Buzz Group Application Methods to Improve The Students’ Reasoning Ability and Mathematical Communication Skills of Class VIII Budi Mulya High School Bandar Lampung

Komarudin*, Aji Ismanto, Heni Rodiawati, Nora Septina, Nia Agustiana, Novi Rosmawati

1Mathematics Education, UIN Raden Intan Lampung, Indonesia.

Abstract. The mathematical reasoning ability of Bina Mulya High School students in Bandar Lampung is relatively low because students are less involved in learning and there is less opportunity to ask questions and discuss with friends. Starting from the above problems the writer wanted to know whether learning methods Buzz Group can improve the ability of mathematical reasoning and communication skills of learners. The method used is quasi-experimental design, with a population of learners in class VIII Bina Mulya High School Bandar Lampung. The research sample number 59 learners, where there are 30 students experimental class and the control class of 29 students. The ability of mathematical reasoning and communication skills mathematical learners were measured using a test consisting of 16 questions and after a description of the data analysis process, the test questions were taken to test the hypothesis as many as 11 a matter of description. Based on the results of tests of normality and homogeneity tests, found that the test data from the two groups were normal and homogeneous. The further test of the hypothesis that has been used two sample t-test did not correlate. The result of hypothesis testing found that the reasoning ability $t_{arithmetic} > t_{table}$ namely 2.212>2.002 and hypothesis testing results found that the mathematical communication skills $arithmetic table$ 3.2761>2.00246 so $H_0$ and accept $H_1$. Buzz Group that the learning model can improve the ability of mathematical reasoning and communication skills of learners SMP Bina Mulya Bandar Lampung.

1. Introduction

Education can be interpreted as a process of changing the behavior of students to become human beings who are able to live independently and as members of society in the natural environment around which the individual is different. The educational problems faced by the Indonesian people today are very broad and complex. One very important problem in the word of education in Indonesia is the lack of quality of education in Indonesia are by improving the quality of human resources through education. The quality of human resources can be enhanced by the learning process that is followed at various levels of education. The teacher has a key role in the education process. The most important role of the teacher in a school is to guide students while providing knowledge [1] One way to improve quality in education is to improve teacher professionalism in the classroom, including the use of various learning methods. methods can increase student participation in classrooms and has the potential to create active learners, participants, and collaborators in the education process [2].

Learning is a process organized by the teacher to teach students to learn how to learn and process knowledge, skills, and attitudes [3]. Mathematics is one of the elements of education. "Mathematics is a field of science which is a means of thinking, communicating, a tool to solve various practical problems, whose elements are logic and intuition, analysis and construction, generality and
individuality, and has branches such as arithmetic, algebra, geometry, and analysis [4]. Teaching mathematics is not just a lesson about facts but that can develop reasoning abilities. If mathematics is taught just a lesson about facts will only make a group of people become good memorizers, not smart at seeing a causal relationship, and not good at solving problems.

By learning mathematics, students are expected to be able to solve problems, find and communicate ideas that arise in the minds of students. For this reason, in mathematics learning, students are skills and communication skills, which are certainly expected to achieve a satisfactory result. The learning that the teacher has developed too far has not supported the development of students mathematical reasoning and communication abilities, learning is one-way, students are not actively involved in exploring mathematical concepts or ideas in depth and meaningfully so that students receive knowledge in the form of the finished or memorized. All abilities that are expected to be processed by the student cannot necessarily be realized simply by relying on the learning process that has been accustomed to being in school, with sequence steps such as taught theory, definitions, theorems, given examples and given questions. Learning processes like this do not make students develop and have reasoning skills based on their thinking, but rather receive passive knowledge.

So that the difficulties faced by students can be overcome and reasoning and communication skills can be improved. It a learning method that is able to provide learning meaningfulness for students. The use of various learning methods in the learning process is intended to overcome boredom and saturation in students in the learning process. The use of good learning methods will also lead to good learning outcomes, most of the methods applied in schools are still teacher-centered learning methods, whereas this method is very ineffective because students just sit, be quiet, and listen so that students become passive and class condition are not conducive. If done continuously it will affect the learning outcomes of students. Active learning activities of students can be raised by changing learning methods, one of them by using discussion methods to be more precise the Buzz Group discussion method.

Buzz Groups method is particularly useful in larger classes and also encourages shyer students to participate. In fact, some students have trouble participating in large group discussions or meetings, so by dividing the whole class into small groups, more students have the opportunity to express their thoughts because students have a chance to practice their comments and to increase their repertoire of ideas in their buzz groups [5].

The name 'Buzz Group' comes from the fact that when this method is employed the classroom will 'buzz' with the noise generated by the student discussion groups. After a given period of time, one student from each group must give a summary of his/her group's discussion to the whole class. During these group discussions, students will be able to "exchange ideas drawn from their collective abilities, knowledge, and experiences" [6].

Multiple teaching-learning tools can be employed to keep the students engaged in large group settings like making buzz groups, asking questions, using audience response, using clinical cases, role plays, and simulations, and showing videos etc [7].

Research conducted by Nailil Faroh with the title "The Influence of Mathematical Reasoning and Communication Ability on the Ability to Complete Problem on the Association’s Main Material Matter on 2nd Semester Students of Class VII MTU NU Nurul Huda Mangkang Semarang 2010/2011 Academic Year". The results of this study are that there is an influence of reasoning ability and mathematical communication on the ability to solve story problems in the subject matter, shown by the correlation coefficient $R=0.72$ at a significant level $\alpha=0.05$ and the coefficient of determination $R^2=0.624$. This shows that 62.4% variation in scores on the ability to solve story problems in subject matter sets is influenced by reasoning ability and mathematical communication.

Research conducted by Kukuh Himawan with the title "Improving Communication and Mathematical Reasoning with Realistic Mathematics Education (RME) Learning Strategies on the Subject of Building Space". The result of the study showed an increase in students' communication skills which can be seen from the increasing indicators including 1) the ability of students to ask and answer (oral aspects) before the action 20.0%, in the first round class action reached 40.0% and after doing the action in round II became 63.3%; 2) students were able to use symbols appropriately (written aspects) before the action 36.6%, in the action of round I class reached 53.3%, and after the second round class action became 70.0%; 3) the ability of students to change the problem into an illustration of completion (aspect of the picture) before the action 13.3%, in the action of round I class reached 30.0%, in class II round action to 60.0%. While the achievement of mathematical reasoning indicators are: 1) the ability
of students to submit allegations before the action 16.6%, in the first round class action reached 40.0%, and in the second round class action to 66.6%); 2) students were able to draw conclusions from the statement before the action 33.3%, in the first round class action reached 43.4%, and in the second round class action it became 70.0%. The difference with the previous research conducted by Rosliana Harahap and Sulistiani is the effectiveness of the buzz group method with results that show that the buzz group learning model is effective towards students’ mathematical reasoning abilities and the buzz group learning model is effective towards students’ activities in learning activities [8].

1. Mathematical Communication Ability

   The ability to communicate with others for work we do. Graphics, charts, maps, symbols, diagrams, mathematical concept, and visual demonstrations, together with words written or discussed, are all commonly used ways [3]. Communication is mathematical communication. De Lange for the definition of the people of the learning, the students of the learning, the process of the learning, the school of the learning, the globalization of the learning of the learning, the mathematical that is enforced, and the other forms and also able to understand the opinions and ideas of others [9]. Students who have mathematical communication skills can be seen from the way they convey ideas, ideas, or express mathematical language. Mathematical language is meant to have symbols, pictures, graphics or algebraic forms according to what the educator commands [10].

   Mathematical communication according to NCTM is the ability of students to explain an algorithm and unique ways to solve problems, the ability of students to construct and explain the presentation of real-world phenomena graphically, words/sentences, equations, tables and physical presentation or the ability of students to provide the notion of geometry images.

   Sumarno identifies mathematical communication indicators including ability:
   a. Reveal real objects, pictures, and diagrams into mathematical ideas.
   b. Explain ideas, situations, and mathematical relations, orally/ in writing with real objects, pictures, graphics or algebra.
   c. State the situation into mathematical language.
   d. Listen, discuss and write mathematics.
   e. Read math presentations.
   f. Make conjectures, arguments, define, generalizations.
   g. Explain/ask about mathematics.

2. Reasoning Ability

   According to Lithner reasoning is thought that is adapted to produce statements and reach conclusions on problem-solving that is always based on formal logic so that it is not limited to evidence (Cita Dwi Rosita, 2014). Reasoning comes from the word reason which has the meaning of consideration of good or bad, the power of thought or activity that allows a person to think logically. According to Lithner reasoning is thought adopted to produce statements and reach conclusions on problem-solving which is always based on formal logic so it is not limited to evidence. The knowledge that is fulfilled by reasoning has the basis of truth, so the prose of thinking must be done in a certain way so that the withdrawal of the new conclusions is considered valid. The reasoning becomes the process of thinking activities that have certain characteristics which connotes with a pattern of thinking which is generally called logic. The reasoning is divided into two, namely deductive reasoning and inductive reasoning. Deductive reasoning is reasoning that goes from things that are specific to things that are common, inductive reasoning is reasoning that goes from things that are common to specific things.

3. Buzz Group Method

   Learning methods are a method used by teachers to convey lessons to students. Because the delivery takes place in an educative interaction, the learning method can be interpreted as a method used by the teacher in making relationships with students during the teaching, thus, the learning method is a tool for creating teaching and learning processes [11].

   Discussion of the type of Buzz Group is a large group divided into several small groups, consisting of 4-5 people. The place is arranged so that students can face to face and exchange ideas easily. The discussion can be done in the middle or at the end of the lesson with the intention of sharpening the framework of the lesson material, clarifying the lesson material, or answering questions [12].
Buzz Group discussion method is a teaching method that is carried out during the middle or end of the lesson with the intention of sharpening, clarifying the material and answering questions, so that the knowledge and concept information conveyed by the teacher can be accepted by students with the same perception [13].

Steps for using the buzz group discussion method:

a. Educators, perhaps with students choosing and deciding problems and parts of problems that will be discussed and need to be solved in learning activities.

b. Educators designate several students to form small groups. The number of groups that will be formed and the number of participants in each small group are adjusted according to the number of sections to be discussed.

c. Educators share the parts of the problem with each small group. One group discussed one part of the problem. Furthermore, the educator explains the group assignments that must be done, the time of discussion (usually 5-10 minutes), the selection of the reporter and so on.

d. Small groups discuss the part of the problem that has been determined. The students in the small group clarify parts of the problem and provide suggestions for solutions.

e. If the specified time has been completed, educators invite small groups to regroup in large groups. Then he invited reporters from each small group to take turns to submit their reports to large groups.

f. Educators or students who are appointed, record the points of the report submitted. Furthermore, students are asked to add, subtract or comment on the report.

g. Educators can assign someone or several students to summarize the results of the final report discussion.

h. Educators with students can propose the possibility of further activities that can be carried out based on the results of the discussion and then evaluate the process and result of the discussion.

2. Research Methods

This research is a quantitative research on the type of Quasy Experimental Design. In this study, respondents were divided into two groups. The first group is the experimental group, namely students get the treatment of Buzz Group learning. The second group is the control group, namely students who receive conventional learning treatment. The variety of his research is structured research that starts from the submission of hypotheses. Correlational research to find out how the factors of Buzz Group (X) learning to increase reasoning ability ($Y_1$) and mathematical communication skills ($Y_2$). The sample in this study was eight grade students of Bina Mulya Bandar Lampung Middle School with 59 students divided into 2 classes, namely, class A 30 students and class B 29 students.

The research instrument was tested for validity using construct validity and items. Testing constructs validity by consulting instruments to three Lampung UIN lecturers and Bina Mulya High School Mathematics teachers in Bandar Lampung. Testing the validity of the items by giving an essay to the sampling class whose result is analyzed using the Pearson product moment correlation formula. Of the 16 items that were tested, 2 items were declared inadequate and the remaining 14 items were declared valid. Reliable test that has been carried out using the formula $r_{11}$ obtained the value of $r_{11} = 0.734$, in the research taken reliability is equal to or more than 0.70, that the test instrument of reasoning ability and mathematical communication ability has been reliable.

![Research Flow Diagram]

Figure 1 Research Flow

Population -> Sample -> Eksperimen Class | Control Class
Pretest

KBM Eksperimen Class (buzz group method) | Control Class (Conventional)

Conclusion
3. Results and Discussion
Based on the result of data analysis that has been presented previously, the following will describe the description and interpretation of research data. Description and interpretation of the data were analyzed based on the factors examined in the study. These factors include the buzz group method, reasoning ability, and mathematical communication skills.

The result showed that there were differences in the reasoning abilities and mathematical communication skills of students who learned through learning mathematics with the buzz group model with students learning with conventional learning.

| Group          | Average | Variance | \( t_{\text{count}} \) | \( t_{\text{table}} \) | Decision       |
|----------------|---------|----------|------------------------|------------------------|----------------|
| Experiment     | 60      | 157,567  | 2.982                  | 2.002                  | \( H_0 \) rejected |
| Control        | 48.276  | 300.74   |                        |                        | \            |

Based on the test of the posttest hypothesis the reasoning ability in the prism and limas material can be seen that \( t_{\text{count}} = 2.982 > t_{\text{table}} = 2.002 \) this means that at the significance level \( \alpha = 0.05 \) \( H_0 \) is rejected. Thus it can be concluded that there is an effect of Buzz Group learning on students’ reasoning abilities.

| Group          | Average | Variance | \( t_{\text{count}} \) | \( t_{\text{table}} \) | Decision       |
|----------------|---------|----------|------------------------|------------------------|----------------|
| Experiment     | 74.17   | 98,4195  | 3.038                  | 2.002                  | \( H_0 \) rejected |
| Control        | 65.69   | 131,650  |                        |                        | \            |

Based on the posttest hypothesis test, mathematical communication skills on prism and limas material can be seen that \( t_{\text{count}} = 3.038 > t_{\text{table}} = 2.002 \) means that the significance level \( \alpha = 0.05 \) \( H_0 \) is rejected. Thus it can be concluded that there is an effect of Buzz Group learning on students' reasoning abilities.

| Group          | Average | Variance | \( t_{\text{count}} \) | \( t_{\text{table}} \) | Decision       |
|----------------|---------|----------|------------------------|------------------------|----------------|
| Experiment     | 0.37    | 0.016    | 4.212                  | 2.002                  | \( H_0 \) rejected |
| Control        | 0.212   | 0.025    |                        |                        | \            |

Based on the N-Gain hypothesis test, reasoning ability in the prism dan limas material can be seen that \( t_{\text{count}}=4.212>t_{\text{table}}=2.002 \) means that the significance level \( \alpha=0.05 \) \( H_0 \) is rejected. Thus it can be concluded that the reasoning ability of students increases through the Buzz Group learning model rather than using conventional models.

| Group          | Average | Variance | \( t_{\text{count}} \) | \( t_{\text{table}} \) | Decision       |
|----------------|---------|----------|------------------------|------------------------|----------------|
| Experiment     | 0.33    | 0.048    | 3.276                  | 2.002                  | \( H_0 \) rejected |
| Control        | 0.169   | 0.020    |                        |                        | \            |

Based on the N-gain hypothesis test, mathematical communication ability on prism and limas material can be seen that \( t_{\text{count}} = 3.276 > t_{\text{table}} = 2.002 \) \( H_0 \) is rejected. Thus it can be concluded that the mathematical communication skills of students increase through the Buzz Group learning model rather than using conventional models.
Based on Anisa Kurniati’s research, Ramon Muhandaz, Fajar Alam Hamzah, the results of the calculation of the final data (posttest) can be made by comparing the value of $t_{hitung}$ with $t_{table}$, the value of $t_{hitung} = 2.22$ means that $t_{hitung}$ is greater than $t_{table}$ significant level of 5% with $df = Nx + Ny - 2 = 36 + 36 - 2 = 70$. With $df = 70$, it is obtained from the significant level of 5% at 2.00. This means that $t_{hitung} > t_{table}$, then the decision that $H_a$ is accepted and $H_0$ is rejected. Thus, from the final data, it can be concluded that there are differences in students’ mathematics communication skills who learn using buzz group learning methods and students who use conventional learning [14].

4. Conclusion
Using the Buzz Group discussion model on mathematics learning abilities can improve the reasoning ability and mathematical communication skills of students in class VIII of Bina Mulya Junior High School Bandar Lampung. Improved mathematical reasoning and communication skills of students who use Buzz Group discussion methods are better than students who are given conventional learning models.

References
[1] A. Saban & A. N. Çoklar 2013 Pre-Service Teachers’ Opinions about the Micro-Teaching Method in Teaching Practise Classes *Turkish Online J. Educ. Technol.* **12** 2 234–240
[2] M. Abrar & A. Mukminin 2016 International Graduate Classroom Discussion Engagement, Challenges, and Solving-Strategies *Asia-Pacific Collab. Educ. J.* **12** 1 5–19
[3] Dimyanti & Mudjiono 2002 *Belajar daan Pembelajaran* (Jkarta: Rineka Cipta)
[4] 2011 *Model Pembelajaran Menciptakan Proses Belajar Mengajar yang Kreatif dan Efektif.* (Jkarta: Bumi Aksara).
[5] H. Giannakopoulou & C. Skanavis 2014 Creating Buzz by Using Media to Make School Gardens Communication Happen *Stud. Media Commun.* **2** 2
[6] S. Y. Fernando & F. M. Marikar 2017 Constructivist Teaching/Learning Theory and Participatory Teaching Methods *J. Curric. Teach.* **6** 1 110
[7] S. Sarwar, Z. Razzaq & I. Saeed 2017 Evaluation Of Interactive Lectures: An Innovative Approach Employed In A Hybrid Teaching System 4
[8] R. Harahap 2017 Efektivitas Model Pembelajaran Kolaboratif Tipe Buzz Group Terhadap Kemampuan Penalaran Matematis Siswa Kelas Xi Di Man 1 Takengon *J. As-Salam* **1** 3 30–40
[9] 2014 *pembelajaran matematika* (yogyakarta: graha ilmu)
[10] F. N. Khaini 2017 Kemampuan Komunikasi Matematis dalam Mengubah Soal Cerita menjadi Model Matematika pada Siswa Kelas VIII MTs Darussalam Kademangan Blitar *Brilliant J. Ris. dan Konseptual*, 2 4 459–469
[11] 2002 *Metodologi Penelitian dan Aplikasinya* (Jakarta: Ghalia Indonesia)
[12] 2012 *proses belajar mengajar* (Bandung: remaja rosda karya)
[13] J. Jumarni 2016 Penerapan Metode Buzz Group Disertai Media Lidi Sebagai Upaya Meningkatkan Hasil Belajar Matematika Siswa Kelas Ii B Pokok Bahasa Perkalian Pada Bilangan Cacah Di Min Pasar Singkil *J. Media Inov. Edukasi*, 2 1 71–81
[14] A. Kurniati, R. Muhandaz & F. A. Hamzah 2017 Pengaruh Penerapan Metode Pembelajaran Kelompok Buzz terhadap Kemampuan Komunikasi Matematika Siswa *Suska J. Math. Educ.*, 3 2 111–118