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Effect of Peer Teaching on the Academic Achievement of Fourth Grade Primary School Students

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ABSTRACT

This research aims to examine the effect of peer teaching on the academic success of primary school fourth grade students. The biggest difference of this research from other researches is the application of a different method in peer teaching. This research is in the pretest-posttest experimental design with an unequal control group. The research sample consists of fourth-grade students in a primary school in the province of Alanya, Antalya, Turkey. There are two fourth-grade classes in the primary school. One of these classes was determined as the experimental group and the other as the control group. There are 32 students in the experimental group. There are 28 students in the control group. The primary school fourth grade academic achievement test developed by the researchers was used as a data collection tool. The research was carried out in December 2021 and January 2022. A seven-week application was made in the fourth grade of a primary school in Alanya as part of the study project. Students in the fourth grade of a primary school participated in an experimental technique.SPSS 25 program was used in the analysis of the data. The statistical test computed was a t-test analysis, indicating that the peer teaching experimental group have a mean of 62,96 on the academic achievement scale. But the control group has a mean of 47,85, a difference of 15,11 points between the two groups. The two-tailed significance test indicates a two-tailed p-value of p=,001. This p value is statistically significant because it is less than alpha =,05. Peer teaching increased students' academic achievement significantly.

Keywords:
Peer teaching, primary school, fourth grade, academic achievement.

1. Introduction

Peer teaching is a teaching technique that is applied intentionally or unconsciously at all learning levels. Sometimes the teacher applies this technique consciously. In some cases, students use it among themselves consciously or unconsciously. If a student does not understand the subject, the teacher may ask their friend sitting next to them to explain it. The student who does not understand any subject can get help from their friend sitting next to them for learning. In short, peer teaching is a technique people often use throughout their education.

For a better understanding of the subject, it is helpful to define the concepts of peer teaching, and peer teaching. Peer; age, occupation, social status, etc. are equal in terms of each other means. Teaching is giving the necessary information according to a certain purpose, training, education. It is defined as the work of organizing activities that will facilitate learning, providing materials and guiding (Turkish Language Institution, 2022). Peer teaching is a method in which one student serves as the instructor and the other as the student, with the

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instructor instructing the student on a particular subject.It is a teaching strategy in which dual student groups work together to develop academic, social, and behavioral skills (Ministry of National Education, 2020, p. 9). Peer teaching is defined as acquiring knowledge, skills through active assistance, and support between two persons. It includes similar social groups who are not professional teachers who help each other learn by this (Topping & Ehly, 1998; Topping, 2005, p. 631; Topping, 2008, p. 767; Ünver & Akbayrak, 2013, p. 214). Peer teaching can also be defined as students of the same or different ages and levels helping each other learn (Türkmenoğlu & Baştuğ, 2017, p. 38). Peer teaching is a method in which one student acts as a teacher/teacher and the other as a learner/teacher (Topping & Ehly, 1998). Peer teaching is an organized learning experience in which one student acts as a teacher or instructor and another student as a learner or student. Peer tutoring is a strategy in which a student who has acquired certain skills helps his classmates acquire knowledge and skills. Peer teaching is a learning experience in groups of two or more students, in which one student acts as a teacher or teacher and another student or student as a learner. Peer teaching can be applied among students of the same or different age groups. In peer tutoring, a student with high academic performance is a teacher, and a student with low academic performance is a learner (Ministry of National Education, 2020, p. 9). When the definitions of peer teaching are examined, it is seen that the process takes place with at least two students. In addition, a student undertakes the role of instructor.

Peer teaching is characterized by the assumption of instructor or student roles. Frequently, there are also clear interaction procedures. Which individuals receive general and/or specialized instruction. Some peer instruction strategies facilitate interaction with structured materials.Others predict structured interactive behaviors. That can be applied effectively to any related material (Topping, 2008, p. 767). Peer teaching is the role of teacher and learner with the educational task given in peer teaching, and peer teaching practices are carried out by the one-to-one work of these two students (Parr and Townsend, 2002, p. 410; Webb, Troper, & Fall, 1995). In peer teaching processes, the instructors exhibit various skills: giving feedback, explaining, creating scaffolding, and giving the learner the chance to manage the timing and participating actively in the process (Chi, Siler, Jeong, Yamauchi, & Hausmann, 2001). In general, the trainer is more advanced and knowledgeable than the learner. But in some peer teaching conditions, this difference in expertise is not so great (Roscoe & Chi, 2007).

According to Vygotsky's concept of proximal development, social interaction and collaboration with peers facilitate learning. Promotes children's mental development (Vygotsky, 1978). The application of the peer teaching method to the course is particularly simple and economical (Gök, 2018, p. 20). Interactions between peers in the classroom are a normal and important part of the learning process that affects students' lifelong learning habits (Burross & McCaslin, 2002, p. 1864). Where much older aides work with much younger students, the difference in ability and interest may be insufficient for aides who are cognitively less likely to win. The assistant being "learning by teaching" and at the same time a closer and reliable model (Topping, 2008, p. 767). To persuade students' peers that their discussions break up monotonous lessons, students are encouraged to consider concept questions and to use information rather than presenting pre-prepared information (Yldrm & Canpolat, 2019, p. 129).On the subject, various researches were conducted by Akay (2011), Can (2009), Demirel (2013), Fuchs and Fuchs (2005), Fuchs, Fuchs, and Kazdan (1999), Fuchs, Fuchs, Mathes, and Simmons (1997), Mazlum (2015), Mazur (2013), Yardım (2009). It is known that peer teaching increases student success in studies conducted in various disciplines (Ding & Harskamp, 2011; Tao, 1999). According to the research findings of Güvey Aktay and Gültekin (2015), students in the classroom and during breaks; cooperate in the form of helping, pointing out the mistake of their friends, doing together, looking, discussing, sharing, and making suggestions; peer collaborative interactions during reading and writing activities and also during recess. When we evaluate the results of studies on peer teaching in general, it is seen that peer teaching method contributes positively to students' scientific process skills, concept learning success, and problem-solving success (Crouch & Mazur, 2001; Sayer, Marshman & Singh, 2016). Some research results have shown that the interest and participation of the students studying with the peer teaching method increases and also increases their motivation (Fagen, Crouch, & Mazur, 2002). Fuchs, Fuchs, Mathes, & Simmons (1997) show that peer teaching is effective. Also, academic gains occur for both the teacher and the learner (Simmons, Fuchs, Fuchs, Mathes & Hodge, 1995). However, the teacher has a minor role in these achievements. Shanahan (1998) reported on studies that found that peer teaching led to more positive interpersonal relationships. Peer teaching is effective in promoting self-learning. Students' school concepts and attitudes were raised (Roswal, Mims, Evans & Smith et al., 1995). However, most approaches agree that

students who surround themselves with their peers will also value their learning. They agree that they will make an effort to improve their education (Burross & McCaslin, 2002, p. 1865). Peer teaching gains in reading and mathematics (Cohen, Kulik, & Kulik, 1982). In reciprocal or peer-to-peer teaching, King, Staffieri, and Adelgais (1998) describe learning outcomes as role switching that engages students in further questioning, explaining, monitoring, and organizing learning.

This research aims to examine the effect of peer teaching on the academic success of primary school fourth-grade students. It is thought that the research results contribute to the field of primary education. In addition, it is thought to have an important benefit in the field of teaching techniques. Since the research is an experimental study, it is important to determine the effect of peer teaching on academic achievement. The most significant difference of this research from other research is the application of a different method in peer teaching. The most significant limitation of this research is that it was conducted with primary school fourth-grade students.

2. Methodology

2.1. Research Model

This research is in the pretest-posttest experimental design with an unequal control group. In the pre-test and post-test experimental design with the unequaled control group, the researcher applies the pre-test to the two existing groups. After the experimental intervention is applied to the experimental group, the post-test is applied to both the experimental group and the control group (McMillan & Schumacher, 2006, p. 274). The difference between the pre-test and post-test scores shows how effective the intervention is (Christensen, Johnson, & Turner, 2015). The symbolic representation of the pre-test post-test experimental design with the unequaled control group is as in Figure 1 (McMillan & Schumacher, 2006, p. 274; Karasar, 1994, p. 102):

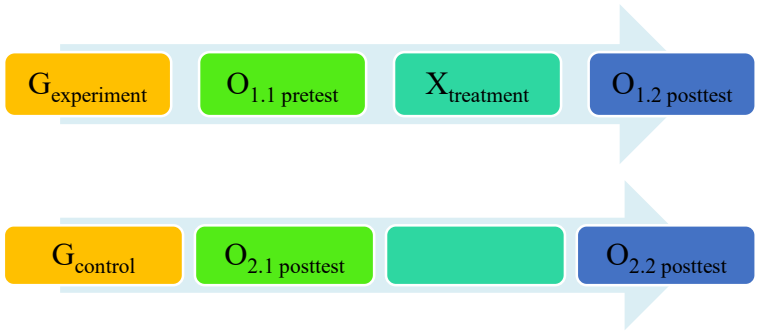


Figure 1. *Research Design*

In the pre-test post-test experimental design with unequaled control group in Figure 1, the case of $O_{2.2posttest}>O_{1.2posttest}$ is considered to be due to "$X_{treatment}$" (Karasar, 1994, p. 102).

2.2. Research Sample

The research population consists of fourth grade primary school students studying in Antalya, Turkey. The research sample consists of fourth grade students in a primary school in the province of Antalya, Alanya. There are two fourth grade class in the primary school. One of these groups was designated as the experimental group, while the other was designated as the control group. 32 students comprised the experimental group. 28 students make up the control group. The experimental and control groups are comprised of eighth- and ninth-grade students. The majority of students are from middle-income families. Students have no prior experience with peer instruction. Students were first informed about peer teaching.

2.3. Data Collection Tools and Procedure

The primary school fourth grade academic achievement test developed by the researchers was used as a data collection tool. The academic achievement test consists of 20 questions. The questions are multiple choice. Each question has four answer choices. The score for each question is 5. The minimum score that can be obtained from the achievement test is 0. The maximum score that can be obtained is 100. The higher the score obtained from the achievement test, the higher the student's academic success. Five questions in the academic

achievement test are from the field of language and arts. Five questions are math questions. Five questions are from the field of science. Five questions are from the field of social studies.

The research was conducted in December 2021 and January 2022. In the fourth-grade of an Alanya primary school, a seven-week application was submitted. The school is heated with a heating system. The school has 628 students enrolled. Both experimental and control group students are located on the school's first floor. The classroom is a bright environment. A smart board is present in the classroom. Students are seated in the configuration depicted in Photos 1 and 2.

Photo 1. *Classroom and Students*

Photo 2. *Classroom*

The treatment was administered to primary school fourth-grade students. The students carried out peer teaching activities and practices. In these applications, the teacher managed the process. It enabled students to perform peer teaching on a regular basis. Where necessary, corrections and contributions were made by the teacher. Researchers provided consultancy services to primary school teachers during the experimental process. In the experimental process, a box was prepared by the researchers. Above this box is written "question pool". The box is divided into four parts. In these sections, "Turkish", "Mathematics", "Science", and "Social Studies" are written. Students throw a question that they cannot do into the required lesson section in the question pool. The student writes his/her name under it while throwing the unfamiliar question into the box. Then, the student who can solve these questions explains how to solve the question to his friend who cannot solve the question. Photographs of the experimental process are presented in Photo 3, Photo 4, and Photo 5.

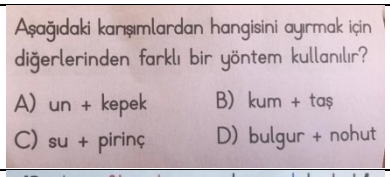
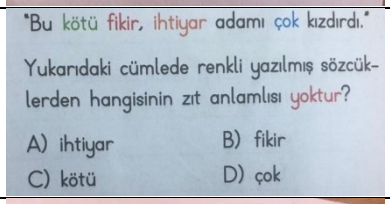
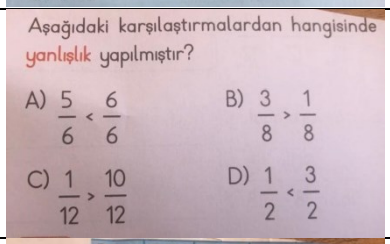
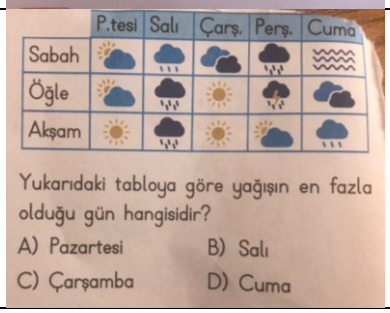
Photo 3. *Question Pool*

Photo 4. *Student*

Photo 5. *Peer Teaching*

The students threw the questions they did not know into the question pool. The student who was able to solve the question in the question pool explained it to his friend, who could not solve the question. Examples of questions that students do not know in the peer teaching process are presented in Table 1.

Table 1. *Examples of Questions in the Peer Teaching Process*

Lesson/Language	Turkish	English
Science		A different method is used to separate which of the following mixtures? A) flour + bran B) sand + stone C) water + rice D) bulgur + chickpea
Turkish		"This bad idea, made the old man very angry." Which of the words in color in the sentence above do not have antonyms? A) old B) idea C) bad D) very
Mathematics		Which of the following comparisons is wrong? A) $\frac{5}{6}<\frac{6}{6}$ B) $\frac{3}{8}>\frac{1}{8}$ C) $\frac{1}{12}>\frac{10}{12}$ D) $\frac{1}{2}<\frac{3}{2}$
Social Studies		According to the table above, which day has the most precipitation? A) Monday B) Tuesday C) Wednesday D) Friday

2.4. Data Analysis

The data was analyzed in SPSS 25 program. The scores of the students from the academic achievement test were entered into the SPSS 25 program. The normal distribution of the data was evaluated with the Kolmogorov-Smirnov test since the group had more than 50 people (Büyüköztürk, 2012). As a result of the Kolmogorov-Smirnov test, p=.20 was found. After it was determined that the data showed a normal distribution, the t-test was applied.

2.5. Ethical

In this study, all rules stated to be followed within the scope of the "Higher Education Institutions Scientific Research and Publication Ethics Directive" were followed.

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Date of Ethics Evaluation Decision: 15.12.2021 Ethics Assessment Document Issue Number: 28/16

3. Findings

Before the experiment, it was first checked to see if the academic skills of the experimental group and the control group were the same.. The pretest academic achievement scores of the experimental and control groups are presented in Table 2.

Table 2. *T Test for Independent Samples for Pre-test on Academic Achievement*

Variable	Number of cases	Mean	Standard Deviation	Std. Error Mean		
Academic achievement score						
Control group	28	46,96	15,77	2,98		
Experimental group	32	47,18	13,13	2,32		
Mean difference= 0,22						
Levene's Test for Equality of Variances F=1,209, Significance=0,26						
Variances	t value	df	2-tail significance	Std. Error Difference	95% Confidence Interval	Effect size
Equal	-,060	58	,95	3,73	Lower:-7,69 Upper:7,24	-

In Table 2, the academic achievement pre-tests are compared. This analysis utilized t-tests. The experimental group's mean score on the academic achievement test was 47.18. The mean of the control group is 46,96. 95 is the t-test p-value. Statistically, this p-value is not significant. Because it exceeds 0.05. According to the results of the pre-test for the academic achievement test, the experimental and control groups are equivalent.--The t-test results of the pre-test and post-test scores applied to the control group are presented in Table 3.

Table 3. *T Test For Paired Samples of Control Group for Pretest and Posttest on Academic Achievement*

Variable	Number of cases	Mean	Standard Deviation	Std. Error Mean	
Academic achievement score					
Control group pretest	28	46,96	15,77	2,98	
Control group posttest	28	47,85	15,42	2,91	
Mean difference= -0,89					
Variances	t value	df	2-tail significance	95% Confidence Interval	Effect size
Equal	-1,41	27	,17	Lower:-2,19 Upper:,40	-

Table 3, compared the pre-test and post-test of the control group on academic achievement. Computed was a *t*-test analysis. The control group pre-test have a mean of 46,96 on the academic achievement scale. The control group post-test has a mean of 47,85. The *t*-test *p*-value is ,17. This *p*-value is statistically not significant because it is more than alpha =,05. According to the pre-test and post-test results of the academic achievement test, it is seen that the control group's academic achievements are equal to each other.

The t-test results of the post-test academic achievement scores of the experimental and control groups are presented in Table 4.

Table 4. *T Test for Independent Samples for Posttest on Academic Achievement*

Variable	Number of cases	Mean	Standard Deviation	Std. Error Mean		
Academic achievement score						
Control group	28	47,85	15,42	2,91		
Experimental group	32	62,96	13,96	2,46		
Mean difference= -15,11						
Levene's Test for Equality of Variances F=,267, Significance=0,60						
Variances	t value	df	2-tail significance	Std. Error Difference	95% Confidence Interval	Effect size
Equal	-3,98	58	,001	3,79	Lower:-22,70 Upper:-7,51	0,22

Table 4, compared peer teaching on academic achievement. The computed was a t-test analysis. The peer teaching experimental group has a mean of 62,96 on the academic achievement scale. But the control group have a mean of 47,85. The *t*-test p value is ,001. Effect size is ,22. This p-value is statistically significant because it is less than alpha =,05. Peer teaching increased students' academic achievement significantly.

The t-test results of the pre-test and post-test scores applied to the experimental group are presented in Table 5.

Table 5. *T-Test oor Paired Samples of Experimental Group for Pretest and Posttest on Academic Achievement*

Variable	Number of cases	Mean	Standard Deviation	Std. Error Mean	
Academic achievement score					
Experimental group pretest	32	47,18	13,13	2,32	
Experimental group posttest	32	62,96	13,96	2,46	
Mean difference= -15,78					
Variances	t value	df	2-tail significance	95% Confidence Interval	Effect size
Equal	-8,45	31	,001	Lower:-19,58 Upper:-11,97	0,70

Table 5 compares the pre-test and post-test academic achievement scores of the experimental group. The analysis computed was a t-test. The average pre-test score for the experimental group is 47.18 on the academic achievement scale. The mean post-test score of the control group is 62,96. The p-value for the t=-8.45 test is.0001. This p value is statistically significant given that it is less than alpha =.05 According to the academic achievement test's pre-test and post-test results, it can be seen that peer teaching significantly increased students' academic achievement.

4. Conclusion and Discussion

This study aims to examine the impact of peer instruction on the academic success of fourth-grade students in elementary schools. The primary distinction between this study and others is the use of a different method for peer teaching. Before beginning the experimental procedure, the academic accomplishments of the experimental and control groups were compared. Compared pre-test academic performance. There was a t-test analysis performed. The experimental group's mean score on the academic achievement test is 47.18. The mean score for the control group is 46,96. The p value of the t test is.95. This p value is not significant statistically. Because it is greater than.05 According to the results of the pre-test for the academic achievement test, the experimental and control groups are equivalent.

This study compared the academic achievement of the control group's pre- and post-tests. The average pre-test score for the control group on the academic achievement scale is 46,96. The average post-test score for the control group is 47,85. The p value of the t test is.17. This p value is not statistically significant since it exceeds alpha =.05 According to the pre-test and post-test results of the academic achievement test, the academic achievement of the control group is equivalent.The effect of peer teaching on academic achievement was compared in research. The analysis conducted was a t-test. The average academic achievement score for the peer teaching experimental group is 62.96. The mean of the control group, however, is 47.85. The p value of the t test is.001. The effect size is.22 This p value is statistically significant given that it is less than alpha =.05 Peer instruction significantly increased students' academic achievement.It is known that peer teaching increases student success in studies conducted in various disciplines (Ding & Harskamp, 2011; Tao, 1999). According to Güvey Aktay and Gültekin (2015), students in the classroom and during breaks; cooperate in the form of helping, pointing out the mistake of their friends, doing together, looking, discussing, sharing, and making suggestions; peer collaborative interactions during reading and writing activities and also during recess. When we evaluate the results of studies on peer teaching in general, it is seen that peer teaching method contributes positively to students' scientific process skills, concept learning success, and problem-solving success (Crouch & Mazur, 2001; Sayer, Marshman & Singh, 2016). Peer teaching is an effective teaching strategy that is supported by research and costs little (in terms of time, effort, etc.). Peer teaching is effective in the development of academic success and academic skills. Students in the learner role can more easily ask their friends about the things they do not understand about the subject, and they have the opportunity to do more exercises on the subject covered in the lesson. Instructors reinforce their learning by reviewing and rearranging their knowledge. Learners, on the other hand, have the opportunity to be personally involved (Ministry of National Education, 2020, p. 14).

Finally, the research compared the pre-test and post-test academic achievement scores of the experimental group. The analysis computed was a t-test. The average pre-test score for the experimental group is 47.18 on the academic achievement scale. The mean post-test score of the control group is 62,96. The p value of the t test is.001.This p value is statistically significant because it is less than alpha =,05. According to the pre-test and post-test results of the academic achievement test, it is seen that peer teaching increased students' academic achievement significantly. Fuchs, Fuchs, Mathes, & Simmons (1997) show that peer teaching is effective. Also, academic gains occur for both the teacher and the learner (Simmons, Fuchs, Fuchs, Mathes & Hodge, 1995). However, the teacher has a minor role in these achievements. In peer teaching, students have to participate more actively in their learning processes, discuss the subject and concepts related to the lesson, and make logical explanations in their own words (Ministry of National Education, 2020, p. 15). Shanahan (1998) reported on studies that found that peer teaching led to more positive interpersonal relationships. Peer teaching is effective in promoting self-learning. Students' school concepts and attitudes were raised (Roswal, Mims, Evans & Smith et al., 1995). However, most approaches agree that students who surround themselves with their peers will also value their learning. They agree that they will make an effort to improve their education (Burross & McCaslin, 2002, p. 1865). Peer teaching gains in reading and mathematics (Cohen, Kulik, & Kulik, 1982). In reciprocal or peer-to-peer teaching, King, Staffieri, and Adelgais (1998) describe learning outcomes as role switching that engages students in further questioning, explaining, monitoring, and organizing learning. Peer teaching develops students' time management, planning, self-control, and study skills. It ensures that the learned knowledge and acquired skills are more permanent (Ministry of National Education, 2020, p. 16).

5. Recommendations

Based on the research findings, the following recommendations are made: It is recommended that primary school students benefit from more peer teaching. It is recommended that peer education increase the academic success of students who are academically unsuccessful. It is recommended that peer teaching be done outside of school, at the student's home or library. This study was conducted with elementary school students. It is recommended to work with middle school, high school, and university students in future studies. This research is experimental in nature. It is recommended that future research be conducted in the form of phenomenology and case studies.

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