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THE EFFECT OF TEACHER-STUDENT INTERACTION ON STUDENTS' LEARNING ACHIEVEMENT IN ONLINE TUTORING ENVIRONMENT

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Abstract **Online tutoring has received more and more attention. Moreover, teacher-student interaction has great influence on students' learning. The main purpose of this study was to investigate the effect of teacher-student interaction on students' learning achievement in online learning environment. In this study, 46 elementary school students participated in this study. This result indicated that the students' learning performance was significant improved after a semester of online tutoring. Moreover, the result indicated that the influence could effectively predict students' learning achievement. In the final of the study, some suggestions were proposed to help the online tutors to manage their online tutoring.**

Index Terms **teacher-student interaction;Math learning ; online tutoring; e-tutor**

I. INTRODUCTION

The use of educational technology (e.g., Computer Assisted Language Learning and Electronic Interactive Whiteboard, digital games) in traditional classrooms has increasingly been the objective of study in recent years. Some studies contended that the use of technology could enhance student achievement scores and learning environment [1][2]. The development of star rural area E-leaning project has led to the hope that such kind of online learning can improve students' learning motivation and learning achievement. Star rural area E-leaning project are getting considerable attentions not only from e-tutors but also from e-tutees in general. Teaching all kinds of subjects (e.g., math, English, Chinese, society, science) via E-leaning project have been particularly used for remedial courses rather than using traditional blackboard for instruction. The meaning of star rural area E-learning project cannot be overlooked since the condition of M-shape society where the rich will be richer and the poor will be poorer affects the opportunity of receiving education[3][4]. Indeed, e-tutees' parents expect that their children to join this project to lower their family income instead of attending to cram school.

In order to cope with uneven distribution of education resources, education authorities in Taiwan and some business groups initiate some remedial teaching plans. Ministration of Education in Taiwan provides some after school program, and the business groups recruited college students to provide remedial instruction for the students in need. However, those after school programs encounter many problems, such as: the limited human resources, the constraints of the time and space.

Recently, due to the development of the internet technology, many countries are committed to reduce the digital divide to reduce the imbalance between urban and rural development. Through different digital platforms, even students and teachers are in different places, they still can communicate with each other at the same time. Due to the situation, the education is no longer limited by time and space, and students will receive more educational resources, and their learning experience will be enhanced.

Current teaching model can be divided into physical teaching model and online distance teaching model. In Taiwan, the Minister of Education initiated the E-tutor project in 2006 to narrow the gap in student's learning achievement and information literacy between the students in rural and urban area. Most participants in the E-tutor program were students lived in the rural area. In the E-tutor program, in order to help the students in rural area enhance their learning achievement, the college students were recruited as the online tutors, and the tutors provided the students synchronous online tutoring in one-on-one model. One-on-one online programs are beneficial for many people who particularly not financially, physically or geographically capable of receiving traditional education[6].

Contrary to traditional education, the goals of online instruction have been to provide training opportunities for economic growth and to offer curriculum enrichment in non-traditional educational settings[6]. Park (2009) maintains that a recent trend in higher education has been to set up e-learning systems which provide students with online access and learning content [6]. E-learning serves not only the purpose of large-scale and efficient education, but increases the possibility of

interaction regardless of the location and time. Providing such kind of e-tutor project to e-tutees has considerable advantages.

In different teaching situations, teacher-student interaction will be different. In a traditional classroom, teacher-student interaction and gradually plays an important role on students' achievement [7].

Additionally, teacher-student interaction also plays an important role in online learning. Some researchers indicated that the teacher-student interaction would affect students' learning attitude and tutors' attitude toward online tutoring. California Adult Education（2006）indicated that it is important for the teachers to provide sufficient support for the students during the online tutoring, and students would have more confidence in their learning [8].

In the past, different methods, such as: interviews, questionnaire, were applied to collect the information about teacher-student interaction. In the past, most teacher-student interaction scale was designed to collect the information of teacher-student interaction from the teachers' perspectives. For example, the Questionnaire on Teacher Interaction designed by Wubbles et al.（1985）was designed to investigate teachers' behaviors from the systematic perspective. It was found that students would get closer to the teacher who could lead and help them. Recent years, more and more researchers try to collect the information about teacher-student interaction from students' perspective. Some studies revealed that students would get closer to the teachers who had high influence on them [9]. Online learning is different from the learning in the classroom context. In the past, most studies investigate the relationships between teacher-student interaction and student's learning in traditional classroom context. In this study, we try to examine the effect of teacher-student interaction on students' learning performance in online learning environment. Therefore, the study aimed to provide answers to the following questions:

1. Does the students' learning performance improve after attending the E-tutor program?
2. Can teacher-student interaction effectively predict students' learning performance?
3. Does the difference in types of teacher-student interaction have impact on students' learning performance?

II. METHODOLOGY

A. Participants

Forty-six elementary school students participated in this study. 29 students are male (63%), and 17 students are female (37%). 3 students are 3rd grade (6.5%), 9 are 4th grade (19.6%), 17 are 5th grade (37%), and 17 are 6th grade (37%). All the students were lived in the rural area. The students came from four different elementary schools in rural area, and volunteered to join the E-tutor program.

B. Instruments

1) *Math learning achievement test:* The Math learning achievement test was used in the pre-test and the post-test to evaluate students' learning. The test would cover the content which the students whould learn in the online tutoring program. After designing the achievement test, in order to ensure the quality of the test, three elementary school teachers were invited to review the content of the test.
2) *Teacher-student interaction scale:* In order to investigate teacher-student interaction during online tutoring, the teacher-student interaction scale developed by Sun, Shih, and Wang (2007) was adapted in this study [9]. Two sub-scales were included: influence (8 items, i.e. When then I needs my tutors' support, he/she will try his best to help me), and proximity (7 items, i.e. When tutoring online, my tutor would share some interesting things or his/her personal experience with me). It is designed as a 5-point Likert scale with response categories of: strongly agree (5), agree (4), neither agree nor disagree (3), disagree (2), and strongly disagree (1). The value of Cronbach's α of the sub-scale of influence is .94, the value of Cronbach's α of the sub-scale of proximity is .77, and the value of Cronbach's α of the whole scale is .92.

C. Procedure

The E-tutor program was a after school program which lasted for 3 month (from 2014 September to 2014 December). In this program, on-on-one tutoring model was applied in the E-tutor program. In the beginning of the semester, the students took the pre-test to ensure their pre-knowledge about mathematics. Students had to take the online course twice a week. Every course lasted for 1.5 hours. During the online tutoring, students would receive the online tutoring through the online conference software, Joinnet. Joinnet allowed teachers and students to communicate synchronously with each other through webcam, microphone, and text chatting room. In the final of the semester, the students were asked to complete the post-test and the teacher-student interaction scale (FIG Ⅰ).

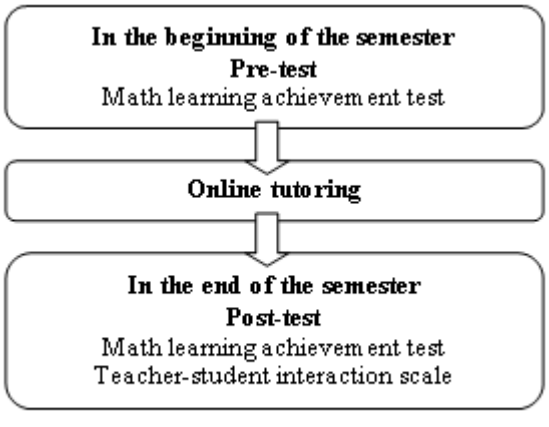

FIGURE I. THE PROCEDURE OF THE E-TUTOR PROGRAM

D. Data Analysis

In this study, the students' learning achievement and teacher-student interaction were analyzed. The paired t test was applied to analyze student's learning performance during the semester. The correlation analysis and regression analysis were applied to analyze the effect of teacher-student interaction on students' learning performance. Moreover, One-way ANOVA analysis was used to examine the influences of teacher-student interaction on students' learning performance.

III. RESULTS

A. The students' learning performance in online tutoring environment

In this study, we applied paired t test to examine the change of students' learning achievement in the online tutoring environment. The result indicate that the students' test score in the end of the semester (M=72.89, SD=18.39) was significantly higher than their test score in the beginning of the semester (M=53.00, SD=17.05) (t=11.54, p<.001). This result indicated that after a semester of online tutoring, the students' learning performance was significant improved.

B. The relationships between teacher-student interaction and students' learning performance

The correlation analysis was applied to investigate the relationships between teacher-student interaction and students' learning performance. The result indicated that influence and proximity had significant low positive correlation with students' learning achievement. The finding indicated that when teachers and students perceived higher influence and proximity, the students would have higher learning achievement (TABLE Ⅰ).

The correlation analysis between teacher-student interaction and post-test

	Influence	**Proximity**	**Post-test**
Influence	-	.84***	.35*
Proximity	.84***	-	.33*
Post-test	.35*	.33*	-

*p<.05 ***p<.001

C. The effect of teacher-student interaction on student's learning achievement

The regression analysis was applied to figure out if teacher-student interaction could predict students' learning performance. The result indicated that influence and proximity had significant low positive correlation with students' learning achievement. The result indicated that the influence could effectively predict students' learning achievement. The total explained variance from the sub-scale, influence, was 44%.

summary of regression analysis for variable predicting students' learning achiecement

Dependnt variable	**Independent variable**	**β**	**R**	**Adjusted R2**
Learning achievement	Influence	14.52*	.35	.10

*p<.05

D. Different types of teacher-student interaction in Etutor environment

In this study, we analyzed the different types of teacher-student interaction shown in E-tutor environment. It was found that 27 students perceived high influence and high proximity (58.7%), 7 students perceived high influence and low proximity (15.2%), 3 students perceived low influence and high proximity (6.5%), 9 students perceived low influence and low proximity (19.6%). The result showed that over half of the students considered that their tutors had high influence on their learning, and they have good relationships with their tutors.

four different types of teacher-student interaction in etutor environment

Type	**N**
High influence High proximity	27 (58.7%)
High influence Low proximity	7 (15.2%)
Low influence High proximity	3 (6.5%)
Low influence Low proximity	9 (19.6%)

One-way ANOVA analysis was used to examine the influences of teacher-student interaction on students' learning performance. Analytical results indicate that students perceived high effective and high proximity and students perceived low influence and low proximity had significantly different learning performance ($F = 3.35$, $p < .05$). Students perceiving high influence and high proximity had significantly higher final exam than the students perceived low influence and low proximity (TABLE Ⅳ).

results of one way anova

Source	**SS**	**df**	**MS**	**F**	**Post hoc**
teacher-student interaction	2933.94	3	977.98	3.35*	HH>LL
Error	12276.65	42	292.30		
Total	259542.25	46			

*p<.05

HH: high influence and high proximity

LL: low influence and high proximity

IV. CONCLUSIONS AND DISCUSSION

This study examined the relationships between teacher-student interaction and student's learning performance in E-tutor environment. It was found that after the E-tutor program, the students learning performance was significantly improved. Moreover, the result showed that teacher-student interaction has significant influence on students' learning performance. Teachers' influence could effectively predict students' learning

performance. It means that in online learning environment, especially for those students with low learning achievement, it is important for the teachers to consider their students' needs, and provide the students with suitable and sufficient learning support. Most importantly, students with high teacher-student interaction performed better than the students with low teacher-student interaction. In the future, it is essential to develop suitable teaching strategies for the teachers to use in online learning environment.

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