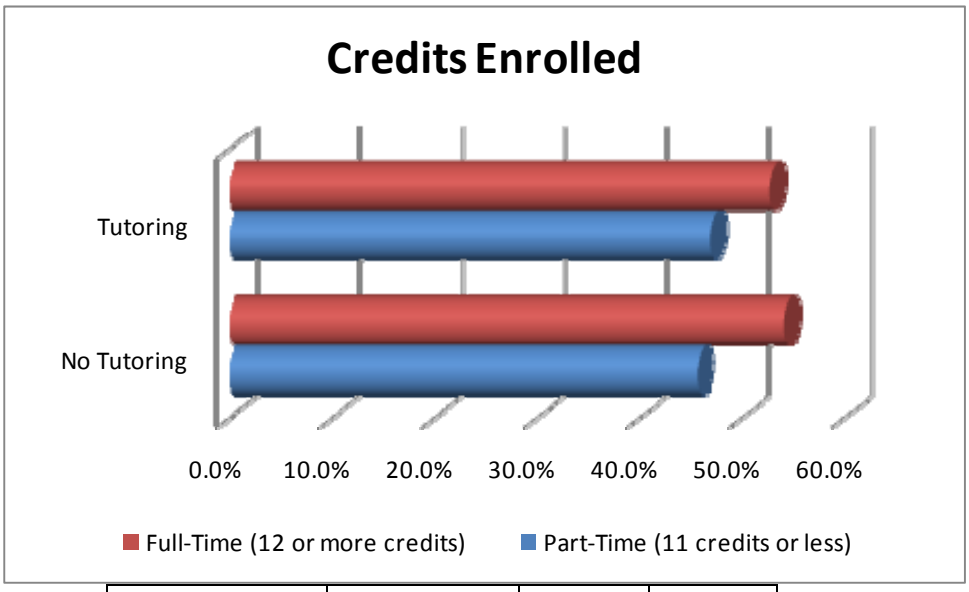


Age in Years	No Tutoring	Tutoring	Total
N	841	208	1,049
Mean	24.3	27.1	24.8
Median	22.0	23.0	22.0
Mode	21.0	20.0	21.0

[5] χ^2=13.60, p = .009
[6] *t* = -4.67, p = .000

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	839[7]	208	1,047
Mean	10.9	10.9	10.9
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 not statistically significant.

Table 5

Tutoring Status by Earned Credit Hours			
	No Tutoring	Tutoring	Total
N	766	200	966[8]
Mean	34.0	37.9	34.8
Median	30.0	35.5	31.0
Mode	12.0	12.0	12.0

[7] Two students did not have credit enrollment data.
[8] 83 students did have earned credit data.

Prior to Spring 2011, the majority of students had taken three prior math courses. Those who received tutoring had a higher average of 2.5 courses compared to those who did not receive tutoring (2.1 average prior math courses). This difference was statistically significant[9].

Table 6

Tutoring Status by Prior MAT Courses						
	No Tutoring		Tutoring		Total	
Prior MAT Courses	N	%	N	%	N	%
No Prior MAT courses	179	21.3%	22	10.6%	201	19.2%
1	308	36.6%	59	28.4%	367	35.0%
2	161	19.1%	59	28.4%	220	21.0%
3	111	13.2%	30	14.4%	141	13.4%
4	41	4.9%	17	8.2%	58	5.5%
5	23	2.7%	10	4.8%	33	3.1%
6	9	1.1%	5	2.4%	14	1.3%
7	6	0.7%	3	1.4%	9	0.9%
8	2	0.2%	0	0.0%	2	0.2%
9	0	0.0%	3	1.4%	3	0.3%
10	0	0.0%	0	0.0%	0	0.0%
11	0	0.0%	0	0.0%	0	0.0%
12	1	0.1%	0	0.0%	1	0.1%
Total	841	100.0%	208	100.0%	1,049	100.0%

Of the college math students who sought tutoring in Spring 2011, 64% had assessed into developmental math. This proportion is approximately 6% higher than those who did not seek tutoring, however this difference is not statically significant.

Table 7

Tutoring Status by Math Placement						
	No Tutoring		Tutoring		Total	
Math Placement	N	%	N	%	N	%
Assessed into Developmental Math	481	57.2%	132	63.5%	613	58.4%
Assessed into College Math	247	29.4%	49	23.6%	296	28.2%
Unknown/Did Not Test	113	13.4%	27	13.0%	140	13.3%
Total	841	100.0%	208	100.0%	1,049	100.0%

[9] t = -3.56, p = .000

Table 8

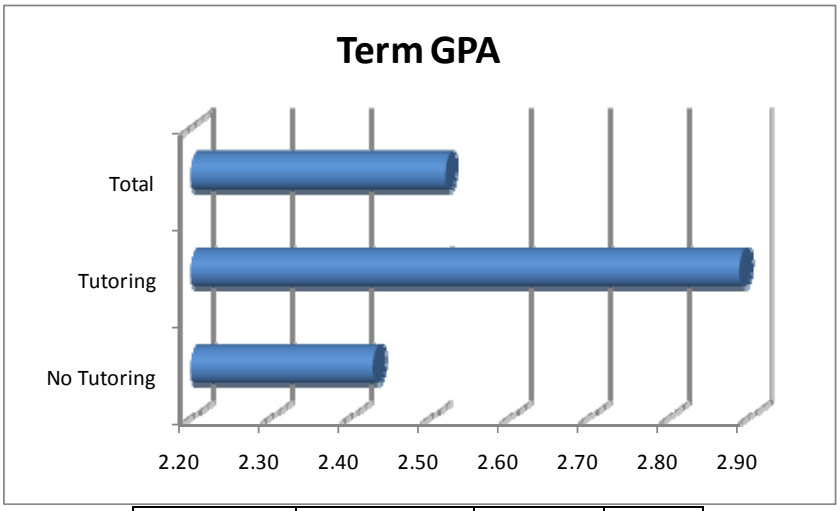
Tutoring Status by Testing Scores		Arithmetic Score	Elementary Algebra Score	College Level Math Score
No Tutoring	Valid	708	709	705
	Missing	133	132	136
	Mean	75.3	63.1	22.7
	Median	80.0	61.0	21.3
	Mode	105.0	0.0	0.0
Tutoring	Valid	181	181	179
	Missing	27	27	29
	Mean	69.6	55.5	19.4
	Median	71.7	51.7	20.0
	Mode	39.0	21.0	0.0

Students who participated in math tutoring received a lower average Arithmetic, Elementary Algebra, and College Level test scores than those who did not seek tutoring. The differences for the Elementary Algebra scores were statistically significant[10].

College Math Outcomes

The final GPA for the Spring 2011 term was, on average, significantly[11] higher for college math students who accessed tutoring services than those who did not (see Chart 3).

Chart 3



Term GPA	No Tutoring	Tutoring	Total
N	841	208	1,049
Mean	2.43	2.89	2.52
Median	2.70	3.12	2.79
Mode	0.00	4.00	0.00

[10] $t = 3.35$, $p = .001$
[11] $t = -4.94$, $p = .000$

A total of 1,064 college math grades were distributed among 1,049 individual students during the Spring 2011 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 significant[12] for both A – C and A – D completion rates.

Table 9

Tutoring Status by Final College Math Grade						
	No Tutoring		Tutoring		Total	
Final Grade	N	%	N	%	N	%
A	175	20.6%	59	27.6%	234	22.0%
A-	53	6.2%	19	8.9%	72	6.8%
B+	49	5.8%	11	5.1%	60	5.6%
B	76	8.9%	22	10.3%	98	9.2%
B-	59	6.9%	10	4.7%	69	6.5%
C+	21	2.5%	4	1.9%	25	2.3%
C	47	5.5%	29	13.6%	76	7.1%
C-	21	2.5%	9	4.2%	30	2.8%
D+	31	3.6%	3	1.4%	34	3.2%
D	49	5.8%	10	4.7%	59	5.5%
F	75	8.8%	18	8.4%	93	8.7%
I	30	3.5%	4	1.9%	34	3.2%
NW	81	9.5%	2	0.9%	83	7.8%
W	83	9.8%	14	6.5%	97	9.1%
Total	**850**	**100.0%**	**214**	**100.0%**	**1,064**	**100.0%**
A - C Completion	480	56.5%	154	72.0%	634	59.6%
A - D Completion	581	68.4%	176	82.2%	757	71.1%

[12] χ^2=17.04, p = .000 and χ^2=16.07, p = .000, respectively

As displayed previously in Table 7, there were 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 greater A – C completion rates in all placement groups except for those that tested two levels below college level. In terms of A – D completion rates, those who sought tutoring services had greater rates in all placement groups.

Table 10

Tutoring Status by Math Placement Groups & Completion Rates						
		A - C Grades	A - D Grades	Total Grades	A-C Completion Rates	A-D Completion Rates
No Tutoring	Missing	33	40	100	33.0%	40.0%
	Did Not Take	6	8	15	40.0%	53.3%
	Waiver	39	44	59	66.1%	74.6%
	Tested at College Level	124	147	194	63.9%	75.8%
	Tested 1 Level Below College Level	232	290	414	56.0%	70.0%
	Tested 2 Levels Below College Level	42	46	60	70.0%	76.7%
	Tested 3 Levels Below College Level	4	6	8	50.0%	75.0%
	Total	480	581	850	56.5%	68.4%
Tutoring	Missing	11	14	20	55.0%	70.0%
	Did Not Take	8	8	8	100.0%	100.0%
	Waiver	9	9	11	81.8%	81.8%
	Tested at College Level	33	38	42	78.6%	90.5%
	Tested 1 Level Below College Level	76	87	109	69.7%	79.8%
	Tested 2 Levels Below College Level	14	17	21	66.7%	81.0%
	Tested 3 Levels Below College Level	3	3	3	100.0%	100.0%
	Total	154	176	214	72.0%	82.2%

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 weak to moderate relationship found between the total minutes spent in tutoring and A – C (G = .263) and A – D (G = 3.11) completion rates.

Controlling for gender, results showed that tutoring had a stronger impact on males than females in Spring 2011. Females who participated in tutoring had a weak to moderate relationship (G = .268) with A – C completion rates whereas males had a stronger relationship (G= .333).

There was also a relationship between age and college math grades for A – C completion rates. Students who participated in tutoring that were over 25 years of age had a positive relationship (G = .327) with A – C completion rates.

When controlling for race (excluding students who had an unknown race/ethnicity), minorities (American Indian/Alaskan Native, Asian, Black non-Hispanic, and Hispanic, multi-racial, and Native Hawaiian/Pacific Islander) demonstrated a stronger relationship between tutoring and final college math grades than the majority (White non-Hispanic) (G = .273 for A – C and G = .341 for A – D).

Summary

College math students who accessed tutoring services were significantly different from those who did not seek tutoring in terms of student status, age, prior math courses, elementary algebra scores, final grades, and end of term GPA. A higher proportion of those who participated in tutoring were female, minority, older, continuing students that 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 a remarkable 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 a relationship between tutoring and the successful completion of college math courses for students who test at college level, one level below and three levels below college level.