
Effects Of Peer Collaboration On Attitude Towards Mathematics In The New Normal

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ABSTRACT

This study aims to determine the effect of peer collaboration on the attitude towards mathematics of teacher education students in the New Normal. This study used accidental sampling to utilise fifty first-year Bachelor in Secondary Education students of the West Visayas State University-Pototan Campus during the second semester of the school year 2022-2023. Data was gathered using a modified Attitude Towards Mathematics Scale adopted from Chaudhary (2020). Descriptive statistics were used to measure means and standard deviations. Wilcoxon Signed-Ranks Test was used, and all sets at .05 alpha for the two-tailed test were used. Results showed a significant difference in the students' attitudes toward mathematics before and after using the peer collaboration approach in learning Mathematics. It was concluded that a significant difference in the students' attitudes toward mathematics before and after the intervention indicates that the peer collaboration approach effectively improves students' attitudes toward mathematics.

Keywords: Attitude, Mathematics, Peer collaboration, New Normal

1. INTRODUCTION

Most people, at one time or another, are puzzled over the reasons behind their behaviour. One factor that explains why a person behaves in a particular manner is the person's attitude towards objects, persons, concepts, or situations. To understand the influence of attitudes on behaviour, it is helpful to consider the principles attributed to attitudes.

Attitudes are beliefs and feelings that predispose our reactions to objects, people, and events (USAID, 2020). They are also perceived as learned predispositions to respond favourably or unfavourably to a particular person, behaviour, belief, or object.

An attitude is specifically relevant to the behaviour. People profess general attitudes that are inconsistent with their behaviour. This perception may be attributed to outside influences like social pressures, which, although minimal, may blur the underlying connection between one's attitudes and actions by affecting either what one can say or do. Attitude is anything favourable or unfavourable evaluative reaction towards something or someone exhibited in one's beliefs, feelings, or intended behaviour. It is a social orientation- an underlying inclination to respond to something either favourably or unfavourably (Myers, 2022).

Collaborative learning is an educational approach to teaching and learning that involves groups of learners working together to solve a problem, complete a task, or create a product (Laal, 2018). Students can enjoy working with and supporting their peers during learning tasks in a lesson (evidence based. education, 2023).

Field theorists consider the attitudinal reaction the most critical aspect of learning. Buhler explains that students' attitudes toward a subject or skill may determine how much they will remember and use such skill. Buhler relates that developing a positive attitude toward the subject being studied is one of today's most prevalent educational goals. After all, many teachers believe that the student's attitude toward the subject affects their achievement.

Children are expected to develop a positive attitude toward their learning subject. Children with a positive attitude become willing learners and find joy and excitement in studying the subject. The mathematics student with a positive attitude studies mathematics because he enjoys it, he gets satisfaction from knowing mathematical ideas, and he finds competency in mathematics its reward. On the other hand, a child with an unfavourable attitude toward a subject will tend to avoid it and find it annoying.

Students often acquire attitudes due to repeated experiences of a similar type. Repeated successful experiences with mathematics will lead to favourable attitudes. On the other hand, repeated unsuccessful experiences or unsatisfying experiences are likely to lead to an unfavourable attitude toward the subject.

Pestalozzi (1800) suggests that an educator should try to avoid the teaching method that is all working, insisting that children should also learn touch and sensation whenever possible. It would be more meaningful if they were learning with their peers. Whatever activity a child has within him is associated with the disposition to do the activity with someone to work with.

Some innovative teachers believe that different instructional strategies and methods of grouping students could make the teaching-learning process in large classes more meaningful.

Polya's theory explains that grouping plays the most crucial role in the learning process, whether the purpose is cooperation or competition. For a group to be structured cooperatively or competitively, there may be positive or negative interdependence among the group members. A cooperative goal exists when there is a positive correlation among group members' goal attainment—when group members who are cooperatively linked also obtain their goal. The present study adopts this cooperative purpose and cooperation.

In addition, grouping helps the teacher use his methods, procedures, and techniques according to students' interests, needs, and potential. It is where the classroom becomes a community of learners working together to enhance each person's knowledge, proficiency, and enjoyment.

Learning experiences may create either pleasant or unpleasant attitudes toward the subject matter. As Crow and Crow stated (2018), the satisfaction or annoyance accompanying any specific experience is the feeling tone of that experience. These conditions affect the attitudes of the individual. Attitude qualities vary in intensity with the strength of the stimulation and the person's physical, mental and emotional state.

In that case, students develop their attitude toward a subject matter "as an accompaniment of their experiences during the learning process" Students' collaboration can be found in various settings. Peer collaboration is essential to many "hands-on" subjects like physical education, drama, and languages, and speaking and listening play key roles. Peer collaboration can be employed in various ages and critical stages and across various subjects and topics. There are many benefits in the classroom when teachers use peer collaboration as students can gain different insights and perspectives from their peers, peers can offer support, guidance and advice to one another and develop a wide range of skills such as working with others, cooperation, listening, and leadership (www.evidencebased.education, 2023). There are many good reasons to implement peer collaboration in the classroom and some great strategies that can be adapted to minimise potential problems. It is another tool for effective teaching.

2. LITERATURE REVIEW

2.1. Collaboration and attitude

Morin (2022) argues that the practical, innovative purpose of grouping is to improve the fit between the students and the teacher's activities and other students' roles. The improvement would be shown in greater attainment of the teacher's purposes as judged by the teacher, activities, and interaction among students, stimulating their ideas and increasing their self-confidence. It also helps form habits and attitudes consistent with a realistic appraisal of their capabilities.

According to Laal, M. (2018), positive interdependence among group members' goals encourages and facilitates each other's efforts to produce. This mutual help and assistance is followed by the belief that one is linked with, supported, and accepted by fellow group members. Group members seek more information and utilise each other's attitudes and conclusions. Group members become intrinsically motivated to succeed and have high expectations for success.

Kingsview's (2021) findings indicate an overall beneficial effect on children's attitudes towards writing, leading to better writing and communication skills. Collaborative writing in a technology-integrated platform positively impacted students' typing skills.

Schuster, Hartmann, and Kolleck, (2021) findings emphasise the importance of collaborative structures to lower the barrier for individual teachers to collaborate and bring together colleagues from different backgrounds.

As Sinnema et al. (2021) put it, systems worldwide should "promote the use of collaborative networks to foster teacher learning and improve practice in the pursuit of educational change to address longstanding equity and achievement issues."

Research has shown that student collaboration in the classroom has recently grown in popularity, especially in mathematics, due to multiple studies pointing to increased student achievement when collaboration is effectively utilised. Although achievement scores are essential, student attitudes are also a vital piece of the puzzle educators should consider when making pedagogical decisions. As a result of the study, collaboration should be considered the best practice for teachers in mathematics classrooms (Golden, 2020).

Laal, (2013) states that one person's success depends on the group's success. Positive interdependence is the term used to describe this success. To succeed, each member must feel connected to the others and rely on them to help them reach the goal. Positive interdependence is the conviction that all group members hold that teamwork has benefits and that collaborative efforts best serve individual learning and product development.

2.2. Attitude and achievement

Like all other psychological constructs, attitude has been a prevalent and essential focus of social research and evaluation in recent years. Mueller (1986) stresses that attitude is an idealised abstraction subject to scientific study and measured through influences on people's beliefs and behaviour. Mueller reminds us that attitudes have many different definitions. While there is no consensus among social scientists regarding the definition of attitude, there is a substantial agreement that affect for or against is a critical component of the attitude concept.

Psychologist generally defines attitude as the predisposition to respond favourably or unfavourably to a given object (Weinburg, 1994); it is a relatively permanent way of feeling, thinking, and behaving toward something or somebody (Elliot, 1996).

It is interesting to note that mathematics educators have used attitude in a less clearly defined way than psychologists. Mcleod (1989) says that attitude means anyone the number of perceptions about mathematics, oneself or the teacher. These, Mcleod clarifies, do not have a vital emotional component. Mathematics educators have also used attitudes to mean anxiety, which typically contains a vital emotional component. Thurstone gave a more comprehensive definition of attitude, describing it as 1.) affect for or against, 2.) valuation of, 3) like or dislike of, or 4) positiveness or negativeness toward a psychological object.

Psychologists have identified three significant influences on the formation of attitudes: social influences, or the influence of other people; cognitive influences, or the influence of our reasoning; and behavioural influences or the influence of our behaviour. These influences jointly mould our earliest attitudes and can change our attitudes throughout our lives (Crider, 1983).

Many of our earliest likes and dislikes are influenced by our parents. Parents provide us with unchallenged information about whether certain things are good for us or bad, and we base many of our attitudes on this information.

A second way parents influence attitudes is by administering rewards and punishments. Parents often praise children for expressing some attitudes and disapprove when they express others. Such approval or disapproval has been shown to impact people's attitudes strongly.

A third social influence on attitude is the process of identification. In the course of growing up, we often try to emulate other people we admire. Part of this process of identification is adopting others' attitudes. Freud suggested that the first people we identify with are our parents, especially our parents of the same sex (Crider, 1983). Erik Erickson emphasises that we identify with many other people, such as relatives, celebrities, or older peers, in forming an identity throughout childhood and adolescence. Through these identifications, we adopt many attitudes.

Parents are not the only people who influence our attitudes. By the time school starts, at age five or six, children spend more and more time with peers. Peers influence attitudes in the same way parents do. They provide each other with information, they reinforce each other for expressing certain opinions, and they identify with each other.

A study of peer influence at different ages suggests that it increases through the elementary school years, reaches its peak in junior high school (ages 15 and 16), and then begins to decrease. Peer influence was highest among the junior high school students (Crider, 1983).

Through somewhat diminished, the influence of peers can be profound during the college years. This influence was shown in the classic study of attitude formation and change among students at Bennington College during the 1930s (Newcomb et al., 1943).

Another significant source of attitude is our very own reasoning and logic. We often go beyond what others have told us and figure things out for ourselves.

A third influence on people's attitudes is their behaviour. Research has demonstrated that people will form attitudes that are consistent with and thereby justify their behaviour (Wicklund and Brehm, 1976 in Crider, 1983). Thus, when parents ensure that their children do their homework, they should form attitudes consistent with this behaviour, especially if the tangible rewards for the behaviour are small. The less external justification there is, the more children will adopt an attitude consistent with their actions.

Generally, research indicates that people will maintain their attitudes at any particular time, whether new or old, unless there is pressure to change. As mentioned previously, students' attitudes toward school arise from several sources: parents, siblings, peers, their performance and teachers, among others. Because students' attitudes towards school are given when they arrive, so one's chances of successfully changing those attitudes will come from directly working with them.

An influence of attitude change involves persuasion. The students who enter the classroom with a negative attitude toward the teacher, the subject matter taught, or both must be persuaded to change that attitude. Persuasive communication (or attitude change) involves the communicator, the message, the audience and the audience-communicator feedback loop.

The *communicators* in our classrooms are the teachers. Teachers as sources of information have an immediate and substantial effect on students, but for the effect to be long-lasting, the information should be accurate, pertinent and exciting.

The *message* refers to the information that the teacher transmits to the class. Assuming the accuracy of the material presented to the class, the teacher's next concern should be how it is presented. Teaching skills that promise success and promote self-esteem seems much more effective than teaching skills with a "do it, or else" attitude, thinking that fear will be a strong motivating force.

The *audience* is the class of students. Several audience characteristics, such as age, gender, and self-esteem, seem to determine the effectiveness of the message. Younger students, for example, are generally easier to persuade than older ones; females are more often willing to change their attitudes than males, and self-esteem seems significant (Elliott, 1996).

Another influential feature of attitude change is the audience-communicator feedback loop (McConnell, 1990 in Elliott, 1996), which refers to the class's response to a teacher. The teacher must take the time to determine if the students can respond cognitively (do they understand what you have taught?) and what their effective reaction is (do they enjoy this work?).

Several attitudes were focused on attitudes towards mathematics. A study designed to investigate the relationship of attitudes towards mathematics with mathematics achievement, parental support, and gender was conducted by Tocci and Engelhard (1991) in Penuela (1996). The subjects were 13-year-old students in the United States and Thailand. Four Attitude Scales (Math and Myself, Math and Society, Math as a Male Domain, and Math Anxiety) were used as the criteria variables. The findings revealed that, in both countries, achievement, parental support, and gender were significant predictors of attitude towards mathematics. Even after controlling for achievement and parental support, it was found that gender differences in attitudes towards mathematics were significant.

2.3. Peer Collaboration

Peer collaboration has come a long way in an astonishingly short time (Damon & Phelps, 1988). As the usefulness found increasing acceptance among teachers and principals, peer relationships' significant influence on young adults' academic achievement becomes more established. Peer relationships, when constructive, promote meaningful interdependence, a feeling of belonging, acceptance, support, and caring (Johnson & Johnson, 1995). Internalising values, attitudes, perspectives and goals for responsible decision-making also exemplifies positive peer relationships. Constructive peer relationship is also typified by the predisposition to

engage in pre-social behaviour, coherent and integrated personal identity, a long-term condition, psychological health, and personal autonomy needed to resist social pressure and antisocial conduct.

2.4. Approaches to teaching mathematics

Adams (1988) also investigated students' achievement in remedial college algebra and determined their change in attitude towards mathematics. The results showed that remedial algebra affected student achievement better than regular college algebra. The student's attitude towards remedial college algebra was found to be positive.

Algani (2021), in his study sample, included 195 male and female primary school math educators and 80 eighth-grade students from Arab schools in northern Israel, who were split into two groups: an experimental group and a control group. The experimental group experimented with collective learning, while the control group experimented with conventional learning—Analyse students' math performance in a post-test with the experimental and control groups. The study's findings revealed that students' educational performance in math using the collaborative learning technique is superior to that in math using the conventional teaching technique.

Webel (2017) used the perspectives of two high school students in the same mathematics class to argue that students' beliefs about the nature of mathematical understanding and the purpose of group work can affect the extent to which their participation in "collaboration" is genuinely collaborative. Promoting collaboration means more than ensuring students adopt responsibility for helping others understand; it means addressing and challenging these underlying beliefs.

Olanrewaju (2019) examined the effects of collaborative learning techniques and Mathematics anxiety on the mathematics learning achievement of secondary school students in Gombe State, Nigeria. A pretest-posttest, control group quasi-experimental design with a 2x2 factorial matrix was used in the study. A multi-stage sampling technique was used to sample participants from four local government areas in the state. The respondents were measured with a validated scale of 0.84 reliability coefficient research instrument, and the data obtained was analysed using independent samples t-test statistical analysis. Two (2) research hypotheses were formulated and tested at a 0.05 significance level. The results showed a significant difference in the mathematics achievement of secondary school students exposed to collaborative learning techniques and those in the control group. The study recommends that educational stakeholders intensify their efforts to organise conferences on the implications of collaborative learning techniques for effective interventions to enhance mathematics learning achievement among secondary school students. Thus, based on the theories above, a research paradigm is presented.

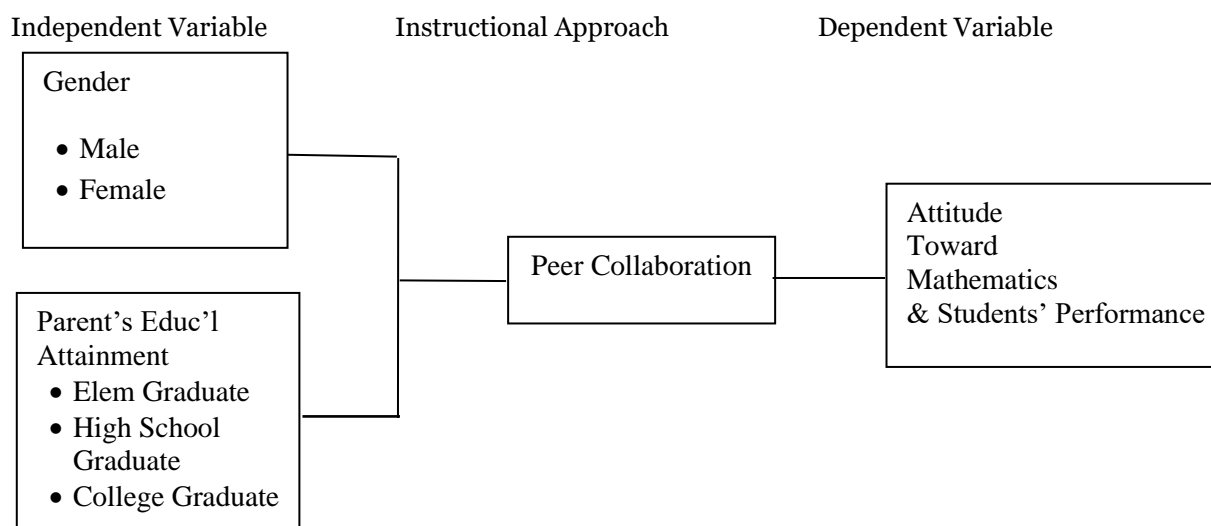


Figure 1. The influence of peer collaboration and other variables on attitude towards mathematics.

The research paradigm illustrates the independent variables (gender and parents' educational attainment) and the effect of peer collaboration on the dependent variable attitude toward mathematics.

3. STUDY'S OBJECTIVES

This study sought to determine the effect of peer collaboration on attitude toward mathematics in the new normal of Bachelor of Science in Secondary Education (BSED) students of the West Visayas State University (WVSU)-Pototan Campus during the school year 2022-2023. Effectiveness is based on measured attitudes at the beginning of the experimental teaching period.

Specifically, this study aimed to answer the following questions:

1. What are the students' attitudes towards mathematics prior to the intervention?
2. What is the student's attitude towards mathematics after the intervention?
3. Is there a significant difference in the students' attitudes before and after the intervention?
4. What are the students' experiences during the experiment?

4. METHODOLOGY

4.1. Research Design

This study used the quasi-experimental research method. Correlational research involves collecting data to determine whether and to what degree a relationship exists between two or more quantifiable variables (Gay, 1992).

This study aimed to determine the effect of peer collaboration on teacher education students' attitudes toward mathematics. It is a quasi-experimental study that evaluated the effectiveness of the peer collaboration approach utilising the one-group, pretest-posttest design. The difference between pre and post-intervention scores on the Attitude Towards Mathematics Scale judged the effectiveness of the treatment. The post-intervention attitude scale was conducted three months after the pre-intervention administration of the scale, during which the students utilised the peer collaboration approach as their learning approach in the classroom.

The attitude towards mathematics Scale was adopted from Hofileña (2002). It was tried out among thirty (30) first-year Bachelor of Science in Information Technology who were not the study participants and was found to have a reliability of 0.83. The gains of the students in the post-intervention attitude scores were used in verifying the null hypothesis at a 0.05 level of significance.

4.2. The Participants

This study's participants will be the fifty first-year Bachelor in Secondary Education students in sections A and B of the West Visayas State University-Pototan Campus during the second semester of the school year 2022-2023. Incidental or accidental sampling was employed because the students were available to the researcher during the study. Of the fifty (50) participants, eight were male, and 42 were female.

4.3. Materials and Instrumentation

To assess the students' attitude toward mathematics, a 30 five-point Likert-type Attitude Toward Mathematics Scale adopted from Chaudhary (2020) will be modified, used and will be pilot tested by the researcher. This assessment was administered before and after the intervention to constitute the pre-test and post-test. The scale consisted of 30 items to which the participants will respond SA for "Strongly agree", A for "Agree", U for "Uncertain", D for "Disagree", and SD for "Strongly Disagree".

The following scoring system was followed: If the participant answered SA for items 1, 2, 4, 6, 9, 11, 12, 15, 16, 17, 21, 25, 27, and 30, he was given a score of 5; if his answer was A, he got a score of 4; if U, 3; if D, 2; and if SD, 1. For items 3, 5, 7, 8, 10, 13, 14, 18, 19, 20, 22, 23, 24, 26, 28, and 29, the scoring is reverse: 1 for SA, 2 for A, 3 for U, 4 for D and 5 for SD. The mean scores of the participants will be interpreted as follows:

<i>Mean Score</i>	<i>Interpretation</i>
3.1 – 5.0	Positive Attitude
1.0 – 3.0	Negative Attitude

The same instrument was used for the pre and post-intervention attitudes towards mathematics. Although the instrument was adopted from previous studies, it will be pilot-tested among 30 first-year Bachelor of Elementary Education students who were not study participants. The obtained reliability coefficient was .92. For research purposes, a helpful rule of thumb is that reliability should be at least .70 and preferably higher, Fraenkel and Wallen, (1993). Hence, the instrument was valid.

4.4. Procedure

The present investigation used the quasi-experimental method employing the single-group pre-post intervention technique. The significance of the difference between correlated means obtained from the same instrument administered to the same group on two occasions was determined (Garrett, 1996).

According to Garrett, the design measures the effect of practice or special training upon the second set of scores. It estimates the effects of some activities interpolated between post-test and pre-test. This study will determine the effect of peer collaboration on the students' post-intervention attitude toward mathematics. Other teaching-learning conditions were inherently controlled, the study being a single-group experiment.

4.4.1. The Classroom Procedure

On the first day of the experiment, the 30-item Attitude Toward Mathematics Scale was administered to the participants. They finished rating the scale in 30 minutes. The participants spent the remaining 30 minutes of the one-hour class period forming their peer groups. They were free to choose their group name and group members, which should be at least four and at most 5. At the end of the period, ten groups were formed. The groups were told that they would function as a unit. This cohort meant that each group member shared individual resources such as books, handouts, notebooks, etc. With group mates, they also helped each other in performing the tasks given to the group, especially if the group output was required. These group outputs were the principal basis of their grades. Group mates are to ask each other questions and, once asked, to respond by giving correct information or explanation, clarifications, or examples of how things are to be done. They have to exhaust asking their group mates first before consulting the teacher. The groups also planned how to do their tasks and responsibilities together. Accountability for each other's work was emphasised. The groups were also free to interact with each other. The attitude toward mathematics scale was administered again three months later.

4.5. Data Analysis Procedure

The data gathered from this study will be subjected to the following statistical treatment. The means obtained will determine participants' attitudes toward mathematics before and after the intervention. The following scale will be employed:

Scale	Interpretation
3.1 – 5.0	Positive Attitude
1.0 – 3.0	Negative Attitude

4.5.1. Wilcoxon-Signed Ranks Test

To determine the significance of the difference in the students' pre- and post-attitude, the Wilcoxon-signed ranks test for two related samples will be used. This non-parametric test will be used because: 1.) the data attitudes are ordinal, and 2.) in this study where sampling was incidental, it is doubtful to assume that the sample was taken from a normally distributed population (Freund & Simon, 1997).

In this test, the difference is ranked without regard to their signs, assigning rank 1 to the most minor numerical difference (the slightest difference in absolute value), rank 2 to the second most minor numerical difference, and so forth. Zero differences are discarded, and if two or more differences are numerically equal, each is assigned the mean of the ranks they jointly occupy. The test statistics are based on the sum of the ranks of the negative difference of the smaller two. All computations were done through the Statistical Packages and Social Sciences (SPSS) software with alpha set at .05.

5. RESULTS AND DISCUSSION

The study aimed primarily at determining the effect of peer collaboration on students' attitudes; a Likert-type Attitude Toward Mathematics Scale adopted from Chaudhary (2020) was used. The same instrument was used to determine the participants' pre- and post-intervention attitudes toward mathematics. In the present study, mean attitude scores of 3.1-5.0 would indicate a positive attitude toward mathematics, while mean attitude scores of 1.0-3.0 would indicate a negative attitude towards mathematics.

5.1. Descriptive Data Analysis

The study's descriptive findings utilised the mean scores to show the participants' attitudes toward mathematics. Standard deviations were employed to determine the students' homogeneity or heterogeneity in attitudes toward mathematics.

5.1.1. The Participant's Pre- and Post-intervention Attitude Toward Mathematics.

This study aimed to determine the students' attitudes toward mathematics before and after the intervention. As shown in Table 1, the students exhibited positive pre-intervention and post-intervention attitudes toward mathematics, as indicated by M-scores of 3.39 and 3.51, respectively, with corresponding SDs of .37 and .38, revealing a narrow dispersion of mean attitude scores.

Table 1. Pre and Post-intervention Means, Description and SD

Category	M	SD	Description
Pre-Intervention	3.39	0.37	Positive Attitude
Post-Intervention	3.51	0.38	Positive Attitude

5.2. Inferential Data Analysis

5.2.1. Differences in the Pre and Post-intervention Attitude Toward Participants' Mathematics.

When the difference between the pre and post-intervention weighted mean scores was computed and ranked, there were 14 pairs of scores with the post-attitude less than the pre-attitude (\bar{M} Rank = 18.82), 33 pairs with the post-attitude greater than the pre-attitude (\bar{M} Rank = 26.20), and three pairs with pre-attitude equal to the post attitude. These results were subjected to the Wilcoxon Signed-Rank Test. The computed test statistics based on hostile ranks were significant, $z = -3.182$, $p < .05$. This indicates a significant difference in the student's attitude toward mathematics before and after the intervention. Table 2 presents the data.

Table 2. Wilcoxon-Signed Ranks Test of the Pre and Post-intervention Attitude Towards Mathematics of the Participants

Description	Signed Rank	N	Mean Rank	Sum of Ranks	Z Statistic	Asymp. Sig (2-tailed)
Post-Attitude is less than Pre-Attitude	Negative	14	18.42	263.50	-0.182	0.001
Post-Attitude is Greater than Pre-Attitude	Positive	33	16.20	864.50		
Pre-Attitude equals Post-Attitude	Ties	3				
Total		50				

5.2.2. Experiences of the Participants on the essence of collaborative work:

The following themes emerged from the students during the conduct of the study written by them based on their experiences, to wit:

Student 1

"I would describe myself as a driven, communicative and empathetic person. If we learn to deal with conflict, I can share our strengths and develop our weaker skills. Collaboration leads to more innovation, efficient processes, increased success and improved communication. It is an activation of differences, ideas, expertise and perspectives. Based on my experience, collaborative learning helped me develop my higher-level thinking, self-management and leadership skills".

Student 2

"I often embrace my solitude and prioritise my peace of mind whenever I start doing my activities. However, when I stepped out of my comfort zone, I learned that collaboration can extend my reach and potential. It provides a safety net to help me catapult my thinking and develop my ideas. Good teamwork requires good listening skills because it allows the group to overcome the obstacles that would have stymied an individual. Furthermore, teamwork simplifies tasks and makes it easier to get the work done faster. When we harmonise our efforts, we can reap the rewards of higher productivity".

Student 5

"No task is too great, and no dream is too far-fetched for a team if we have solidarity and camaraderie. Collaboration allows us to know more than we can know by ourselves. Indeed, unity is strength when there is teamwork and collaboration."

Student 8

"I prefer group work. Getting things done together is easier and faster during our activities. Although we have different views and thoughts about our work, we manage to synchronise our answers."

Student 10

"Working as a team means being fully dependent on others as we did our best to contribute evenly. Every member strives to put effort and time into our work. We shared our various ideas and voiced our perspectives, and we were able to showcase our presentation to the class. From there, I realised every one of us has a potential. I witnessed how we showed leadership skills, influenced the team, and provided solutions to every problem/situation. I enjoy engaging with my group members as we learned and got along well."

Student 15

"We are tough as we had survived the task. We experienced hardships and trials but overcame them as we reached a common goal. I experienced easy flow working as a team. Teamwork is the idea of being able to work collaboratively within a group. We provided an open space for each other to express our thoughts fully. Group work is better as you can discuss the lessons and learn from others' points of view. Additionally, it also improved my social skills. Group work promotes personal growth, good listening skills and team success."

Student 23

I prefer group work. When people apply their unique skills to a common task, they often create more effective solutions than independent workers. We combine our perspectives, strengths, and collective brainstorming in group work. It can also improve our socialisation skills, especially for introverted people."

Student 35

"I love to do teamwork because we were not just learning, but we have a bond that strengthens our closeness. We do not work alone to shine. We share our works, experiences, educational backgrounds, and creative impulses by working closely with others. Each person has limited skills and a finite knowledge base; we need others' help to solve difficult problems and see beyond our blind spots".

Student 48

"Group work is preferred due to its potential for critical thinking, student learning, and professional development. It enhances communication, time management, and understanding through discussion and explanation. Group projects also introduce unpredictability in teaching, as students can approach tasks and solve problems in novel ways. This approach also helps students develop process skills for processing information, evaluating, and solving problems."

6. THE STUDY'S FINDINGS

1. The teacher education students had a positive attitude towards mathematics before and after using the peer collaboration approach in learning mathematics.
2. There is a significant difference in the students' attitudes towards mathematics before and after using the peer collaboration approach to learning mathematics.
3. Students prefer to use collaboration in learning mathematics based on their experience. There is an opportunity to share and discuss answers, ideas and views. Working with peers can help develop positive classroom relationships outside their friendship groups.

7. CONCLUSIONS

Given the findings, the following conclusions are drawn:

- 7.1. A positive attitude toward mathematics indicates that teacher education students study mathematics because they enjoy it, they get satisfaction from knowing mathematical ideas, and they find competency in mathematics its reward.
- 7.2. A significant difference in the students' attitudes toward mathematics before and after the intervention indicates that the peer collaboration approach effectively improves students' attitudes toward mathematics.
- 7.3. Students can learn more about the subject matter When they collaborate rather than work alone or in rivalry with their peers. From their peers, students can learn new perspectives and insights. Numerous abilities, including cooperation, listening, working with others, and leadership, can be developed through peer collaboration.

8. RECOMMENDATIONS

Based on the conclusions of the investigation, the following recommendations are formulated:

- 8.1. The attitude toward the mathematics scale should be used for screening applicants to the teacher education curriculum so that the mathematics teachers do not have to exert much effort in motivating the students to learn and for them to like mathematics.
- 8.2. Mathematics teachers should use peer collaboration more often to improve students' attitudes towards mathematics.
- 8.3. Peer collaboration is a familiar strategy math teachers use to help students improve various abilities, including cooperation, leadership, listening, and teamwork. Working with classmates in the classroom, especially when they are not in their established buddy groups, can foster the growth of beneficial relationships.
- 8.4. In-service training on the peer collaboration approach may be conducted to familiarise the teachers with its mechanics. This investigation may be replicated or expanded to include variables influencing attitudes toward mathematics.

8.5. The results of this research may be included in the syllabi of mathematics teachers so that they can use this approach to improve students' attitudes towards mathematics and their performance.

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