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Tutorial Services UNC Assessment Mini-Grant Data Report

Using the grant, Tutorial Services (TS) conducted quantitative and qualitative analyses to evaluate observed and perceived student academic success. The quantitative analysis used undergraduate student end-of-semester grades in a causal-comparative research design to examine statistical significance between students using TS peer-tutoring (independent variable) and their end-of-semester grades (dependent variable), for students using TS for the first time and enrolled in that course for the first time. The comparison group comprised of students enrolled in the same course, in the same semester, for the first time, who had not used TS peer-tutoring services. Frequency-of-use was also measured within the treatment group to determine if there were significant correlations between the frequency students used TS services and their end-of-semester grades.

Math and science courses were selected to evaluate the effectiveness of peer-tutoring services. Students enrolled in Biology (BIO 110), Chemistry (CHEM 103 & 111), Algebra (MATH 124), and Calculus (MATH 131) were observed based on two research questions:

- *Research Question 1: Do undergraduate students who receive peer-tutoring services significantly outperform undergraduate students not utilizing peer-tutoring when measured by end-of-semester mathematics and science grades?*
- *Research Question 2: For students within the treatment group, is there a statistically significant relationship between the number of visits to peer-tutoring and end-of-semester mathematics and science grades?*

Participants chosen for the baseline study were comprised of undergraduate students classified as freshman, sophomore, junior, or senior, that were full-time defined as being enrolled for 12 or more credit hours. Only participants that earned a letter grade of A, B, C, D, or F were included, and those that recorded an S, W, I, or U were excluded from analyses. In addition, graduate students, student GPAs, entrance exams, and placement exams were excluded for determining placement of participants. Matching procedures involved a stratified randomized matching procedure matching participants from the treatment group with participants from the comparison group in the same course in the same semester, and further matched based upon race-ethnicity, gender, and classification. This procedure ensured control over these extraneous variables to strengthen the focus of the baseline evaluation on the effects of peer-tutoring on end-of-semester grades.

A Mann-U Whitney test was used to examine the difference in median scores between the treatment and comparison groups. A Spearman's rho correlation analysis was used for the second research question to determine if frequency-of-use correlates with higher end-of-semester grades. Because tutoring visits used a ratio level of measurement and grades used an ordinal level of measurement, Spearman's rho correlation analysis was the appropriate choice for examining the relationship between these two variables.

Below, are the findings of the qualitative analysis conducted to identify dominant themes in student responses to self-reporting surveys. Also, the following tables are a representation of our study conducted measuring the effectiveness of peer tutoring for AY 2020-2021. Also, a section reflecting our findings and an additional section projecting our future directions in measuring the effectiveness of supplemental instruction will conclude this report.

Table 1 includes baseline demographic and descriptive data on participations for all courses measured during the 2020-2021 academic year. Demographic data includes gender and ethnicity. Data for treatment and control groups are identified as well.

Table 1

Baseline Participation Demographic and Descriptive Data for All Courses (AY 2020-2021).

Characteristic	BIO 110	CHEM 103	CHEM 111	MATH 124	MATH 131
Gender					
Male	t=3 c=3	t=2 c=2	t=2 c=2	t=0 c=0	t=0 c=0
Female	t=56 c=56	t=15 c=15	t=15 c=15	t=4 c=4	t=4 c=4
Ethnicity					
White	t=38 c=38	t=14 c=14	t=10 c=10	t=3 c=3	t=2 c=2
Hispanic	t=14 c=14	t=3 c=3	t=5 c=5	t=0 c=0	t=2 c=2
African American	t=1 c=1	t=0 c=0	t=1 c=1	t=1 c=1	t=0 c=0
Asian/Other	t=6 c=6	t=0 c=0	t=0 c=0	t=0 c=0	t=0 c=0
Total	n=118	n=34	n=32	n=4	n=4

Note. (t=) denotes treatment group and (c=) denotes comparison group.

Table 2 includes data regarding the frequency-of-use of participants in the treatment group and the percentage of participants who received each end-of-semester grade (A-F). Grades that were identified as “S”, “W”, “I”, or “U” were excluded from data analysis. Participants who received a grade of “A”, “B”, “C”, “D”, or “F” were included in Table 2.

Table 2

Frequency and Percent of Treatment Group: Participant Earned Grade (A-F).

Grade	Treatment Group Frequency and Percent
A=	65 (32%)
B=	79 (38.9%)
C=	56 (27.6%)
D=	1 (.5%)
F=	0 (0%)

Note. No letter grades of ‘F’ were recorded. Over 98.5% of participants earned a letter grade of ‘C’ or higher. Also, first time tutoring conducted virtually as ‘drop-in’ tutoring was suspended due to COVID-19 restrictions.

Table 3 data lists the results from the Mann-Whitney U statistical analysis by the mean rank and the sum of the mean ranks.

Table 3

Mann-Whitney U Results: Grade Ranks and Significance (All Courses AY 2020-2021)

Group	N	Mean Rank	Sum of Ranks
0	102	**96.96**	9695.50
1	102	**105.00**	10605.50

Figure 1 displays the results of the Spearman's Rho correlation between subjects in the form of a scatterplot.

Figure 1

Spearman's Rho Between Subjects Correlation

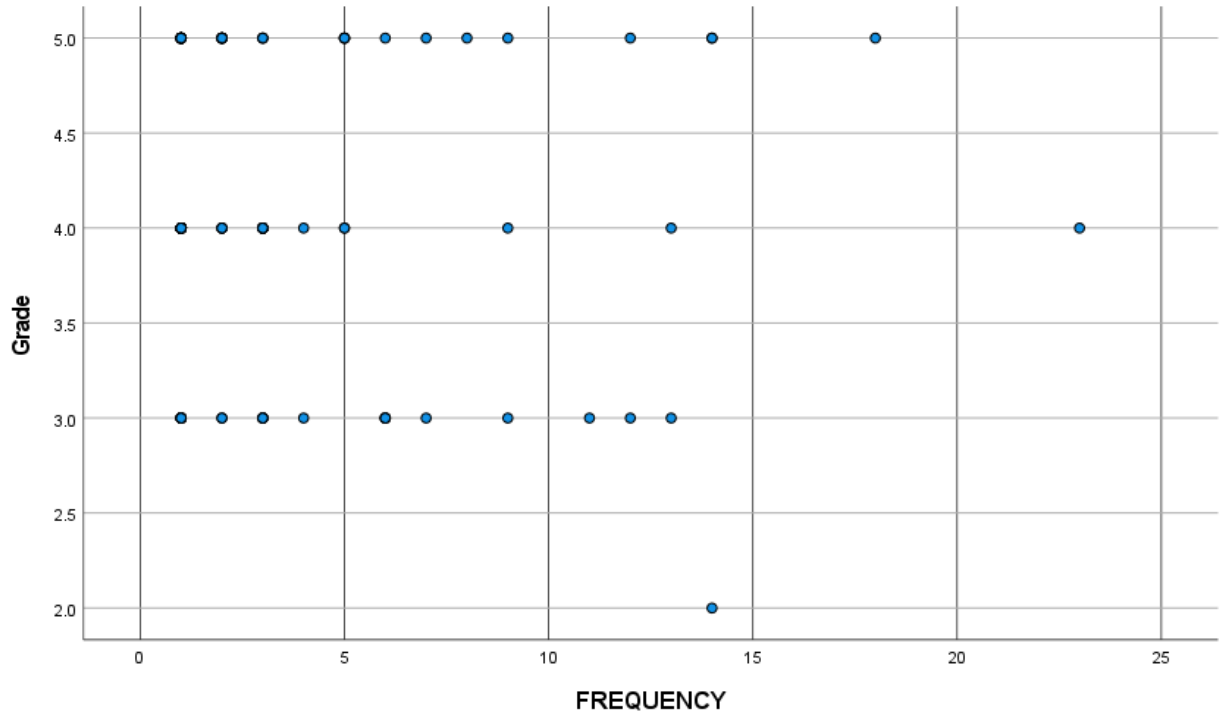

Table 4 lists the frequency of earned grades of treatment group participants per each subject. Grades that were identified as “S”, “W”, “I”, or “U” were excluded from data analysis. Participants who received a grade of “A”, “B”, “C”, “D”, or “F” were also included.

Table 4

Frequency of Treatment Group (All Groups). Participant Earned Grade (A-F).

	Treatment Group Frequency of Earned Grades (A-F)				
Grade	BIO 110	CHEM 103	CHEM 111	MATH 124	MATH 131
A=	37	11	9	5	3
B=	47	14	12	6	1
C=	33	8	10	5	0
D=	0	1	0	0	0
F=	0	0	0	0	0

Table 5 lists the totals of participants in each classification per each course measured. Both treatment and control group participants are identified here.

Table 5

Participant Classification All Courses (AY 2020-2021).

Classification	BIO 110	CHEM 103	CHEM 111	MATH 124	MATH 131
Senior	t=1 c=1	t=1 c=1	t=1 c=1	t=1 c=1	t=1 c=1
Junior	t=1 c=1	t=1 c=1	t=3 c=3	t=0 c=0	t=0 c=0
Sophomore	t=6 c=6	t=0 c=0	t=3 c=3	t=1 c=1	t=2 c=2
Freshman	t=51 c=51	t=15 c=15	t=8 c=8	t=2 c=2	t=1 c=1

Note. (t=) denotes treatment group and (c=) denotes comparison group.

Table 6 displays the frequency and percentage of treatment group participants' earned grade.

Table 6

Frequency and Percent of Treatment Group: Participant Earned Grade (A-F).

Grade	Treatment Group Frequency and Percent
A=	24 (22.8%)
B=	30 (23.6%)
C=	32 (25.6%)
D=	18 (14.2%)
F=	12 (10.2%)
Total	116

Note. Nine participant scores not calculated by SPSS. Reason not specified. Over 72% of participants earned a letter grade of 'C' or higher.

Dominant Themes Identified for Qualitative Analysis

Tutorial Services conducted qualitative analyses of self-report surveys focused on student recorded feedback of tutoring services provided. Questions on the survey included the following instrumentation for data collection, format of tutoring session, satisfaction with tutoring services and tutor, perceived assistance and target goal reached, perceived, or observed raise in letter grade because of the tutoring session/s attended, the impact of COVID-19 adjustments on student experiences with Tutorial Services, and the probability of a student recommendation for Tutorial Services. The intent for Tutorial Services staff was to identify dominant themes that emerged from recorded responses by students from the surveys, to measure student perceptions of the effectiveness of their tutoring sessions. Tables 7 through 9 display the results from student surveys throughout the 2020-2021 academic year.

Table 7

Student Feedback of In-Person and Online Sessions With COVID-19 Adjustments

	In-Person **(48.24%)**	Online **(51.76%)**
N/A	n = 14	n = 27
Needed tutoring services more	n = 1	n = 1
Harder to connect with others	n = 3	n = 2
Adequate adjustment with the online option	n = 2	n = 3

Note. Throughout the fall semester, 48.24% of students attended in-person tutoring sessions, while 51.76% attended online sessions via zoom. The feedback regarding student engagement for in-person versus online sessions considering COVID-19 adjustments are addressed here.

Table 8

Student Overall Satisfaction with Tutorial Services

Survey Questions:	Greatly Dissatisfied	Dissatisfied	Neutral	Satisfied	Greatly Satisfied
Please rate your overall satisfaction with tutoring services:	n = 2 **(3.33%)**	n = 0 **(0.00%)**	n = 0 **(0.00%)**	n = 14 **(23.33%)**	n = 44 **(73.33%)**
Please rate your overall satisfaction with the experience	n = 2 **(3.33%)**	n = 0 **(0.00%)**	n = 1 **(1.67%)**	n = 12 **(20.00%)**	n = 45 **(75.00%)**

with your tutor:					
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Please rate the level at which you agree with the following statement: "I received the assistance that I came to the tutoring session for."	n = 2 **(3.33%)**	n = 0 **(0.00%)**	n = 0 **(0.00%)**	n = 12 **(20.00%)**	n = 45 **(75.00%)**
	Very Unlikely	Unlikely	Neither Likely nor Unlikely	Likely	Very Likely
How likely are you to recommend Tutorial Services to a friend?	n = 1 **(1.64%)**	n = 0 **(0.00%)**	n = 1 **(1.64%)**	n = 15 **(24.59%)**	n = 44 **(72.13%)**

Note. Students rate their satisfaction with tutoring session and tutor, perceived goals reached during session, and likelihood of recommending Tutorial Services to a friend.

Table 9

Student Perceived and Observed Effects of Tutorial Services

Survey Questions:	Yes	No
Do you feel that coming to Tutorial Services will help you raise your letter grade in your class?	n = 19 **(95.00%)**	n = 1 **(5.00%)**
After using Tutorial Services, did you observe a letter grade improvement in your class?	n = 15 **(78.95%)**	n = 4 **(21.05%)**

	Exam	Project	End-of-Semester Grade	Other
Was your letter grade specifically improved for an exam, project, end-of-semester grade, or other? (Please select all that apply)	n = 5 **(31.25%)**	n = 5 **(31.25%)**	n = 3 **(18.75%)**	n = 3 **(18.75%)**

Note. Students indicate the perceived and observed effect of Tutorial Services on their letter grade in class, projects, exams, and any other assignments they received assistance with.

Findings

The baseline study conducted for this annual review was designed to effectively measure the impact of student-tutor interactions in peer-tutoring session on student end-of-semester grades. Not included in this evaluation was a cross tabulation analysis that measured for any statistical significance in correlation between race/ethnicity and end-of-semester grades, and possible correlation between gender and end-of-semester grades. Although these variables are important, they were beyond the scope of this evaluation and when calculated, no statistical difference was found with gender, race/ethnicity, and student end-of-semester grades. A significantly sharp drop in attendance of TS peer-tutoring sessions in AY 2020-2021 was evident in the reported numbers within this document. Despite the drop in attendance, TS peer-tutoring continued to have a statistically significant impact on student's end of semester grades for the five courses measured. This is important to note, as major restrictions in access to TS services due to the response by the university to COVID-19, students continued to seek TS through our online peer-tutoring delivery format.

The three groupings of data analyzed in this report were purposely designed to observe TS impact with a large, archived data set beginning with spring 2018 to spring 2021. This permitted TS staff to measure peer-tutoring services prior to, and external to, the COVID-19 pandemic. The second grouping of data consisted of AY 2019-2020 peer-tutoring sessions that were affected by the closure of in-person tutoring access in March 2020, due to the pandemic. AY 2020-2021 data set was uniquely tied to TS operations through adaptation of delivery of services to undergraduate students via Zoom. In answering the first research question of this

baseline evaluation, in all three groupings of data sets, students who used TS peer-tutoring over the last seven semesters, consistently outperformed their peer fellow students enrolled in the same course for the first-time within that each semester. More importantly, the rejection of the null hypothesis for the second research question, strongly indicates that TS is outperforming the national standard posited in research and practice pertaining to the frequency of visits and end-of-semester grades. Students who came to TS peer-tutoring, regardless of the number of visits, earned higher end-of-semester grades than those who did not come TS. The findings from analysis used in answering the second research question differ from scholarship and other research studies focused on frequency-of-use and student end-of-semester grades, in that students from each of the seven semesters selected for this baseline evaluation, recorded a majority of 'A' and 'B' letter grades for all five individual subjects. This point is strengthened by, and is aligned with, a large majority of students' recorded responses to self-reporting surveys indicating higher earned grades in projects, exams, and end-of-semester grades.

Two recurring and dominant themes were identified through qualitative analysis. One, students that came seeking academic peer-tutoring support believe that they will benefit through higher-earned letter grades by attending tutoring. Second, students' belief that having attended tutoring at TS had further prepared them to succeed in the classroom with projects, exams, end-of-semester grades, and other assignments was more evident, strongly inferring that self-efficacy was higher for the student after using peer-tutoring for their chosen course. An additional theme that emerged from student self-reporting surveys, was the likelihood of students referring fellow students and friends to TS due to their positive experiences during the tutoring session, strongly inferring that TS peer-tutors approach to assisting students is holistic and highly effective.

Future Directions

It is with great confidence that staff at Tutorial Services believe that newly created delivery platforms that complement existing deliver platforms, will greatly benefit undergraduate students as the university moves to 100% capacity this fall. The online tutoring and supplemental instruction platforms created out of necessity in the spring semester of 2020, have become valuable options for students to benefit from, moving forward. Anticipation of student need and request for in-person tutoring assistance has moved Tutorial Services to prepare to receive larger numbers of students for night-time drop-in tutoring, and appointment-based tutoring throughout the day.

Lastly, a major focus for TS staff in AY 2021-2022, will be to evaluate TS Supplemental Instruction (SI) services, also measured through end-of-semester grades using archived data and a comparison and treatment group. It is a major goal of TS to strengthen existing collaborations with faculty who partner with SI leaders to help students in class, as well as to create new collaborations based on evidence supporting the need for students to access TS peer-tutoring and SI support to help students successfully and independently navigate their academic trajectories. In addition to evaluating SI services, physics will be added to the five courses already included in this baseline evaluation for peer-tutoring.