

Analysis of Students' Mathematical Problem Solving Ability in Lesson Study-Based Learning for Learning Community Based on Student Learning Style

Dedi Ahmad Syaputra, Mulyono, Hasratuddin
Mathematics Education Study Program, Medan State University, Indonesia

Abstract

Data analysis techniques include data reduction, data presentation, and drawing conclusions. The results of this study indicate that students who are classified into the Accommodator learning style are 7 students (19.4%). Students classified in the Divergent learning style amounted to 14 people (38.8%). There are 10 students classified into Assimilation learning style (27.7%). There are 5 students who are classified into Convergent learning styles (13.8%). From the results of the classification of learning styles, learning styles diverge more than other learning styles. However, the divergent learning style is not the learning style that gets the highest score in the problem-solving ability test, but the convergent learning style that gets the highest score in the mathematical problem-solving ability test. and drawing conclusions. However, the divergent learning style is not the learning style that gets the highest score in the problem-solving ability test, but the convergent learning style that gets the highest score in the mathematical problem-solving ability test. From the results of the classification of learning styles, learning styles diverge more than other learning styles.

Keywords: Problem Solving Ability; Learning Style; Lesson Study for Learning Community.

DOI: 10.7176/JEP/12-35-03

Publication date: December 31st 2021

INTRODUCTION

Mathematics is a branch of science that has an important role in the development of science and technology. Therefore, from an early age we have been instilled in learning mathematics from the time we are in kindergarten until as long as we live we will continue to do mathematics. However, as a science, mathematics is very important to be taught for everyone to make it easier to carry out their activities and solve a problem. In addition, as a step to develop mathematics as a science, teaching mathematics is of course carried out through formal education such as at school which is associated with human daily life which is commonly called realistic mathematics. In mathematics, the materials taught are basic sciences that are growing rapidly both in content and in application. Thus the teaching of mathematics in schools is a priority in education. Mathematics is also very important in everyday life. Mathematics is also not a tool for counting and thinking, but can also be used as a tool to determine patterns, communicate, solve problems, and draw conclusions. Based on its development, the problems faced in learning mathematics are increasingly complicated and lead to creative 21st century educational goals. Experiences that can develop students' understanding and improve problem solving in learning mathematics need to be provided. For example, by giving students a mathematical problem and by facilitating a mathematics program where students can explore mathematical relationships and patterns, by which students will be able to solve these mathematical problems and then develop mathematical knowledge that leads students to solve problems and explore new ideas, in and outside the classroom.

Although problem solving is an important aspect, students' mathematical problem solving abilities are currently still low. The low mathematical problem solving ability of these students can be seen from the results of the Program for International Student Assessment (PISA) test on mathematics competence. Where Indonesia's participation in the PISA test in 2003, 2006, 2009 and 2012 obtained unsatisfactory results. In the 2003 PISA test, in mathematics, Indonesia was ranked 38th out of 41 countries with an average score of 360 out of an international average score of 496. In 2006 the average student score rose to 391 with a ranking of 50 out of 57 countries. In 2009 Indonesia was ranked 61 out of 65 countries with the average decreasing to 371. According to 2012 Indonesia was in the second lowest rank, only superior to Peru with a score of 375 which is ranked 64 out of 65 countries that took the test. Based on the results of the PISA test according to (OECD, 2015:5), in 2015 Indonesia was ranked 63 out of 70 countries with an average score of 386 out of an average international score of 490. In addition to the learning difficulties faced by the students themselves, the low mathematical problem solving ability of students is also caused by the lack of precise orientation of mathematics learning in schools. Nur (in Ibrahim and Hidayati, 2014:33) that "mathematics learning in Indonesia is generally still in conventional mathematics learning which is much characterized by structuralistic and mechanistic and teacher-centered".

Based on the results of observations in December 2020 at SMA Muhammadiyah 1 Medan, the average value of the Odd Semester Examination (US) for the 2020/2021 school year for class XI mathematics subjects was 68.5, lower than the KKM, which was 75. This shows that the ability to solve math problems of class XI students at

SMA Muhammadiyah 1 Medan. Students have a habit of seeing how to solve problems on examples of similar problems that have been done. This causes students not to be able to solve their own problems well and see the work of others when they get questions that are not simple. Therefore, it is necessary to conduct a study to analyze where students' errors in answering each question were given at the end of the semester assessment. In line with the importance of solving mathematical problems in the world of mathematics education, educators must certainly strive for students to achieve optimal results in mastering problem solving skills. Various efforts can be made by the teacher, including by providing good learning media, or by providing appropriate teaching methods for students. One of The way to improve problem solving skills is to use Lesson Study for Learning Community (LSLC) based learning. LSLC is different from the concept of lesson study. Lesson study for learning community, emphasizes the study of how students learn and collaborate, compared to the study of how teachers teach and master the material (Rosdiana, 2018: 32). Broadly speaking, students learn in the following aspects: 1) do (work in groups/individually), 2) speak up, 3) ask/question/discussion, and 4) listen (Hobri, 2016). The elements of lesson study for learning community used in this research are collaborative learning and caring community. In collaborative learning, students are encouraged to work together with a group of friends, while the caring community, students are trained to care for each other in group activities. Mathematical logical intelligence is related to one's thinking ability in calculating, understanding, analyzing, and solving mathematical problems. Someone who can solve problems easily then that person has mathematical logical intelligence.

Problem solving abilities need to be studied further to find out how problem solving abilities are for each student with different learning styles. In order for the description of students' problem solving abilities to be known better, in this study students were directed to use the problem solving stage given through LSLC learning. Based on the description above, further research is needed on the Analysis of Students' Mathematical Problem Solving Ability in Lesson Study for Learning Community-based learning based on student learning styles. This research is expected to be an in-depth study of Students' Mathematical Problem Solving Ability in Lesson Study for Learning Community-based learning based on student learning styles which aims to determine the level of students' mathematical problem solving abilities in terms of learning styles after the implementation of Lesson Study For Learning Community Learning on students SMA Muhammadiyah 1 Medan.

LITERATURE REVIEW

1. Analysis

According to the Big Indonesian Dictionary, "Analysis is the decomposition of a subject from its various parts and the study of the parts themselves and the relationship between the parts to obtain a proper understanding and understanding of the meaning of the whole". According to Nana Sudjana (2016: 27) that "Analysis is an attempt to sort an integrity into elements or parts so that the hierarchy and or composition is clear". According to Abdul Majid (2013: 54) that "Analysis is (the ability to describe) is to break down the unit into separate units, divide the unit into sub-sections or parts, distinguish between the same two, select and identify the differences (among several which are in one unit). unity)". According to (Priyatno, 2016) that "Analysis is an activity to calculate the data that has been collected so that it can be presented systematically and can be interpreted. Data analysis in quantitative research can be calculated manually by calculating using statistical formulas or using statistical aid programs such as SPSS, Minitab, XL-Stat, S-Plus, etc. " From some of the opinions above, it can be concluded that analysis is an activity to find new findings on the object to be studied or observed by researchers by finding accurate evidence on the object.

2. Problem Solving in Mathematics

Most Mathematics Education experts state that the problem is a question or question that must be answered or responded to. But they also stated that not all questions or automatic questions would be a problem. A question will become a problem only if it shows a challenge that cannot be solved by a routine procedure that is already known to the perpetrator, as stated by Cooney, et al below: "...for a question to be a problem, it must present a challenge that cannot be resolved by some routine procedure known to the student" (Shadiq, 2014:8). The meaning of the above definition, the inclusion of challenges and not knowing the routine procedures for a question that will be given to students will determine whether or not a question is categorized as a "problem" or just an "ordinary question". A question will be categorized as a problem only if the perpetrator does not know the steps to solve the problem.

In addition, Hudojo (2005:127-128) said that a question is a problem depending on the individual and time. That is, a question is a problem for students, but may not be a problem for other students. Likewise, the question is a problem for a student at one time, but is no longer a problem for the student at the next time, if the student already knows the method or process of getting the solution. Therefore, teachers need to be careful in determining the questions or questions that are presented as problems.

3. Problem Solving Ability in Mathematics

Ability according to the KBBI can be interpreted as ability, intelligence or skill. Furthermore, problem solving is the process of applying previously acquired knowledge and skills into new, unfamiliar situations. This is in line

with the opinion of Patnani (2013: 133) Problem solving is a complex cognitive skill, and perhaps the most intelligent human ability. Problem solving is needed when an individual has a desire to achieve a certain goal and that goal has not been achieved

Conney states that teaching problem solving to students allows students to be more analytical in making decisions in their lives. In other words, if students are trained to solve problems, they will be able to make decisions, because students have become skilled in how to collect relevant information, analyze information, and realize how important it is to re-examine the results they have obtained (Hudojo, 2010). 2005: 130).

NCTM revealed that, solving problems is not only a goal of learning mathematics but also a major means of doing so. ... In everyday life and in the workplace, being a good problem solver can lead to great advantages. ... Problem solving is an integral part of all mathematics learning. That is, solving problems is not only the goal of learning mathematics but also the main means of doing so, in everyday life and in the workplace, being a good problem solver can provide great benefits, problem solving is also a part of all mathematics learning (Pehkonen, 2007:1).

Koray also said that, *problem solving skills are essential to success in a range of activities in everyday life. Graduates with strong problem-solving abilities are life-long learners that are able to critically analyze complex problems*, which means problem solving skills are essential for success in various activities in everyday life. Graduates with good problem solving skills can critically analyze complex problems. For that reason, NCTM states that problem solving is the key to learning mathematics (Pratama, 2016: 806).

4. Learning Style

Learning styles can be defined in various ways way, depending on the perspective of each person. The following are some definitions of learning styles. Dunn and Dunn, as quoted by Cavas (2010: 48), define learning style as a person's way of concentrating, processing, and mastering new and difficult information at the time of learning. According to Felder as quoted by Sengul, et al. (2013:1), learning style is the tendency of students to collect and organize information. Honey and Mumford as quoted by Aljaberi (2015: 154), state that learning style is something that describes attitudes and behavior in learning. Based on some of the opinions above, it can be concluded that learning style is a person's way of collecting and mastering new and difficult information during the learning process.

RESEARCH METHOD

This qualitative descriptive research was carried out at SMA Muhammadiyah 1 Medan with class XI MIA research subjects. This research was carried out in the 2020/2021 school year. The subjects in this study were students of class XI MIA, totaling 36 students. Data collection techniques used are Learning Style Questionnaire, Problem Solving Ability Test, and interviews. Learning Style Questionnaire was used to classify students into types of learning styles (Diverger, Converger, Assimilator, Accommodator), problem solving ability tests and interviews were used to obtain information about students' problem solving abilities. Then the data analysis technique used using the steps of Miles and Hubner (in (Sugiyono, 2015: 337)) including data reduction, data presentation, drawing conclusions. To check the validity of the data, the researcher used instrument validation on each data to be used, the researcher used a problem-solving ability test as a reference and continued interviews to confirm the results of the tests that had been carried out so that the data obtained was more accurate. The subjects in this study were taken based on the type of learning style, where each type of learning style was represented by 2 students. Subject selection is based on the dominant score that represents each type of learning style.

RESULTS AND DISCUSSION

1. Research Results

The results of the learning style questionnaire, it was found that students occupying each Kolb & Kolb learning style. The number of students classified into the Accommodator learning style is 7 students (19.4%). There are 14 students classified in the Diverger learning style (38.8%). There are 10 students classified into the Assimilator learning style (27.7%). There are 5 students who are classified into the Converger learning style (13.8%).

The student's mathematical problem solving ability test consists of 6 questions in the form of descriptions with Sequence and Series material. From the results of the validation and testing of the instrument, it was found that the 6 questions could be used without revision, were valid and reliable with a very high category. The student's mathematical problem-solving ability test will be held on Thursday, August 19, 2021 for 90 minutes. The mathematical problem solving ability test was carried out by students individually and honestly and was directly supervised by the researcher. The level of students' mathematical problem solving abilities can be seen in Table 1. below.

Table 1. Ability Level of Students' Mathematical Problem Solving Ability

Value Interval	The number of students	Percentage	Assessment criteria
0 SKBKM < 50	20 people	55.55%	Low
50 SKBKM < 80	13 people	36.11%	Currently
80 SKBKM 100	3 people	8.3%	Tall

Description:

SKPMM = Student's Mathematical Problem Solving Ability Score

2. Discussion

Based on the results of the study, it was found that from 36 students of class XI MIA, students classified into the Accommodator learning style were 7 students (19.4%). There are 14 students classified in the Diverger learning style (38.8%). There are 10 students classified into the Assimilator learning style (27.7%). There are 5 students who are classified into the Converger learning style (13.8%). From the results of the classification of learning styles, it is clear that there are more divergent learning styles than other learning styles. However, the divergent learning style is not the learning style that gets the highest score in the problem-solving ability test, but the converger learning style that gets the highest score in the mathematical problem-solving ability test. The results of this study are the same as the results of Peker's (2009) study which found that the existence of a learning style with the highest percentage score in problem solving ability among other learning styles is the converger learning style. Peker (2005) and Peker & Mirasyedioglu (2008) have found that the number of students with divergent and accommodator learning styles is less than the number of students with converger and assimilator learning styles. The same thing was found in Cavas' research (2010) that the converger and assimilator learning styles had higher scores in problem solving abilities than other learning styles.

The results of this study are equivalent to several previous studies where the converger learning style has a higher value in problem solving ability than other learning styles. Meanwhile, the number of students with accommodator and diverger learning styles has lower scores than students with converger and assimilator learning styles. Thus, this study can be said to support the relevant literature.

In this study, the converger style has the most dominant presence percentage compared to other learning styles. Kolb & Kolb (2005) stated that students who have a converger learning style prefer tasks and problems that are technical in nature rather than social problems and interpersonal problems. The greatest strength of the converger student lies in the practical application of ideas. Mathematics is basically a lesson that can be applied in everyday life where converger students are very challenged to see it through Mathematics lessons. Kolb & Kolb (2005) also stated that students who have an assimilator learning style are less focused on people and more interested in abstract ideas and concepts. Assimilator students like mathematics because mathematics is a collection of abstract concepts. This is different from students who have a divergent learning style. According to Kolb & Kolb (2005), students who have a divergent learning style have an interest in culture.

CONCLUSION

The number of students classified into the Accommodator learning style is 7 students (19.4%). Students classified in the Divergent learning style amounted to 14 people (38.8%). There are 10 students classified into Assimilation learning style (27.7%). There are 5 students who are classified into Convergent learning styles (13.8%). From the results of the classification of learning styles, learning styles diverge more than other learning styles. However, the divergent learning style is not the learning style that gets the highest score in the problem-solving ability test, but the convergent learning style that gets the highest score in the mathematical problem-solving ability test.

BIBLIOGRAPHY

- Aljaberi, N. M. 2015. University Students' Learning Styles and Their Ability to Solve Mathematical Problems. *International Journal of Business and Social Science*, Vol 6, No. 4 (1), 152-165.
- Kolb, D A. 2011. *Experiential Learning Theory: A dynamic, Holistic Approach to Management Learning, Education, and Development*. London: Sage Publications.
- Bhat, M. A. 2014. *The Effect of Learning Style on Problem Solving Ability among High School Students*. *International Journal Advances in Social Science and Humanities*, 2 (7), 1-6.
- Bahar, H. H. & Sulun, A. 2011. *The Learning Styles of Prospective Science Teachers, The Correlation between Learning Styles and Gender and Academic Achievement by Learning Styles*. *Kastamonu Education Journal*, 19 (2), 379-386.
- Balim, A. G. 2009. *The Effects of Discovery Learning on Students' Success and Inquiry Learning Skills*. *Egitim Arastirmalari-Eurasian Journal of Educational Research*, 35, 1-20.
- Bell dan Shadiq. 2014. *Pembelajaran Matematika: Cara Meningkatkan Kemampuan Berpikir Siswa*. Yogyakarta: Graha Ilmu
- Carson, J. 2007. A Problem With Problem Solving: Teaching Thingking Without Teaching Knowledge. *The Mathematics Educator Journal*, 17 (2), 7-14.

- Cavas, B. 2010. A Study on Pre-service Science, Class, and Mathematics Teachers's Learning in Turkey. *Science Education International Journal*. 21 (1), 47-61.
- Darminto, B. P. 2010. *Peningkatan Kreativitas Dan Pemecahan Masalah Bagi Calon Guru Matematika Melalui Pembelajaran Model Treffinger*. Makalah dipresentasikan pada Seminar Nasional Matematika dan Pendidikan Matematika. Yogyakarta, 27 November 2010.
- Dewanti, S. S. 2011. *Mengembangkan Kemampuan Berpikir Kritis Mahasiswa Pendidikan Matematika Sebagai Calon Pendidik Karakter Bangsa Melalui Pemecahan Masalah*. Prosiding Seminar Nasional Matematika. Surakarta: Universitas Muhammadiyah Surakarta.
- Dinata, Yuwono Marta. 2015. *Arduino Itu Mudah*. Jakarta : PT. Alex Media Komputindo.
- Dunbar, K. & Fugelsang, J. 2006. *An Introduction to Cognitive Psychology*. Toronto: Department of Psychology, Toronto University.
- Effendi, L. A. 2012. Pembelajaran Matematika dengan Metode Penemuan Terbimbing untuk Meningkatkan Kemampuan Representasi dan Pemecahan Masalah Matematis Siswa SMP. *Jurnal Penelitian Pendidikan Universitas Pendidikan Indonesia*, 13 (2) , 1-10.
- Gloria. 2015. Penerapan Pendekatan Keterampilan Proses Dalam Mengajarkan Biologi Untuk Mengetahui Hasil Belajar Siswa Pada Pokok Bahasan Ekosistem Kelas VII Di SMPN 1 Talun. *Jurnal Scientiae Educatia*, 2(1): 76
- Hasratuddin. 2015. *Mengapa Harus Belajar Matematika*. Perdana Publishing: Medan.
- Hudojo, H. 2005. *Pengembangan Kurikulum dan Pembelajaran Matematika*. Malang: Universitas Negeri Malang.
- Ibrahim dan Nur Hidayati. 2014. Pengaruh Model Pembelajaran Teams Games Tournament (TGT) Terhadap Peningkatan Kemampuan Pemecahan Masalah Matematika Ditinjau dari Kemampuan Awal siswa Sma Negeri 1 Seyegan. *Jurnal Agri Sains* 5(2) : 115-136. ISSN : 2086-7719.
- Kurniawan, H. 2015. Analisis Keterampilan Pemecahan Masalah Pada Pembelajaran Matematika. *Prosiding Seminar Nasional Pendidikan November 2015*. ISBN: 978-979-3456-52-2.
- Kolb, D A. 1984. *Experiential Learning: Experience as The Source of Learning and Development*. Prentice Hall, Inc: New Jersey. Kolb,
- National Council of Teachers of Mathematics (NCTM). 1989. *Curriculum and Evaluation Standards for School Mathematics*. Reston. VA: NCTM
- National Council of Teachers of Mathematics (NCTM). 2000. *Principles and Standars for School Mathematics*. Reston, VA: NCTM
- OECD. 2016. *PISA 2015 Results in Focus*. Diambil dari <https://www.oecd.org/pisa/pisa-2015-results-in-focus.pdf>
- Peker, M. 2009. Pre-Service Teachers' Teaching Anxiety about Mathematics and Their Learning Style. *Eurasia Journal of Mathematics, Science & Technology Education*, Vol. 5 (4), 335-345.
- Peker, M. & Mirasyedioglu, S. 2008. Pre-Service Elementary School Teachers' Learning Styles and Attitudes towards Mathematics. *Eurasia Journal of Mathematics, Science & Technology Education*. 4 (1), 21-26.
- Sengul, et al. 2013. Learning Styles of Prospective Teachers: Kocaeli University Case. *Journal of Educational and Instructural Studies*. 3 (2), 1-12.
- Sugiyono. 2016. *Metode Penelitian Kuantitatif, Kualitatif, Dan R&D*. Bandung: Alfabeta.