



STEM Embedded Tutoring Class/Instructor Analysis Fall 2017

Introduction

The purpose of this report is to evaluate the effectiveness of Embedded Tutoring (ET) classes compared to Non-ET classes taught by the same instructor. What follows are descriptive statistics and success rates for each course offered under ET in Fall 2017.

Embedded Tutoring is just one activity Citrus College has implemented with the goal of facilitating student learning and ultimately student success. Embedded Tutoring provides regularly scheduled, in-class and out-of-class review sessions for students who may want additional help.

In Fall 2017, Embedded Tutoring (ET) was offered for two mathematics courses – MATH030, and MATH150 – for a total of 210 students in five sections. The same instructors also taught sections that were not supported by ET. The Non-supported ET classes consisted of 170 students across four sections. This report focuses on three instructors that taught both supported and non-supported ET sections.

Table 1 Course Enrollment and ET Participation

Courses	# of ET Supported Sections	ET Enrollment	# of Non-ET Supported Sections	Non-ET Enrollment
MATH030 Total	3	127	2	82
Instructor 1	1	43	1	38
Instructor 2	2	84	1	44
MATH150 Total	2	83	2	88
Instructor 1	1	42	1	45
Instructor 3	1	41	1	43
All Courses	5	210	4	170

Success Rates based on ET Participation

A Chi-Square test for independence were used to examine if students who took a class supported by Embedded Tutoring (ET) were more likely to be successful compared to students who did not take a ET supported class taught by the same instructor. Success was defined as students earning a final course grade of A, B, or C. Students earning a final course grade of D, F, FW, or W were considered unsuccessful.

Table 2 Success Rates by Course and ET Participation

Course	ET Course			Non-ET Course		
	Success Count	Total	Success Rate	Success Count	Total	Success Rate
MATH030 Total	76	127	60%	45	82	55%
Instructor 1	29	43	67%	24	38	63%
Instructor 2	47	84	56%	21	44	48%
MATH150 Total	60	83	72%	64	88	73%
Instructor 1	27	42	64%	32	45	71%
Instructor 3	33	41	80%	32	43	74%
All Courses	136	210	65%	109	170	64%

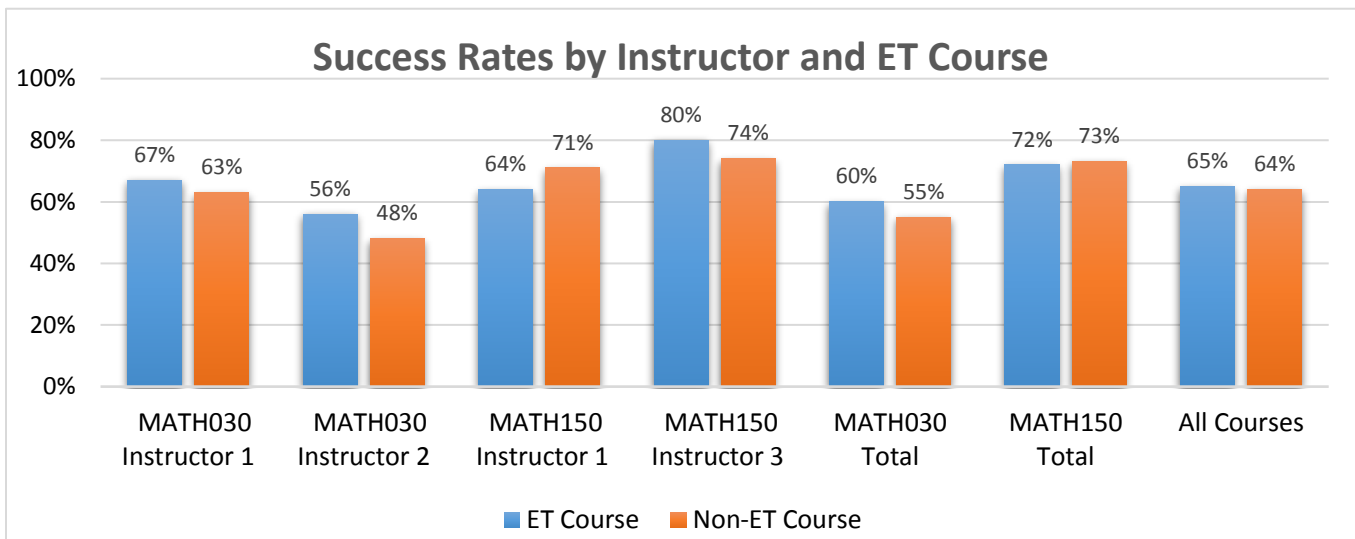


Figure 1

* Indicates statistically significant differences at $p \leq .05$. No significance was found.

Students who took a MATH030 course supported by Embedded Tutoring had higher success rates than students who did not. A similar result was found for MATH150 courses taught by Instructor 3. The results of several chi-square tests revealed the differences in success rates were not statistically significant for all courses combined, $X^2(1, N=380) = .017, p=.896$ or when disaggregated by course and instructor.

ET Participation and Success Rates by Gender

The figures below show the breakdown of Embedded Tutoring Classes and success rates by gender. With the exception of MATH030 taught by Instructor 2, female students attending a math class with Embedded Tutoring succeeded at a lower rate than females attending the same math class but without Embedded Tutoring. Figure 3 showed a more expected pattern in which male students attending a math class with Embedded Tutoring succeeded at a higher rate than males attending the same math class but without Embedded Tutoring. The only exceptions to this pattern was for MATH030 taught by Instructor 2 and MATH150 taught by Instructor 1.

The results of chi-square tests, at the course level and for all courses combined, revealed the differences in success rates were not statistically significant for females, $X^2(1, N=205) = .117, p=.732$, or for males, $X^2(1, N=168) = .649, p=.420$.

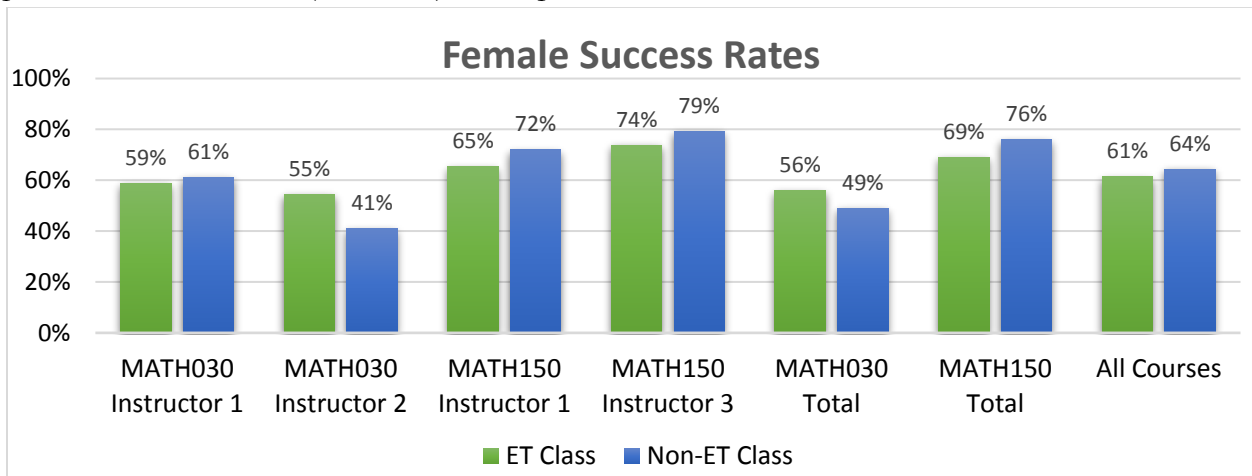


Figure 2

* Indicates statistically significant differences at $p \leq .05$. No significance was found.

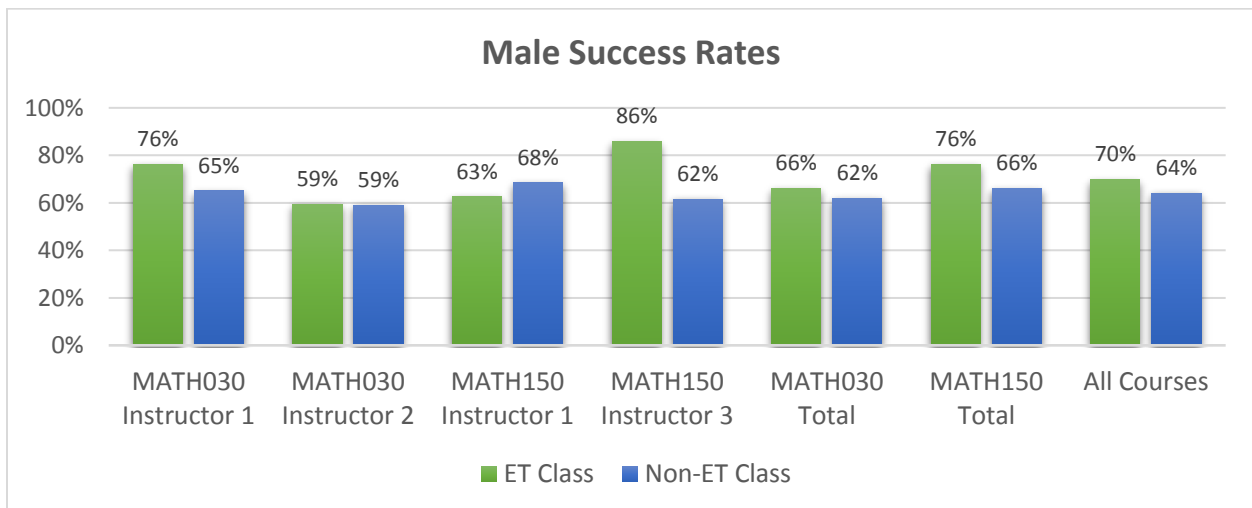


Figure 3

* Indicates statistically significant differences at $p \leq .05$. No significance was found.

ET Participation and Success Rates by Ethnicity

The figures below show the breakdown of Embedded Tutoring Classes and success rates by ethnicity. As shown in Figure 4, there is not a consistent pattern in terms of Hispanic students in ET classes succeeding at a higher rate than those in non-ET supported classes. The results of chi-square tests, at the course level and for all courses combined, revealed the differences in success rates shown below were not statistically significant for Hispanic students, $X^2(1, N=271) = .041, p = .839$.

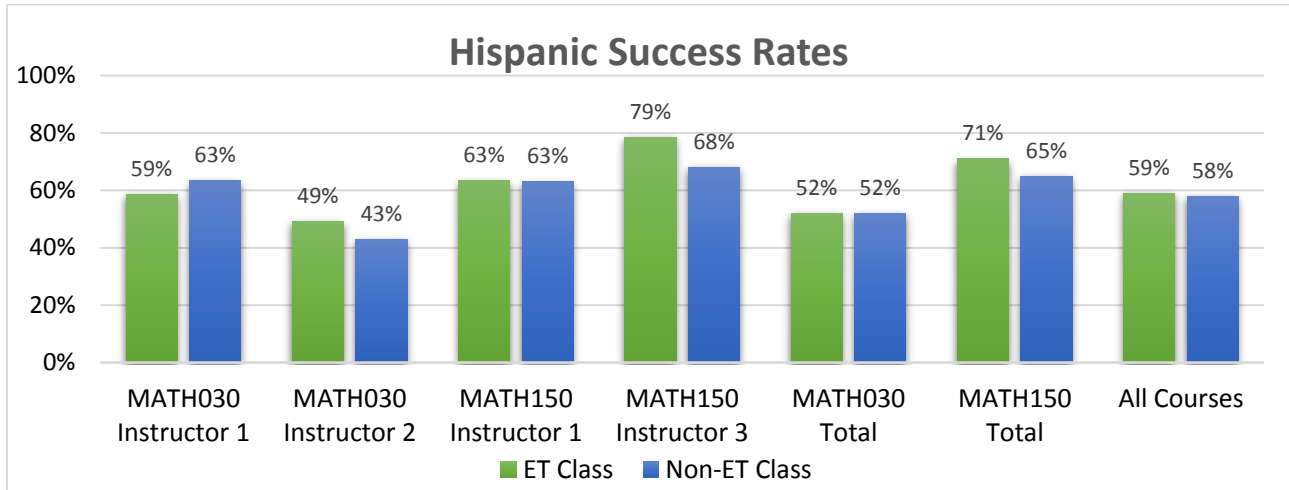


Figure 4

* Indicates statistically significant differences at $p \leq .05$. No significance was found.

Figure 5 reveals that White students in ET classes succeeded at a higher rate than those in non-ET supported classes. However, the results of several chi-square tests for independence, at the course level and for all courses combined, revealed the differences in success rates shown below were not statistically significant, $X^2(1, N=46) = 1.84, p = .175$. The lack of significant results is mostly likely due to low sample sizes.

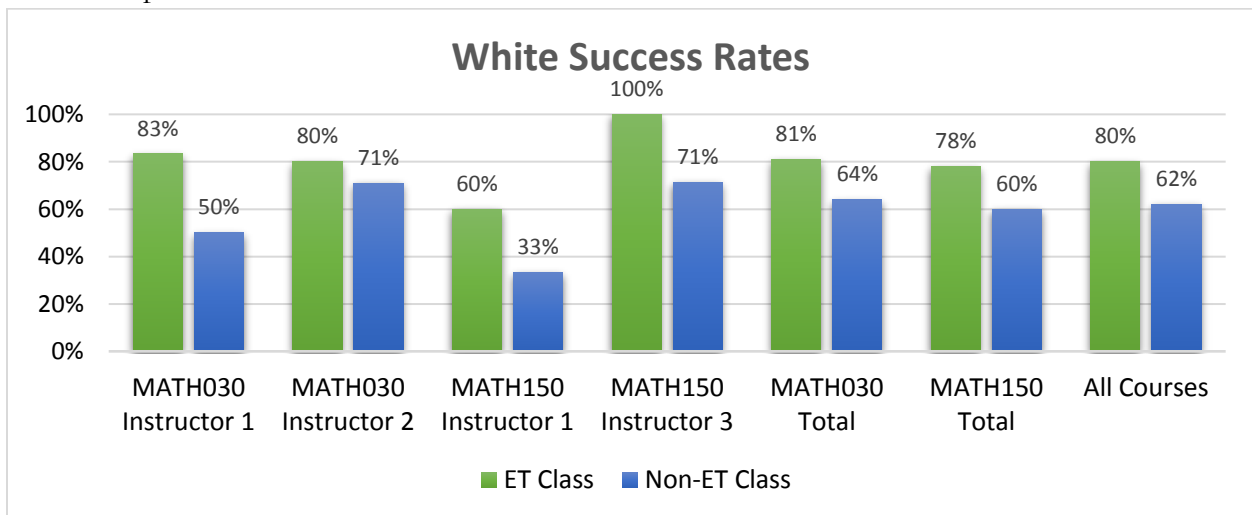


Figure 5

* Indicates statistically significant differences at $p \leq .05$. No significance was found.

As displayed in Figure 6, Asian students in ET classes succeeded at a lower rate than those in non-ET supported classes which is counter to our expectations. The only exception was for MATH030 taught by Instructor 1. There were no Asian students in the MATH030 Non-ET class taught by Instructor 2. Chi-square analyses, at the course level and for all courses combined, revealed the differences in success rates shown below were not statistically significant, $X^2(1, N=36) = 1.85$, $p = .174$.

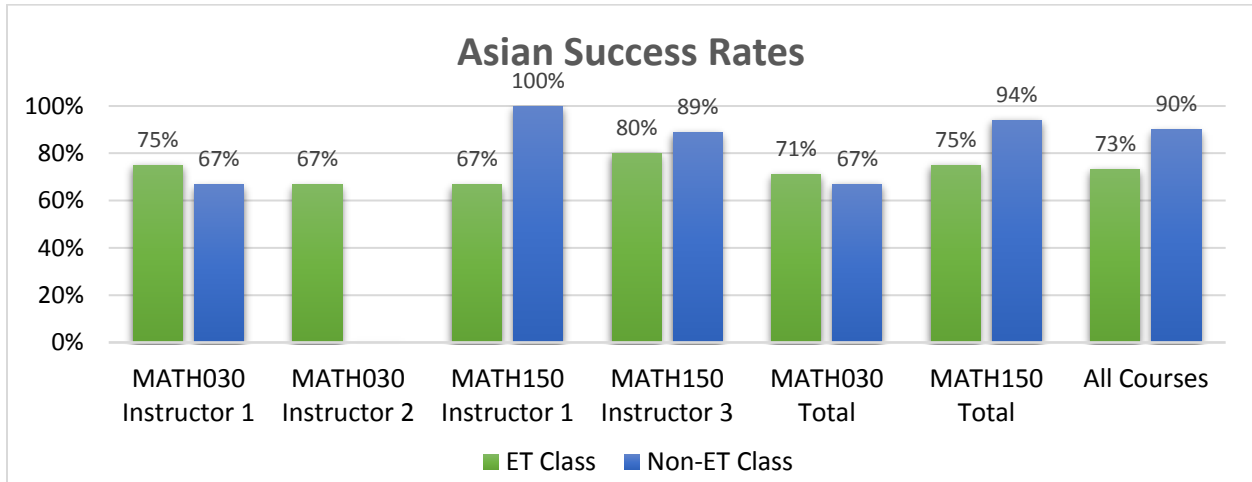


Figure 6

* Indicates statistically significant differences at $p \leq .05$. No significance was found.

Figure 7 shows that students of Other Ethnicities in ET classes succeeded at a lower rate than those in non-ET supported classes which is counter to our expectations. The only exception was for MATH030 taught by Instructor 1. There were no students of Other Ethnicity in the MATH030 Non-ET class taught by Instructor 2. The results of chi-square tests, at the course level and for all courses combined, revealed the differences in success rates shown below were not statistically significant, $X^2(1, N=27) = .147$, $p = .702$.

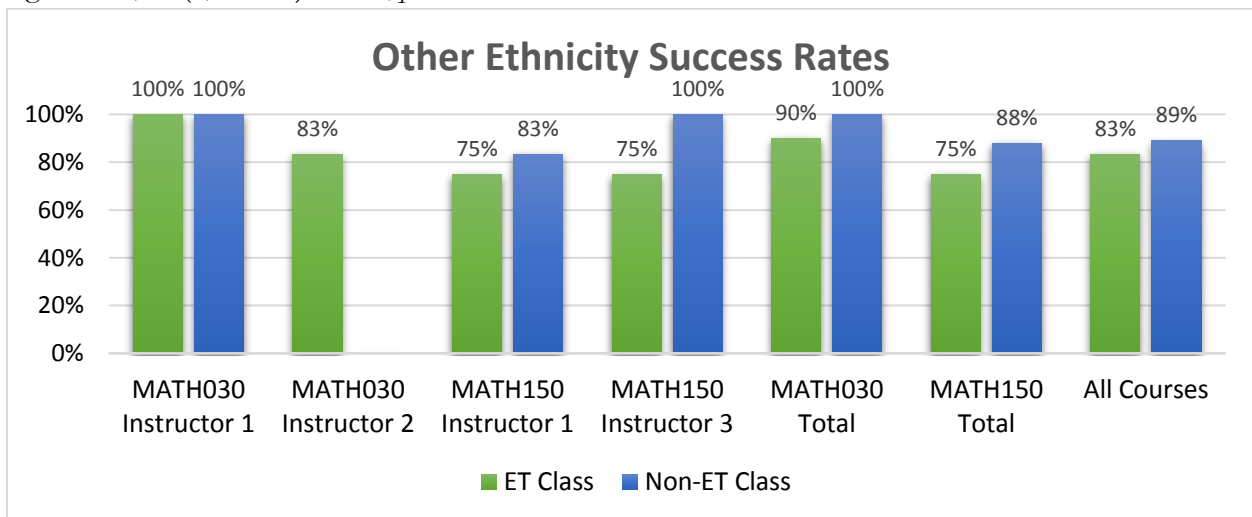


Figure 7

* Indicates statistically significant differences at $p \leq .05$. No significance was found.

ET's Influence on Course Success: Logistic Regression Analyses

To gain a better understanding of how Embedded Tutoring related to student success even when taking into account other extraneous variables not controlled for, a hierarchical logistic regression analysis was employed. This analysis examines whether ET participation predicted higher course grades above and beyond other influential factors such as students' gender, ethnicity, and cumulative GPA prior to the course (i.e. Pre-GPA).

When looking at all courses, the analysis revealed that pre-existing GPA was a significant predictor. In particular, the odds ratio revealed that as students' GPA increased by a unit, the odds of success in the course increased by a factor of almost 2 (1.90); in other words students were more likely to be successful if their preexisting, overall GPA was high, regardless of them attending a class with Embedded Tutoring support. This suggests that the greatest predictive variable of an individual student's success in a math course may be their preexisting GPA.

There was marginal significance in terms of ethnicity. Based on the odds ratio for ethnicity, students of Other Ethnicity were over 3 times (3.71) more likely to succeed compared to Hispanic students which was the comparison group.

Table 3 Hierarchical Logistic Regression Examining Predictors of Overall Course Success

Variables	B	S.E.	Wald	p-value	Odds Ratio
Step 1					
Pre-GPA*	0.643	0.171	14.079	0.000	1.90
Gender (Female)	0.296	0.284	1.089	0.297	1.34
Ethnicity (White)	0.381	0.423	0.809	0.368	1.46
Ethnicity (Asian)	0.698	0.506	1.906	0.167	2.01
Ethnicity (Other)	1.31	0.67	3.818	0.051	3.71
Step 2					
ET Class	-0.056	0.281	0.04	0.841	0.95

*Indicates significance at $p \leq .05$.

Logistic regression analyses were also conducted for each course. The results are summarized below.

For **MATH030 taught by Instructor 1**, the analysis revealed that GPA, Gender, Ethnicity, and Embedded Tutoring Class support were not significant predictors of course success.

Table 4 Hierarchical Logistic Regression Examining Predictors of MATH030 Instructor 1 Course Success

Variables	B	S.E.	Wald	p-value	Odds Ratio
Step 1					
Pre-GPA	0.696	0.415	2.809	0.094	2.01
Gender (Female)	1.074	0.702	2.344	0.126	2.93
Ethnicity (White)	0.257	0.965	0.071	0.790	1.29
Ethnicity (Asian)	-0.36	1.111	0.105	0.746	0.70
Ethnicity (Other)	20.631	2.84E+04	0	0.999	9.12E+08
Step 2					
ET Class	-0.367	0.685	0.287	0.592	0.69

*Indicates significance at $p \leq .05$. No significance was found.

For **MATH030 taught by Instructor 2**, the analysis revealed that GPA, Gender, Ethnicity, and Embedded Tutoring Class support were not significant predictors of course success.

Table 5 Hierarchical Logistic Regression Examining Predictors of MATH030 Instructor 2 Course Success

Variables	B	S.E.	Wald	p-value	Odds Ratio
Step 1					
Pre-GPA	0.355	0.276	1.657	0.198	1.43
Gender (Female)	0.286	0.509	0.316	0.574	1.33
Ethnicity (White)	0.73	0.7	1.09	0.296	2.08
Ethnicity (Asian)	-0.118	1.489	0.006	0.937	0.89
Ethnicity (Other)	0.782	1.284	0.371	0.542	2.19
Step 2					
ET Class	0.635	0.519	1.497	0.221	1.89

*Indicates significance at $p \leq .05$. No significance was found at the .05 level.

For **MATH150 taught by Instructor 1**, the analysis revealed that pre-existing GPA was a significant predictor. In particular, the odds ratio revealed that as students' GPA increased by a unit, the odds of success in the course increased by a factor of 2.4. Gender, Ethnicity, and ET Class support, however, were not significant predictors of course success.

Table 6 Hierarchical Logistic Regression Examining Predictors of MATH150 Instructor 1 Course Success

Variables	B	S.E.	Wald	p-value	Odds Ratio
Step 1					
Pre-GPA*	0.877	0.389	5.087	0.024	2.40
Gender (Female)	-0.359	0.578	0.385	0.535	0.70
Ethnicity (White)	-0.802	0.922	0.757	0.384	0.45
Ethnicity (Asian)	1.277	1.143	1.249	0.264	3.59
Ethnicity (Other)	1.574	1.171	1.808	0.179	4.83
Step 2					
ET Class	-0.482	0.574	0.705	0.401	0.62

*Indicates significance at $p \leq .05$

For **MATH150 taught by Instructor 3**, the analysis revealed that GPA was a significant predictor. In particular, the odds ratio revealed that as students GPA increased by a unit, the odds of course success increase by a factor of 6. Gender, Ethnicity, and ET Class support were not significant predictors of course success.

Table 7 Hierarchical Logistic Regression Examining Predictors of MATH150 Instructor 3 Course Success

Variables	B	S.E.	Wald	p-value	Odds Ratio
Step 1					
Pre-GPA*	1.806	0.628	8.265	0.004	6.09
Gender (Female)	0.524	0.836	0.393	0.530	1.69
Ethnicity (White)	1.114	1.267	0.773	0.379	3.05
Ethnicity (Asian)	0.254	0.993	0.065	0.798	1.29
Ethnicity (Other)	0.112	1.431	0.006	0.938	1.12
Step 2					
ET Class	0.269	0.77	0.122	0.727	1.31

*Indicates significance at $p \leq .05$

Conclusion

The results of the chi-square analyses did not show support for the hypothesis that students who enrolled in classes with Embedded Tutoring support were significantly more likely to be successful than students who did not.

Logistic Regression analyses examined whether ET class support predicted student success when controlling for other possible contributing factors like students' gender, ethnicity, or GPA. Results showed that Embedded Tutoring class support did not significantly predict final course grade when controlling for other contributing factors. However, results indicated that a students' pre-existing GPA was a predictor of how well a student performed, at least in MATH150. GPA did not predict course success for students in MATH030.