

Buzz Groups Discussion Teaching Method and the Enhancement of Mathematics Achievement among Secondary School Students in Kurdistan

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Abstract

The academic achievement of secondary school students in Kurdistan in mathematics is demonstrably low. Teachers are reluctant to adopt alternative pedagogical approaches outside their comfort zones. This research was designed to assess the efficacy of Small Group Discussions, particularly the Buzz Groups, teaching method on students' understanding of mathematics, mathematical thinking skills, and academic accomplishments in the Kurdistan region. Data was collected via pretest-posttest administered to secondary school students and interviews with teachers and students. Results from pretest-Posttest clearly indicate a marked improvement in students' performance. Interviews further reinforce this result and suggest that Buzz Groups enhance learning skills among students, increases their engagement in the classroom, and strengthens peer relationships among them. However, interviews reveal that majority of the teachers and students had never used Buzz Groups or any other form of Small Group Discussions as teaching methods in their classrooms.

Keywords: Small Group Discussions, Buzz Groups, Mathematical Thinking, Mathematics Achievement, Peer Coaching.

Introduction

Mathematics performance in the Kurdistan Region of Iraq is markedly deficient. The current state of achievement in secondary and high school indicates that students are having a difficult time grasping the fundamentals of the subject. It is possible that this may be caused by the complex interplay of economic, political, social, and cultural factors which have not provided students of this region with the necessary foundation for success in mathematics from an early age. However, if the right reforms are implemented in school policies to bring a change in the classroom management and content delivery, through effective teaching methods by instructors, it is possible to reverse the situation.

The concept of 'Teaching Methods' has been long-established. Westwood (2008) elucidated it as an array of guidelines, techniques, or strategies to be employed by educators to accomplish the sought-after learning outcomes in students. To be more specific, Ehlers (2002) outlined a Small Group as a gathering of 3 to 15 persons who share mutual interests and responsibilities in a face-to-face environment, and Pollock, Hamann, & Wilson (2011)

articulated a Discussion as a component of cooperative learning, which assists students in comprehending material more profoundly and formulate novel points of view.

Buzz groups have been identified as one such Small Groups Discussion teaching technique. This technique involves putting the class into small groups of not more than 3 students, and it's intended for discussing a particular topic or problem. Research suggests that Buzz Groups promote learning through improved students' engagement and provides a fertile ground for for development of critical thinking skills in students. This is evident in El-Ghoroury and Galper (2020) study's results that show the effectiveness of Buzz Groups in promoting student engagement and improving student performance both in class activities and on exams. Besides students' engagement, and Buzz Groups have been touted to have a positive effect on students' interaction, collaboration, critical thinking, and problem-solving skills. Dev and Kumar (2019) depict Buzz Groups as dynamic and versatile in promoting student centered learning since they can be used in many learning environments including online environment and the traditional classroom environment.

Background Literature

In 2004, Kitta identified mathematics as a language that facilitates the description of concepts and relationships that are derived from the environment. Mathematics is widely recognized as one of the most significant disciplines in the school curriculum globally. However, Tshabalala and Ncube (2016) argued that the poor performance of students in mathematics is attributable to various factors. These include a lack of adequately trained teachers who can teach the subject effectively, inadequate teaching facilities, insufficient resources for purchasing relevant equipment, inadequate textbooks, large class sizes, unmotivated teachers, a lack of laboratories and libraries, disorganized supervisory activities, the frequent transfer of teachers and principals, the detrimental impact of public examinations on the teaching and learning process, and disparities in educational opportunities.

It is worth noting that the teacher-student relationship has the potential to provide both teachers and students with motivation. A positive teacher-student relationship can encourage teachers to attend classes regularly, while eliminating any sense of hostility that may exist between them. Such a relationship can also foster a positive attitude towards mathematics and its teachers among students (Michael, 2015).

Cooperative learning has been established as an effective pedagogical approach to increase academic success among learners through multiple studies (Hossain & Tarmizi, 2013). Enu, Danso, & Awortwe (2015) conducted a study that investigated the effects of cooperative learning on achievement and attitude among mathematics students. They found that cooperative learning not only significantly improved student outcomes, but also enhanced the attitude and trust in the cooperative community.

To ensure positive interdependence, it is suggested that group sizes should be kept as small as possible, while also being large enough to draw on the necessary diversity of opinions and backgrounds to complete the task at hand (Enu, Danso, & Awortwe, 2015). Furthermore, Wiedman, Leach, Rummel, & Wiley (2012) noted that it is not necessary for

all members of the group to possess strong mathematical skills, as long as at least one participant does.

Diversity has been identified as a valuable asset for work groups, as it can improve the overall effectiveness of the group (Moreland, Levine & Wingert, 2013). Therefore, group members with different backgrounds and experiences should be included in cooperative learning groups to provide a range of perspectives.

This paper examined the impact of Buzz Groups on students’ confidence, critical thinking abilities, and overall achievement in mathematics.

Research Design and Methodology

This research adopted a mixed method design with pretest-posttest data for qualitative part and semi-structured interviews for qualitative part. A pre-test was administered to 2 groups of secondary students taking a geometry course. This was to ascertain the average geometry knowledge level of each group. One group was taught using Buzz Groups for a full term of 15 weeks, while the other group was taught using the same traditional approach and was used as a control for the research. At the end of the term, each group had covered the same mathematics content and were given a post-test. For qualitative data, 5 teachers and 5 students were randomly selected from the same school and interviewed prior to the pretest. The interview sought to establish whether teachers use group discussions in their lessons, and if so, at what frequency. The tables below give a summary of the participants of the interviews.

Table 4.1: List of Teachers Showing Years of Experience

Teacher	Years of Experience	Frequency of using GD
Teacher 1	10 years	Never used
Teacher 2	12 years	Never used
Teacher 3	15 years	Never used
Teacher 4	5 years	Never used
Teacher 5	12 years	Every end of chapter

Table 4.2: Students Interviewed

1 st grade Student	Frequency of participating in GD
Student 1	Never participate
Student 2	Never participate
Student 3	Participate many time
Student 4	Never participate
Student 5	Never participate

Results

The findings of the present investigation are seemingly uncomplicated yet strikingly noteworthy. Specifically, an overwhelming majority of educators who participated in the study, totaling eighty percent, reported that they exclusively utilized traditional lecture-based instructional strategies. Similarly, the data gleaned from the student interviews

indicated that a similarly vast majority of participants, with only one exception, acknowledged that they had not been exposed to alternative methods of teaching, such as group discussions. Importantly, the information garnered from both teacher and student interviews is presented without any manipulation or modification. These outcomes provide valuable insight into the prevailing teaching practices in the educational system and highlight the need for alternative pedagogical approaches.

Interviews

Five teachers and five students were interviewed, and out of these only one teacher had actually used group discussions method in the class. Interestingly, out of the five students interviewed, just one had experienced group discussion in class. Excerpts from interviews with both the teacher and the student who had group discussions experience are presented below verbatim. Full interviews are appended at the end.

Teacher's Interview

Interviewer: *Do you use group discussion method in your classes?*

Teacher: *Yeas I use it.*

Interviewer: *How often do you use this method?*

Teacher: *At the end of the chapters and section I am using especially for difficult sections.*

Interviewer: *On average, how many students do you put in a group? Why?*

Teacher: *Four or five. If I make it so crowded maybe it takes time maybe it cannot be helpful.*

Interviewer: *Prior to using groups, approximately what percentage of the class would answer such tasks without your help?*

Teacher: *It will take too much time, only clever students like 5 to 6 students will answer tasks others can't, but if these clever students can help other students all the class will do.*

Interviewer: *Would you say the percentage in 2 above increased when using groups?*

Teacher: *50% increased especially weak students.*

The above excerpt highlights that the teacher employed a group discussion method solely for the purpose of recapitulating lessons, which occurred at the end of each chapter. While this approach may be an efficient way to review a chapter, it does not fully exploit the potential of the method to enhance students' capacity for retention. Moreover, it is apparent that the teacher did not correctly implement the method, as no consideration was given to group dynamics when forming the groups. This oversight may have resulted in counterproductive outcomes with respect to learning.

Additionally, it is noteworthy that the teacher did not utilize Buzz Groups, a technique that involves creating smaller groups comprising two to three students each. In contrast, the groups in this case were composed of up to five students, which can be considered small groups but not small enough to qualify as Buzz Groups. Despite the fact that the groups

were not appropriately assembled and facilitated, the interview excerpt clearly indicates a marked improvement in student achievement at the end of the study.

Student's Interview

Interviewer: *How often do you solve tasks correctly without teacher help?*

Student: *Few times not too much maybe I could solve only two question from the whole task.*

Interviewer: *After group activity, do you handle related tasks independently and individually with relative ease?*

Student: *Yes, I will solve the tasks correctly without any help.*

Interviewer: *Is there a difference in your performance when the teacher uses this method? If yes, what is the difference?*

Student: *Yes, there is, I understood the lesson easier and better also we solved one question in different ways in the group that made me know easier ways to solve.*

Interviewer: *What do you think may have caused this difference?*

Student: *Because we are more than two students in the group, we shared all information together and we solved together.*

In the interview, the student reports struggling to solve tasks correctly without teacher help, with only being able to solve a few questions from the whole task. This suggests that the student may have difficulty comprehending the material independently and may require more guidance from the teacher to fully understand the concepts. However, after participating in a group activity, the student reports being able to handle related tasks independently and with relative ease. This improvement can be attributed to working collaboratively with peers, as the student reports learning new, easier ways to solve problems and better understanding the lesson.

The student's improved performance after participating in a group activity highlights the importance of collaborative learning in educational settings. By working with peers, students can benefit from multiple perspectives and approaches to problem-solving, as well as gaining exposure to different thought processes and strategies. Additionally, the social interaction and discussion involved in group activities can help students better comprehend and retain information by promoting active engagement with the material. These findings suggest that incorporating more group activities and collaborative learning opportunities in the classroom may benefit students who struggle with independent learning and comprehension.

Pretest-Posttest

The results from the two written tests are summarized in the table below.

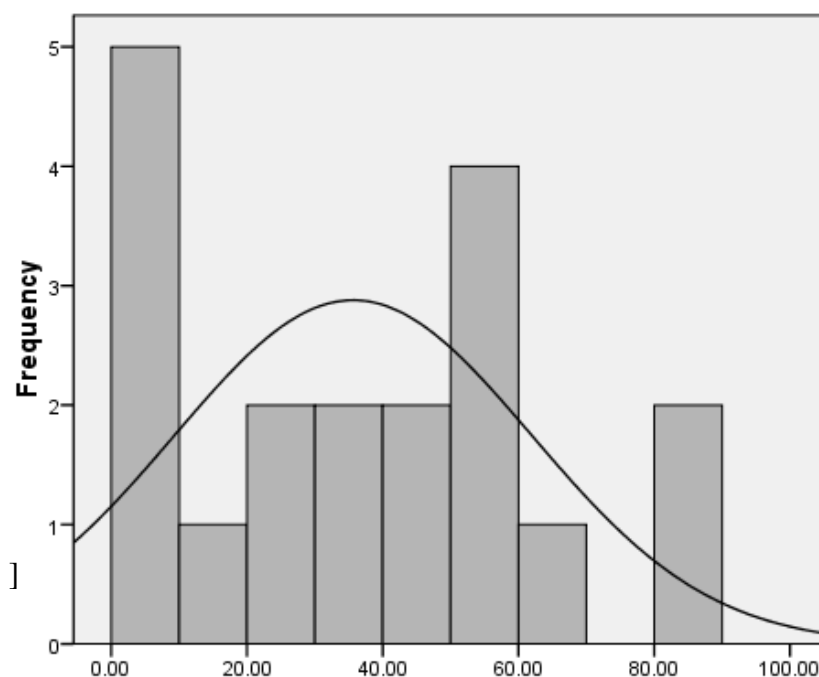
Table 4: Analysis of the Pre-test and Post-test Results

Score	Pretest	Posttest	Grade	Pretest Mean.	Posttest Mean	Remark
80 – 100	2	6	A	82	88.2	Very High
75 – 79	0	3	B+			
70 – 74	0	0	B	64	68.4	High
65 – 69	1	2	B-			
60 – 64	0	0	C+			
55 – 59	6	2	C	50.8	52	Average
50 – 54	0	0	C-			
45 – 49	0	0	D+			
40 – 44	2	3	D			
35 – 39	1	1	D-	14.4	25.3	Below Average
≤ 34	7	2	E			

According to the results in the table above, a paltry 36% of the student population achieved a score of 50 or higher on the pretest. In contrast, the post-test yielded a higher passing rate of 63%. Among the 19 students who participated in the assessments, only 2 individuals obtained a grade of A in the pretest. However, this number increased to 6 students in the post-test, representing 21% increment in the number of students who scored grade A. this indicates an improvement in overall academic performance.

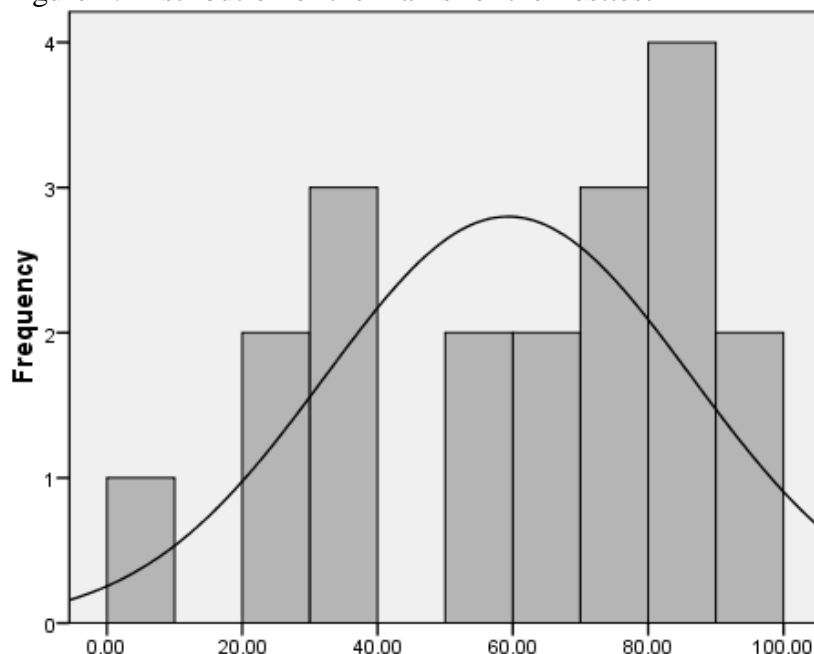
To illustrate the disparity in performance between the two assessments, two figures have been included below - one depicting the results of the pretest and the other illustrating the post-test scores. These figures serve to clearly demonstrate the observed changes in student performance between the two testing periods.

Figure 3 Distribution of the marks for the Pretest



The figure above depicts positive skewness indicating a smaller number of students in the above average zone and majority of them in the average and below average zones. The contrary is shown clearly in the figure below, the graph is negatively skewed indicating a very small number in the below average zone and highlighting majority of the students in the average and above average zones.

Figure 4: Distribution of the marks for the Posttest



Discussion and Conclusion

It is unequivocally evident in this research that a vast majority of teachers, either in public or private sector, do not incorporate the Group Discussion Method of instruction in their classrooms. In fact, many of experienced instructors have failed to explore any approach other than the conventional lecture method or direct instruction method. This implies that either teachers have not expended sufficient effort towards improving the learning experience of students, or they may not have engaged in professional development opportunities to consistently enhance their pedagogical practices. The absence of Group Discussion Method in the classroom, especially Buzz Groups, may result in an impediment to developing students' critical thinking. This is because Buzz Groups are highly collaborative and interactive and presents opportunity for students to develop other skills besides learning mathematics.

Academic Performance and Achievement

The findings indicate that Buzz Groups have a positive impact on students' academic performance in mathematics. Firstly, there was a significant increase in the students' posttest scores, indicating an improvement in their understanding and application of mathematical concepts. Additionally, during the interview, students expressed that they found the lessons to be more comprehensible and easier to follow due to the use of Buzz Groups. Furthermore, students were able to demonstrate their ability to solve mathematical problems using various

approaches, which they attributed to the collaborative efforts of the group discussions. Secondly, the teacher noticed a marked difference in the students' performance and noted a positive change in their relationships with their peers. These findings align with previous research that has shown the effectiveness of collaborative learning methods in enhancing students' learning outcomes (Geetha & Nirmala, 2017; Onwuka & Agomuo, 2018).

Learning Skills Development

According to the results of the investigation, Buzz Groups is a valuable approach to facilitate the advancement of learning skills among students. The collaborative nature of Buzz Groups generates a conducive learning atmosphere that stimulates and promotes the dissemination and exchange of diverse ideas and knowledge among students. This type of collaborative learning environment creates a platform for students to hone their learning skills. In the interviews conducted, students explicitly mentioned that they were able to solve more challenging questions due to their active participation in group discussions, where they could effectively share and exchange information with their peers. This result is similar to that of Rohaan, Van der Rijst & Van Bruggen, (2018) and that of Liu, Wang & Chen, (2019) that collaborative learning techniques, such as Buzz Groups, enhances students' learning skills and outcomes.

Student Engagement/Participation

According to the results, Buzz Groups environments enable students to effectively complete tasks without relying on direct intervention from the instructor. Interview with the teacher revealed that students demonstrated a high level of involvement and participation during the lesson. Additionally, students expressed a strong desire to exhibit their problem-solving skills, which further increased their participation in the learning process. This finding supports Cai & Wang, (2021) who demonstrated that collaborative learning enhances students' motivation and learning.

Students' cohesion and Relationships

The results of the study demonstrate that Buzz Groups are a pedagogical strategy that fosters affirmative social relationships among students in the classroom. Such favorable social interactions among students enable teachers to concentrate more on delivering instruction with minimal interruption. The case study findings indicate that students reciprocally provided support and guidance, which in turn enhanced their interpersonal relationships. Additionally, the outcomes of the study suggest that Buzz Groups constitute an effective instructional intervention for improving students' performance in mathematics and, concomitantly, their overall dispositions towards the subject matter. The findings are similar to Eddy, Hogan & Cohen, (2021); Wubbels, Brekelmans & den Brok, (2020); Huang, Zhang, Xu & Yang, (2020).

Conclusion

This research findings indicates that the present educational policy requires an overhaul to integrate teacher training prerequisites that promote student-centered pedagogical practices

such as the Buzz Groups method, which has been empirically validated to have a constructive impact on student accomplishment. In light of this, the government must provide ample opportunities for educators to hone their skills through diverse professional development programs that are endorsed by the government to advance the educational standards in the region, particularly in the domain of mathematics. Empirical findings suggest that diverse instructional approaches can be advantageous for students in enhancing their cognitive processes, and the Buzz Groups method is particularly pivotal for this purpose. This pedagogical approach facilitates the convergence of multiple perspectives, thereby allowing for the expression of individual viewpoints and opinions on a given topic. Moreover, student-centered pedagogical approaches like the Buzz Groups method boost students' interest and engagement, consequently sustaining their attention and facilitating the acquisition of analytical and critical thinking competencies.

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