

Efficacy of TILT Tutoring Programs

TILT provided academic support via the tutoring program to 1283 students across thirty lower-level undergraduate courses in the 2012-13 academic year. To quantify the efficacy of the tutoring program, the current analysis compares the course grades of tutoring program participants to non-participants enrolled in the same courses. Additionally, a regression analysis was completed to assess whether course grades could be predicted by program participation after controlling for academic preparation (CCHE Index). Please contact Institutional Research should you have any questions or comments regarding this analysis.

Tutoring participation was shown to positively impact course grades; however, CCHE index proves to be a stronger predictor of course success. Overall, tutoring participants did not significantly differ in their course grade than non-tutoring participants, but it should be noted that students participating in the tutoring program had a significantly lower average CCHE index score than those who did not participate. When CCHE index was controlled for, thereby isolating the impact tutoring participation has on course grade, tutoring participation was shown to significantly increase students' course grades when compared to those who did not participate.

Results interpretation: Please note the small group sizes for most individual courses make it difficult to extrapolate significant results. Analyses conducted in aggregate will be more accurate than those analyses conducted at the individual course level. A bolded number with a green or orange highlight indicates a statistically significant ($p < .05$) difference between Tutoring Participants and Non-Tutoring Participants. A bolded number without a highlight means statistically significant at a $p < .10$ level. The smaller the p-value, the less likely the results are due to chance. Stated otherwise, smaller p-values indicate more significant results. Course grade can be interpreted as follows: A = 4.0, B = 3.0, C = 2.0, D = 1.0, F = 0.

Research Question: Do students who participate in the TILT tutoring programs earn higher course grades than those students who do not participate?

For statistically significant results ($p < .05$) level, an effect size, Cohen's d , is included. An effect size is a standardized measure that describes the magnitude of the difference between the two group means. This allows for a practical interpretation for understanding to what extent the two groups differ. Although there is no objective rule, Cohen (1988) suggests the following guide for interpreting an effect size: small = .20, moderate = .50, large = .80.

- Looking at all tutoring participants for the 2012-2013 academic year, students who participated in tutoring did not receive significantly higher course grades on average compared to non-tutoring participants. One factor that may be impacting this result is that tutoring participants had significantly lower index scores on average ($d = .20$) than non-tutoring participants.
- Examining individual courses over both terms, tutoring participants had significantly higher ($p < .05$) average grades in CHEM 341 ($d = .38$), CHEM 343 ($d = .65$), and PH 122 ($d = .44$) compared to non-tutoring participants. Students who participated in tutoring for CHEM 341 had a significantly higher course grade on average than those students who did not participate in tutoring despite having a significantly lower CCHE index ($d = .68$).

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Table 1. Fall 2012: Average course grade and CCHE index across tutoring program participant status and course.

Course	Tutoring Participants			Non-Tutoring Group Participants			d	
	N	Average Course Grade	Average CCHE Index	N	Average Course Grade	Average CCHE Index		
ANEQ 230	12	2.83	107.67	76	1.89	113.08	.76	
BMS 300	13	2.72	112.80	608	2.31	116.29		
BZ 350	4	1.75	108.00	147	2.22	118.89	.99	
CHEM 103	4	3.33	105.00	296	2.71	109.02		
CHEM 111	74	1.73	114.09	1231	1.95	120.14	.23	.51
CHEM 113	45	2.19	114.85	464	2.01	117.97	.30	
CHEM 245	9	2.33	114.67	245	2.44	119.24		
CHEM 341	32	3.02	116.93	314	2.71	123.26	.35	.50
CHEM 343	4	1.58	117.00	143	1.99	122.28		
ECON 202	29	2.87	111.36	967	2.56	114.30	.35	
ECON 204	9	3.04	108.50	613	2.54	113.11		
LIFE 102	18	2.37	111.60	1385	2.55	115.71		
LSPA 105	5	2.80	98.50	104	2.51	109.34	1.24	
LSPA 107	4	3.09	119.75	137	2.84	112.97		
MATH 141	5	2.60	98.67	566	2.62	111.56	1.68	
MATH 155	73	2.39	114.15	278	2.22	116.82	.26	
MATH 160	53	1.69	118.98	374	1.67	121.13		
MATH 161	42	2.50	117.90	333	2.37	119.68		
MATH 180A2	3	0.00	113.50	78	0.98	111.97		
MATH 255	8	2.25	115.33	28	1.84	111.4		
MATH 261	8	2.17	114.60	349	2.09	124.24	.75	
MATH 340	7	2.00	122.00	236	2.26	123.05		
MATH 369	7	210.00	122.00	103	2.72	125.64		
PH 121	53	3.29	115.87	386	3.1	120.00	.37	
PH 122	7	3.05	119.33	109	2.76	117.26		
PH 141	69	2.72	119.27	316	2.63	120.59		
PH 142	12	2.62	120.14	169	2.69	124.26		
STAT 201	5	2.93	107.75	440	2.75	109.9		
STAT 301	20	2.87	113.94	500	2.67	117.52		
Total	634	2.47	115.28	10995	2.43	117.06	.15	

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Table 2. Spring 2013: Average course grade and CCHE index across tutoring program participant status and course.

Course	Tutoring Participants			Non-Tutoring Group Participants			<i>d</i>	
	N	Average Course Grade	Average CCHE Index	N	Average Course Grade	Average CCHE Index		
ANEQ 230	20	2.00	105.41	69	1.80	114.13	.92	
BMS 300	6	1.83	115.33	599	2.45	116.58		
BZ 350	5	2.80	118.50	180	2.17	120.66		
CHEM 107	4	2.25	110.00	258	2.40	112.92		
CHEM 111	75	2.24	111.83	818	1.92	115.09	.33	.32
CHEM 113	22	2.11	116.07	727	2.15	121.72	.46	
CHEM 245	23	2.61	113.15	260	2.39	118.57	.48	
CHEM 341	26	2.72	111.96	181	2.21	122.34	.53	.93
CHEM 343	17	3.37	122.73	330	2.35	122.35	1.0	
ECON 202	21	2.86	112.44	861	2.64	114.10		
ECON 204	15	3.04	106.91	776	2.93	112.87	.53	
LIFE 102	5	1.40	98.00	724	2.63	112.87	1.45	1.42
MATH 141	18	2.17	104.38	612	2.19	110.26	.61	
MATH 155	60	2.41	113.41	269	2.41	118.53	.39	
MATH 160	62	1.71	112.57	283	1.78	115.76	.34	
MATH 161	26	2.67	118.25	312	2.50	121.79		
MATH 180A2	11	1.10	105.50	52	1.79	110.26		
MATH 261	16	2.08	119.33	284	1.92	120.97		
MATH 340	10	2.50	107.50	256	2.53	123.97	1.43	
MATH 369	9	2.74	115.80	144	2.48	121.99		
PH 121	18	2.78	114.33	209	2.61	117.21		
PH 122	45	3.49	116.95	353	3.23	121.36	.39	.42
PH 141	56	2.48	119.40	358	2.26	121.53		
PH 142	44	2.65	122.48	211	2.59	123.37		
STAT 301	35	2.57	113.00	529	2.59	116.59		
Total	649	2.47	114.18	9655	2.42	117.02	.24	

Table 3. Academic Year 2012-13: Average course grade and CCHE index across tutoring program participant status and course.

Course	Tutoring Program Participants			Non-Tutoring Program Participants			<i>d</i>
	N	Average Course Grade	Average CCHE Index	N	Average Course Grade	Average CCHE Index	
Total	1283	2.47	114.73	20650	2.43	117.04	.20

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Table 4. Academic Year 2012-13: Average course grade and CCHE index across tutoring program participant status and course for those courses offered both fall and spring terms.

Course	Tutoring Participants			Non-Tutoring Group Participants			d	
	N	Average Course Grade	Average CCHE Index	N	Average Course Grade	Average CCHE Index		
ANEQ 230	32	2.31	106.19	145	1.85	113.61	.37	.73
BMS 300	19	2.44	113.75	1207	2.38	116.43		
BZ 350	9	2.33	113.25	327	2.19	119.90		
CHEM 111	149	1.99	112.90	2049	1.94	118.21	.47	
CHEM 113	67	2.16	115.18	1191	2.10	120.22	.46	
CHEM 245	32	2.53	113.50	505	2.42	118.89	.50	
CHEM 341	58	2.89	114.64	495	2.54	122.93	.38	.68
CHEM 343	21	3.03	121.53	473	2.25	122.33	.65	
ECON 202	50	2.87	111.78	1828	2.60	114.21	.30	
ECON 204	24	3.04	107.47	1389	2.76	112.98	.53	
LIFE 102	23	2.16	108.20	2109	2.58	114.77	.38	.60
MATH 141	23	2.26	103.47	1178	2.39	110.87	.78	
MATH 155	133	2.40	113.84	547	2.31	117.66	.33	
MATH 160	115	1.70	115.78	657	1.73	118.85	.30	
MATH 161	68	2.57	118.04	645	2.44	120.73		
MATH 180A2	14	0.92	107.50	130	1.35	111.34		
MATH 261	24	2.11	117.94	633	1.84	111.40	.43	
MATH 340	17	2.29	112.33	492	2.40	123.54	.43	
MATH 369	16	2.46	118.13	247	2.58	123.57		
PH 121	71	3.17	115.50	595	2.93	119.05	.28	.33
PH 122	52	3.43	117.26	462	3.12	120.49	.44	
PH 141	125	2.60	119.33	674	2.42	121.11		
PH 142	56	2.64	122.05	380	2.64	123.76		
STAT 301	55	2.68	113.35	1029	2.63	117.05	.32	

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Research Question: Does participation in the TILT tutoring program predict a higher course grade after controlling for academic preparation (CCHE Index)?

Results Interpretation: The beta coefficient, B, represents the association between course grade and tutoring participation after controlling for CCHE index. For instance, a coefficient of .50 can be interpreted as participation in tutoring results in an average increase of .50 points in a student's final course grade after controlling for their index. A bolded p value indicates tutoring participation is a statistically significant predictor of course grade above and beyond index level at the $p < .05$ level. A bolded p-value indicates statistical significance at the $p < .10$ level.

As mentioned previously, course results are somewhat limited by the small number of tutoring participants in each course; however, there were still some noteworthy findings:

- For each term and for the AY12-13 as a whole, participation in the tutoring program significantly predicts a higher course grade (on average, about a .17 course grade point increase) than those students who do not participate in the tutoring program. In particular, tutoring participants over the fall and spring term received a significantly higher course grade (ranging from a .24 to 1.25 course grade point increase) after controlling for CCHE index compared to non-tutoring participants in the following courses: For ANEQ 230, CHEM 111, CHEM 113, CHEM 341, CHEM 343, ECON 202, MATH 155, MATH 340, PH 121, PH 122, and PH 141.
- When looking at the results over both terms, students who received tutoring for Chemistry, Economics, and Public Health classes (categorized in aggregate) received a higher course grade (average increase of .35, .30, and .24 course grade points respectively) compared to those students in the same courses who did not receive tutoring. This was not found to be true for most Math courses on the whole. Tutoring participation for Math courses did not significantly predict a higher Math course grade than for non-tutoring participants with the exception of two individual courses: Math 155 (average increase of .46 points) and Math 340 (average increase of 1.25 points).
- Tutoring participants in LSPA, LIFE, and BZ courses did not have significant increases in course grade after controlling for CCHE index compared to non-tutoring participants; however, it should be noted there was an inadequate number of tutoring participants in these courses to complete a valid analysis.

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Table 5. Fall 2012: Linear regression results: Predicting final grade based on tutoring program participation after controlling for CCHE index.

Fall 2012					
Course	Tutoring Participants (n)	Non-Tutoring Participants (n)	R²	B	p
ANEQ 230	12	76	0.21	1.24	0.02
BMS 300	13	608	0.18	0.76	0.04
BZ 350	4	147	0.08	-0.16	0.79
CHEM	168	2693	0.14	0.19	0.04
CHEM 103	4	296	0.20	0.68	0.27
CHEM 111	74	1231	0.30	0.22	0.08
CHEM 113	45	464	0.11	0.28	0.13
CHEM 245	9	245	0.13	-0.07	0.87
CHEM 341	32	314	0.09	0.47	0.04
CHEM 343	4	143	0.07	-0.24	0.72
ECON	38	1580	0.18	0.43	0.01
ECON 202	29	967	0.20	0.40	0.02
ECON 204	9	613	0.15	0.54	0.20
LIFE102	18	1385	0.31	0.15	0.55
LSPA	9	241	0.19	0.25	0.48
LSPA 105	5	104	0.14	0.50	0.35
LSPA 107	4	137	0.21	-0.03	0.95
MATH	206	2345	0.08	0.12	0.29
MATH 141	5	566	0.12	0.52	0.40
MATH 155	73	278	0.20	0.49	0.01
MATH 160	53	374	0.22	0.29	0.16
MATH 161	42	333	0.10	0.12	0.60
MATH 180A2	3	78	0.10	-0.91	0.44
MATH 255	8	28	0.17	0.43	0.42
MATH 261	8	349	0.37	0.09	0.90
MATH 340	7	236	0.15	0.76	0.26
MATH 369	7	103	0.04	-0.17	0.82
PH	141	980	0.14	0.20	0.03
PH 121	53	386	0.33	0.32	0.00
PH 122	7	109	0.15	0.23	0.50
PH 141	69	316	0.26	0.05	0.79
PH 142	12	169	0.10	0.32	0.33
STAT	25	940	0.08	0.24	0.29
STAT 201	5	440	0.08	0.73	0.15
STAT 301	20	500	0.11	0.27	0.29
FA12 Total	634	10995	0.12	0.17	0.00

Table 6. Spring 2013: Linear regression results: Predicting final grade based on tutoring program participation after controlling for CCHE index.

Spring 2013					
Course	Tutoring Participants (n)	Non-Tutoring Participants (n)	R ²	B	p
ANEQ 230	20	69	0.22	0.64	0.06
BMS 300	6	599	0.16	-0.59	0.19
BZ 350	5	180	0.18	0.83	0.17
CHEM	167	2574	0.14	0.50	0.00
CHEM 107	4	258	0.13	0.31	0.61
CHEM 111	75	818	0.13	0.44	0.00
CHEM 113	22	727	0.25	0.26	0.30
CHEM 245	23	260	0.22	0.50	0.05
CHEM 341	26	181	0.08	0.64	0.01
CHEM 343	17	330	0.07	1.24	0.00
ECON	36	1637	0.12	0.17	0.34
ECON 202	21	861	0.13	0.16	0.50
ECON 204	15	776	0.12	0.24	0.38
LIFE102	5	724	0.23	-0.54	0.21
MATH	212	2212	0.11	0.10	0.35
MATH 141	18	612	0.36	0.30	0.30
MATH 155	60	269	0.25	0.43	0.04
MATH 160	62	283	0.03	-0.06	0.78
MATH 161	26	312	0.06	0.28	0.28
MATH 180A2	11	52	0.24	-1.19	0.03
MATH 261	16	284	0.14	0.45	0.20
MATH 340	10	256	0.12	1.38	0.00
MATH 369	9	144	0.12	0.28	0.63
PH	163	1131	0.13	0.27	0.00
PH 121	18	209	0.13	0.49	0.08
PH 122	45	353	0.16	0.39	0.00
PH 141	56	358	0.21	0.37	0.02
PH 142	44	211	0.49	0.10	0.42
STAT 301	35	529	0.17	0.31	0.11
SP13 Total	649	9655	0.11	0.16	0.00

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Table 7. Academic Year 2012-13: Linear regression results: Predicting final grade based on tutoring program participation after controlling for CCHE index.

AY 2012-2013					
Course	Tutoring Participants (n)	Non-Tutoring Participants (n)	R ²	B	p
ANEQ 230	32	145	0.20	0.84	0.00
BMS 300	19	1207	0.17	0.23	0.41
BZ 350	9	327	0.13	0.39	0.37
CHEM	335	5267	0.14	0.35	0.00
CHEM 111	149	2049	0.22	0.34	0.00
CHEM 113	67	1191	0.19	0.29	0.04
CHEM 245	32	505	0.17	0.34	0.11
CHEM 341	58	495	0.08	0.49	0.00
CHEM 343	21	473	0.05	0.94	0.00
ECON	74	3217	0.14	0.30	0.02
ECON 202	50	1828	0.17	0.30	0.04
ECON 204	24	1389	0.13	0.39	0.10
LIFE102	23	2109	0.28	-0.03	0.89
MATH	418	4557	0.10	0.10	0.16
MATH 141	23	1178	0.36	0.22	0.38
MATH 155	133	547	0.23	0.46	0.00
MATH 160	115	657	0.10	0.10	0.47
MATH 161	68	645	0.08	0.19	0.28
MATH 180A2	14	130	0.11	-0.79	0.11
MATH 261	24	633	0.14	0.32	0.32
MATH 340	17	492	0.14	1.25	0.00
MATH 369	16	247	0.08	0.09	0.85
PH	304	2111	0.13	0.24	0.00
PH 121	71	595	0.25	0.41	0.00
PH 122	52	462	0.17	0.40	0.00
PH 141	125	674	0.12	0.24	0.04
PH 142	56	380	0.16	0.13	0.31
STAT 301	55	1029	0.14	0.29	0.06
AY12-13 Total	1283	20650	0.12	0.17	0.00

Research Question: What are the demographic characteristics of students who participate in the tutoring program compared to students who do not participate?

- Compared to non-tutoring participants enrolled in the same courses for the appropriate term, the demographic characteristics suggest women tutoring participants (51.4% of tutoring participants vs. 47.8% of non-tutoring) were more represented than men (48.6% vs. 52.2% respectively).
- Higher proportions of STEM majors (61.7% vs. 55.1% of non-tutoring participants) and minority students (20.4% vs. 16.3% of non-tutoring participants) utilized the tutoring program compared to those students in the same courses who did not attend tutoring.
- Students with majors from the College of Natural Sciences and Engineering comprised about 45% of the tutoring program participants. Students with majors in Business and Liberal Arts only consisted of 5.6% of the tutoring program participants despite being 10.9% of non-tutoring participants.

Table 8. Gender proportions for tutoring program participants and non-tutoring program participants.

Gender		Tutoring Participants	% of Tutoring Participants	Non-Tutoring Participants	% of Non-Tutoring Participants
Female	AY12-13	660	51.4%	9871	47.8%
	FA12	330	52.1%	5414	49.2%
	SP13	330	50.8%	4457	46.2%
Male	AY12-13	623	48.6%	10779	52.2%
	FA12	304	47.9%	5581	50.8%
	SP13	319	49.2%	5198	53.8%

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Table 9. Student characteristic proportions for tutoring program participants and non-tutoring program participants.

Student Characteristics		Tutoring Participants	% of Tutoring Participants	Non-Tutoring Participants	% of Non-Tutoring Participants
First Generation Students	AY12-13	327	25.5%	5053	24.5%
	FA12	164	25.9%	2713	24.7%
	SP13	163	25.1%	2340	24.2%
Residents	AY12-13	972	75.8%	15710	76.1%
	FA12	478	75.4%	8360	76.0%
	SP13	494	76.1%	7350	76.1%
STEM Majors	AY12-13	791	61.7%	11383	55.1%
	FA12	395	62.3%	5989	54.5%
	SP13	396	61.0%	5394	55.9%

Table 10. Student level proportions for tutoring program participants and non-tutoring program participants.

Student level		Tutoring Participants	% of Tutoring Participants	Non-Tutoring Participants	% of Non-Tutoring Participants
Freshman	AY12-13	393	30.6%	6642	31.2%
	FA12	193	30.4%	3661	33.3%
	SP13	200	30.8%	2781	28.8%
Sophomore	AY12-13	415	32.3%	6860	33.2%
	FA12	202	31.9%	3694	33.6%
	SP13	213	32.8%	3166	32.8%
Junior	AY12-13	297	23.1%	4345	21.0%
	FA12	162	25.6%	2150	19.6%
	SP13	135	20.8%	2195	22.7%
Senior	AY12-13	174	13.6%	2944	14.3%
	FA12	75	11.8%	1452	13.2%
	SP13	99	15.3%	1492	15.5%
Graduate	AY12-13	4	0.3%	59	0.3%
	FA12	2	0.3%	38	0.3%
	SP13	2	0.3%	21	0.2%

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Table 11. Ethnicity and Minority status proportions for tutoring program participants and non-tutoring program participants.

Ethnicity/Minority Status and Year		Tutoring Participants	% of Tutoring Participants	Non-Tutoring Participants	% of Non-Tutoring Participants
Minority Student	AY12-13	262	20.4%	3359	16.3%
	FA12	137	21.6%	1775	16.1%
	SP13	125	19.3%	1584	16.4%
Hispanic	AY12-13	132	10.3%	1755	8.5%
	FA12	69	10.9%	925	8.4%
	SP13	63	9.7%	830	8.6%
Asian	AY12-13	44	3.4%	419	2.0%
	FA12	24	3.8%	219	2.0%
	SP13	20	3.1%	200	2.1%
Multi-Racial	AY12-13	44	3.4%	700	3.4%
	FA12	22	3.5%	366	3.3%
	SP13	22	3.5%	334	3.5%
Black	AY12-13	38	3.0%	394	1.9%
	FA12	20	3.2%	218	2.0%
	SP13	18	2.8%	176	1.8%
Native Amer.	AY12-13	2	0.2%	68	0.3%
	FA12	1	0.2%	35	0.3%
	SP13	1	0.2%	33	0.3%
Hawaiian/PI	AY12-13	2	0.2%	23	0.1%
	FA12	1	0.2%	12	0.1%
	SP13	1	0.2%	11	0.1%
White	AY12-13	865	67.4%	15480	75.0%
	FA12	423	66.7%	8282	75.3%
	SP13	442	68.1%	7198	74.6%
International	AY12-13	63	4.9%	613	3.0%
	FA12	30	4.7%	309	2.8%
	SP13	33	5.1%	304	3.1%
No Response	AY12-13	93	7.2%	1198	5.8%
	FA12	44	6.9%	629	5.7%
	SP13	49	7.6%	569	5.9%

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Table 12. College major proportions for tutoring program participants and non-tutoring program participants.

College and Year		Tutoring Participants	% of Tutoring Program	Non-Tutoring Participants	% of Tutoring Group
Agricultural Sciences	AY12-13	72	5.6%	1240	6.0%
	FA12	36	5.7%	644	5.9%
	SP13	36	5.5%	596	6.2%
Business	AY12-13	28	2.2%	1122	5.4%
	FA12	18	2.8%	585	5.3%
	SP13	10	1.5%	537	5.6%
Engineering	AY12-13	262	20.4%	3711	18.0%
	FA12	127	20.0%	1927	17.5%
	SP13	135	20.8%	1784	18.5%
Health & Human Sciences	AY12-13	173	13.5%	3099	15.0%
	FA12	86	13.6%	1743	15.9%
	SP13	87	13.4%	1356	14.0%
Intra-University	AY12-13	200	15.6%	2794	13.5%
	FA12	86	13.6%	1461	13.3%
	SP13	114	17.6%	1333	13.8%
Liberal Arts	AY12-13	41	3.2%	1137	5.5%
	FA12	19	3.0%	691	6.3%
	SP13	22	3.4%	446	4.6%
Natural Sciences	AY12-13	311	24.2%	5312	25.7%
	FA12	165	26.0%	2771	25.2%
	SP13	146	22.5%	2541	26.3%
Veterinary Med. & Biomed. Sci.	AY12-13	87	6.8%	1179	5.7%
	FA12	42	6.6%	620	5.6%
	SP13	45	6.9%	559	5.8%
Warner College of Natural Res.	AY12-13	109	8.5%	1056	5.1%
	FA12	55	8.7%	553	5.0%
	SP13	54	8.3%	503	5.2%