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## Effectiveness of Group Work on Students' Academic Performance in Mathematics at Primary Level: An Action Research

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**Abstract:** Group Work leads to effective learning in all subjects, including mathematics. This study aims to explore the effectiveness of group work on students' academic performance in mathematics subjects at the primary school level through action research. Six students from class three of a public sector girls' school were selected purposely for the study. Students were divided into two groups. A pre-test was conducted before the intervention, and a post-test was conducted after the group work intervention. The results of pre and post-tests were compared. It was found that group work is more effective in improving students' academic performance in mathematics at the primary school level. So, it is recommended that principals and teachers should use group work as a teaching strategy in their schools.

**Key Words:** Effectiveness, Group Work, Primary School Students, Mathematics, Action Research

### Introduction

Group work leads to effective learning as students work in groups, don't feel bored, and learn in an enjoyable way, especially primary level students feel motivated and enjoy listening to others and present their own thoughts when working in groups (Jakavonytė-Staškuvienė, 2021). Group work is currently the most appreciative strategy for instruction as it involves students in the process of learning. Researches show that group work is a more effective teaching strategy when compared to traditional teaching strategies, and it enhances student's academic performance, especially in mathematics at the primary level (Torreto-Seijo, 2020; Prieto-Saborit et al., 2022).

Group work is the procedure of dividing students into groups to perform a task. All the members of a group play their roles to accomplish the task. Students and teachers both have positive views about group work. Students feel good about working in groups and enjoy the different activities that they perform in groups. Teachers think that, at first, it is a bit difficult to run group work successfully, but slowly, it becomes enjoyable (Meganingtyas et al., 2018).

Group work can be divided into three main types in schools. These types are cooperative group work, collaborative group work, and peer tutoring. These types are used according to the needs and psyche of students (Foot et al., 1990). Groups have three kinds of learning: cooperative learning, collaborative learning, and companion or peer tutoring (Damon & Phelps, 1989).

### Cooperative Group Work

In cooperative learning, students are ordered and structured, and they follow some rules to discuss or learn something by helping each other in small groups. Teachers have good perceptions about cooperative learning. They encourage it and think it is more effective in increasing students' academic performance (Abramczyk & Jurkowski, 2020). According to Li and Lam (2013), cooperative learning is one of the main types of group work that is fully student-centered, while the teacher is only a facilitator. In cooperative learning, students work in small groups and interact with each other. Cooperative learning is a widely used

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instruction strategy from kindergarten to higher level. The students in cooperative learning work in small groups to accomplish tasks that they cannot do alone (Gillies, [2016](#)).

### **Collaborative Group Work**

Collaborative learning is another important type of group work where the focus is on self-contained tasks, and the group members have an understanding of each other, especially when older students are involved (Foot et al., [1990](#)). According to Summers ([2006](#)), cooperative learning involves small groups where students collaborate on the same task, and the members of the group help each other to accomplish the task.

### **Peer Tutoring**

Peer tutoring is the process of learning in a small group by a group leader or simply by a group member, usually not under the supervision of a teacher (Alegre, [2020](#)).

### **Student's Mathematics Status and Reasons Behind It**

Students' status in the subject of mathematics is not good, and the reason behind this is the way teachers present it in front of them. Drastic representations of mathematics by teachers in front of students are unable to understand the conversation of mathematics with them. The communication process of teacher and student needs to be enhanced, and teachers are not interested in it. It shows that in front of students, the teaching quality of representing the subject is not agreeable (Zhe, [2023](#)). According to Gulzar and Mahmood ([2019](#)), the status of students in mathematics is not satisfactory, and the reason behind this is that the national curriculum of mathematics does not align with students' learning outcomes. Some students' learning outcomes are the same in both primary and secondary levels, and some students' learning outcomes are repeated twice for the same grade.

### **Effectiveness of Group Work in Oral Proficiency**

Hong et al. ([2022](#)) investigated the fact that collaborative learning (group work) is more effective in the oral command of the learner. It can give much better results than learners who do not do group work. Nievecda and Ortega-Auquillain ([2019](#)) investigated how cooperative learning can help primary-level students become proficient in speaking English.

Group work is widely used in the world to enhance students' oral proficiency in all languages, academic performance in all subjects, social behavior or emotional intelligence, etc. According to Salvin (2011), the majority of US teachers use group work as an instruction strategy from the primary to university level, and they think that it is more effective in enhancing student's academic performance at all levels, including primary. The curriculums of modern countries contain group work activities in all their chapters because they have understood that learning by students themselves only flourishes through peer working groups.

### **Effectiveness of Group Work in Social Behavior**

Qaisar et al. ([2015](#)) found that students in cooperative group work show appreciative differences in their behavior and performance. Group work enhances their behavior, such as how to give significance to others and understand others' views. Tolmie et al. ([2010](#)) investigated the fact that group work at the primary level can have positive cognitive and social effects. The students involved in group work activities can talk better in social gatherings and are more confident to present their views in front of others. Students learning in groups are more confident to present their thoughts, listen and value others' thoughts, and transfer their knowledge (López et al., [2023](#)).

### **Effectiveness of Group Work in Mathematics**

Mathematics is considered a difficult subject, and students don't have good perceptions of it. When this subject is taught through group work activities, then it can be interesting for students, and they can perform better in it. Qaiser (2011) found that primary school students in Pakistan can engage in excellent group work activities and can perform much better in mathematics. It shows that students in Pakistan, like students from other countries, show readiness for working in groups and perform better when taught



using group work activities than traditional teaching methods. Students working in groups can present their ideas in front of all group members, and by discussing these thoughts, many points for the same topic can be produced. This leads students to think critically on the topic. Mathematics generally measures the critical thinking of students, so it means students working in groups can have a better understanding of mathematics problems.

In schools, usually, secondary-level students perform group work activities, but there is a good concept of group work at the primary level. The primary level students generally are from 5 to 12 years old in Pakistan, and at this age, students need interesting ways of learning, such as group work, to take an interest in the process of learning, but due to no group work, they become bored do not take an interest in studies especially difficult subjects like mathematics. So, to improve students' academic performance at the primary level in mathematics, group work must be used.

Many studies were conducted to check the effectiveness of group work, and all found that when group work is done carefully with proper planning, it improves academic performance as it is more effective than traditional teaching methods. Traditional teaching methods do not involve students. In fact, teachers in those methods are active, and students are passive, so they learn only what the teacher tells them. No cognitive development occurs among students, and they remain dependent on the teacher only, but in group work, students think about things and are active while the teacher helps them remove misconceptions.

Prieto-Saborit et al. (2022) investigated that pupils from 10 to 15 years show positive results in mathematics subjects when taught in groups. Chen (2023) found that students at the primary level, taught by cooperative learning (group work), not only gain knowledge better but are also motivated towards the process of learning. When students discuss lessons in groups, it provides a better understanding of things as compared to what they learn alone (Fall et al., 2000).

Torreto-Seijo (2020) found that cooperative learning or group work enhances students' academic performance (especially in mathematics), emotional intelligence, and language at the primary level. Salvin (2011) found that the majority of US teachers use group work as an instruction strategy and think it is effective in improving language learning, academic performance, interpersonal skills, etc. Qaisar et al. (2015) found that students in cooperative group work show appreciative improvement in academic performance. Pakistani primary school students can engage in group work excellently, and their performance in mathematics can improve after being taught in a group.

Peer tutoring has great benefits in increasing student's academic performance at primary and secondary levels in mathematics. It was found that students at the primary and secondary levels both had more encouraging results in mathematics after being engaged in peer tutoring (Alegre, 2020).

## Problem Statement

The author observed that some students in the class are showing poor performance in mathematics. This not only affects their grades but also negatively impacts their overall learning experience. To make mathematics easier and more enjoyable, the author needs to adopt new teaching techniques. Group work is a teaching technique that can enhance students' collaboration, problem-solving skills, and understanding. The purpose of this action research is to examine the effectiveness of group work, specifically to determine whether group work improves students' performance in mathematics at the primary school level in district Panjgur, Baluchistan.

## Research Question

The research question for this research was

- How does the implementation of group work affect the academic performance of public sector primary school students in mathematics in district Panjgur, Baluchistan?

## Research Methodology

The philosophical stance for this research was pragmatism, as the researcher practiced group work at primary level. The researcher used an action research strategy due to the serious nature of the issue. The

time horizon for this research was longitudinal because data was collected twice from the same sample. The population of this research was the students of class three of a public sector girls' school in the district of Panjgur, Baluchistan. The sample size of the study was six students from class three, a public sector girls' school. The sampling technique for this study was purposive because the researcher, with the help of a class teacher, chose six slow learners for the study. The technique used for measuring the effectiveness of group work in this study was group work; a pre-test was conducted before and a post-test after the intervention of group work by the researcher. The tool used for data collection was a self-made mathematics achievement test. The tool was validated by the language expert and subject specialists.

### Data Collection Process

The data was collected from a public sector girls' school. Six students from class three were divided into two groups (group one and group two). Each group consisted of three slow-learner students. A pre-test was conducted on the first day of data collection, and then, for 12 days, the researcher taught students in groups, performing many group activities, which are detailed in Table 3.1. On the last day of data collection, the same test was conducted again. Details of data collection is shown in Table 1.

**Table 1**

*Details of data collection*

No of days	Work done
Day 1	The pre-test was conducted, and after that, two groups were formed: group 1 and group 2. Groups were asked to talk more and more to develop understanding, and they also played games during break time.
Day 2	The concept of Roman numbers was introduced. Roman numbers to ten were learned with the help of a teacher.
Day 3	Roman numbers till 15 were learned with the help of teachers, while till 39 by discussion of group members because their concept was clear enough. The teacher was only a facilitator.
Day 4	The teacher introduced the concept of even and odd numbers.
Day 5	A deeper understanding of even and odd numbers was given by the teacher.
Day 6	A competition between both teams was held, where Team Group 1 had to guess whether the number given by Team Group 2 was even or odd and vice versa.
Day 7	The concept of place value was introduced. Place value of 3-digit numbers in a gaming manner was taught.
Day 8	The place value of 4-digit numbers was taught to both groups.
Day 9	A competition between both groups was held where the given number by one team was challenged to be correctly read by another.
Day 10	Student groups learned the place value of 5-digit numbers.
Day 11	Student groups learned to write numbers in extended forms to understand their place value better.
Day 12	The same test was conducted on day one.

### Ethical Considerations

The researcher informed the school authorities (from where data was collected) about her research strategies. As the population of the study was immature students of class three, their parents were informed about the research by the researcher, and the participation of the population was involuntary. The personal information of all participants, such as name, father's name, etc., is not mentioned anywhere in the research.

### Data Analysis

The results of both pre and post-tests were compared. The pre-test results of both groups are arranged in Table 2, the post-test results of both groups are arranged in Table 3, and the results of both tests are compared in Table 4.



The students in the first group scored 11 to 15 marks on the pre-test out of 20. The first student from group 1 scored 12 marks, the second student from the same group scored 15 marks, and the third student from this group scored 11 marks in the pre-test.

In contrast, the students in group 2 scored 8 to 18 on the pre-test. The first student from group 2 scored eight marks, the second student from this group scored ten marks, and the third student from the same group scored 18 marks in the pre-test.

**Table 2**

*The results of the pre-test*

Group 1		Group 2	
No of students	Marks obtain in pre-test	No of students	Marks obtain in pre-test
1	12	1	08
2	15	2	10
3	11	3	18

In the post-test, both groups performed better. The students of group 1 scored 18 or 19 marks out of 20 marks in the post-test. The first student from group 1 scored 18 marks, the second student scored 19 marks, and the third student from this group scored 18 marks in the post-test.

Similarly, the students of group 2 scored 18 or 19 marks out of 20 marks in the post-test. The first student from group 2 scored 18 marks, and the second student also scored 18 marks, while the third student from this group scored 19 marks in the post-test.

**Table 3**

*The results of post-test*

Group 1		Group 2	
No of students	Marks obtain in pre-test	No of students	Marks obtain in pre-test
1	18	1	18
2	19	2	18
3	18	3	19

When the researcher compared the results of both tests, the difference in marks was quite interesting, which shows the effectiveness of group work. The first student from group 1 scored 12 marks on the pre-test and 18 marks on the post-test. The difference in marks on both tests is 6. The second student from group 1 scored 15 marks on the pre-test and 19 marks on the post-test. The difference in both test marks is 4. The third student from the same group scored 11 marks on the pre-test and 18 marks on the post-test; the difference in marks on both tests is 7.

In addition, the first student from group 2 scored eight marks on the pre-test and 18 marks on the post-test; the difference in both test marks is 10, which is the highest among all. The second student from group 2 scored ten marks on the pre-test and 18 on the post-test; the difference in both test marks is 8. The third student from group 2 scored 18 marks on the pre-test and 19 marks on the post-test. The difference in both test marks is 1, which is the lowest among all.

**Table 4**

*The comparison of results of pre and post-test*

Group 1			
No of students	Marks obtain in pre-test	Marks obtain in post-test	Difference in marks
1	12	18	06
2	15	19	04
3	11	18	07
Group 2			
No of students	Marks obtain in pre-test	Marks obtain in post-test	Difference in marks
1	08	18	10
2	10	18	08
3	18	19	01

## Discussion

The study found that group work improves student's academic performance at the primary level in mathematics subject. These findings align with Torreto-Seijo (2020), who states that group work enhances students' academic performance, especially in mathematics. The findings of this study are also in line with Qaisar (2011), who found that group work is effective in the context of primary school students in Pakistan, and students can improve in mathematics after the intervention of group work.

Primary school students can deal in groups and perform better. The findings of this study are similar to the findings of Fall et al. (2000), which state that primary school students can engage in active group work and perform better academically. The findings of this research also match the findings of Prieto-Saborit et al. (2022) that students from 10 to 15 years old can give positive results in mathematics when taught in groups. This finding is also in line with Kutnick et al. (2008), who found young kids can deal nicely with group work, improving their academic performance in mathematics.

## Conclusion

Action research was conducted to check the effectiveness of group work at the primary level for mathematics. The researcher chose six students from a public sector girl's school and engaged these students in group work. A pre and post-test was conducted on the first and last day of data collection. The results of both tests were compared, and it was found that group work is more effective in increasing students' academic performance.

## Recommendations

The researcher, based on the evidence from her study, has some general and future recommendations.

### General Recommendations

The general recommendations of this study are

- The curriculum designers should design a curriculum containing group work activities.
- The School principals should adopt group work to improve the performance of their school.
- The school teacher must use group work to enhance the academic performance of their students, especially in mathematics.

### Future Recommendations

The future recommendations of this study are

- Future researchers should research the effectiveness of group work at the elementary and secondary levels.
- Future researchers should choose boys or both girls and boys as population.
- Future researchers should choose other subjects despite mathematics.

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