

Mathematical Problem Solving Ability in Indonesia

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Article Info	Abstract
Received January 19, 2022	This study aims to provide knowledge and references to researchers as a basis that will be used in further research. The method used is the Systematic Literature Review (SLR), which identifies, classifies, and categorizes certain topics related to research on students' mathematical problem solving abilities in Indonesia. The data used are 33 articles that have SINTA 1 and SINTA 2 accredited criteria, such as in the journals AKSIOMA and KREANO, which were taken within the last 3 years, namely 2019 to 2021. The data are grouped into 6 discussions, namely a list of journal names, year published articles, methods used, research subjects, teaching materials used, and research results. In most articles, the most widely used research method in qualitative research methods, and the research subject is 8th grade of junior high school. It was also found that 10th grade of senior high school, 11th grade of senior high school, and 10th grade of vocational high school were also research subjects. While the material in the research is mostly found about constructing flat side spaces.
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INTRODUCTION

Problem solving in mathematics is a skill that must be possessed because one indicator of success in learning mathematics is the ability to solve problems (Dewi, 2018; Septian et al., 2021). As stated by Mulyati (2016), problem solving is one of the skills that must be mastered by students after learning mathematics. This ability is needed by students, related to the needs of students to solve the problems they face in everyday life and be able to develop themselves. Mathematical problem solving ability is a real effort in order to find solutions or ideas regarding the goals to be achieved (Koenigstein et al., 2020; Legowo et al., 2019). Mathematical problem solving ability is an ability to solve problems using appropriate procedures.

In problem solving ability, there are several steps put forward by experts. One of them is proposed by polya. The stages of problem solving based on polya steps are as follows. First, understand the problem (understanding the problem). At the stage of understanding the problem, students need to identify what is known and asked about the problems presented. Second, make a plan (devising plan). At this

stage, students need to make a strategy or plan by transforming the problem in the form of mathematical modeling. Third, carry out the plan (carrying out). At this stage, what is done depends on what has been planned in the previous stage. Fourth, check back (looking back). At this stage the things to pay attention to is to re-check the results obtained and prove that the answers obtained are correct, then conclusions are made (Rachmawati & Adirakasiwi, 2021; Son, Darhim, & Fatimah, 2020).

Research on mathematical problem solving abilities has been widely carried out in Indonesia. This is done in an effort to improve quality mathematical problem solving ability in Indonesia. There are several things that are usually investigated, such as examining the effect of a learning model on mathematical problem solving abilities, analyzing mathematical problem solving abilities, applying a model in an effort to improve mathematical problem solving abilities and others. Some examples of published research articles include, "Analysis of Mathematical Problem Solving Ability of High School Students" (Rachmawati & Adirakasiwi, 2021), "The Influence of Pair Checks Learning Model Based on Problem Submission Tasks on Students' Mathematical Problem Solving Ability" (Yuli, Siswono, & Ekawati, 2020), "The Effect of Reciprocal Teaching on Mathematical Problem Solving Ability in terms of Students' Self-Efficacy" (Chotima, 2019), "Description of Mathematical Problem Solving Ability of Class VIII Students on Timss Problems in terms of Initial Ability" (Prasetyo & Ramlah, 2021), "Mathematical Problem Solving Ability in View of Gender Differences" (Lestari et al., 2021), and many more.

From the results of the literature review conducted, there are many research articles that discuss students' mathematical problem solving abilities, with various levels of education, and learning materials and methods. Research using the SLR method on problem solving abilities has also been widely used by researchers. With this, we would like to analyze and classify 33 articles that have been published in 8 mathematics education journals indexed by SINTA 1 and SINTA 2 in the last 3 years, to obtain a comprehensive classification of research on mathematical problem solving abilities of students in Indonesia using the SLR method. . However, there are some differences in research conducted by other researchers, with research conducted by us, the differences include, research conducted by other researchers has problems that are focused on one problem, while our research discusses many problems from various articles that have been published. we are looking for.

From the results of this study, researchers can contribute in providing detailed information about trends in research on the problem solving ability of students in Indonesia. The trend in question is, the research method used, the learning materials used, the learning model, the focus of the problem, the content and context used in the research.

RESEARCH METHODS

The method used is the SLR method. SLR research is carried out for various purposes, including identifying, reviewing, evaluating, and interpreting all available research with topic areas of interest to phenomena, with certain relevant research questions (Triandini et al., 2019). Systematically, the researcher collected

journal articles from SINTA 1 and SINTA 2. The keyword was Indonesian Student Mathematical Problem Solving. The articles collected were only articles published in the period 2019 to 2021. From various articles, researchers selected 33 articles that were closely related to the keywords used. The next step, articles related to Indonesian Mathematical Problem Solving are grouped into 6 discussions, namely based on a list of journal names, year of publication of articles, methods used, research subjects, teaching materials used and research results. Categorization of most/majority based on the highest number.

RESULT AND DISCUSSION

Name of Journal of Mathematical Problem Solving Ability in Indonesia List of Journal Names on Mathematical Problem Solving Ability. The highest number of articles is in the AKSIOMA Journal while the lowest number of articles is in the Journal on mathematical education and Educandum: Jurnal Pendidikan Dasar dan Pembelajaran. The highest number of articles is in the AKSIOMA Journal with 15 articles. The lowest number of articles was found in the Journal of Mathematical Education and Educandum: Jurnal Pendidikan Dasar dan Pembelajaran, each of which amounted to 1. The articles in the AKSIOMA Journal were the most because articles on mathematical problem solving abilities were mostly published in the AKSIOMA Journal. The AKSIOMA Journal discusses a lot about journals in the field of mathematics education. The following is shown in Figure 1 of the breakdown by number of publications.

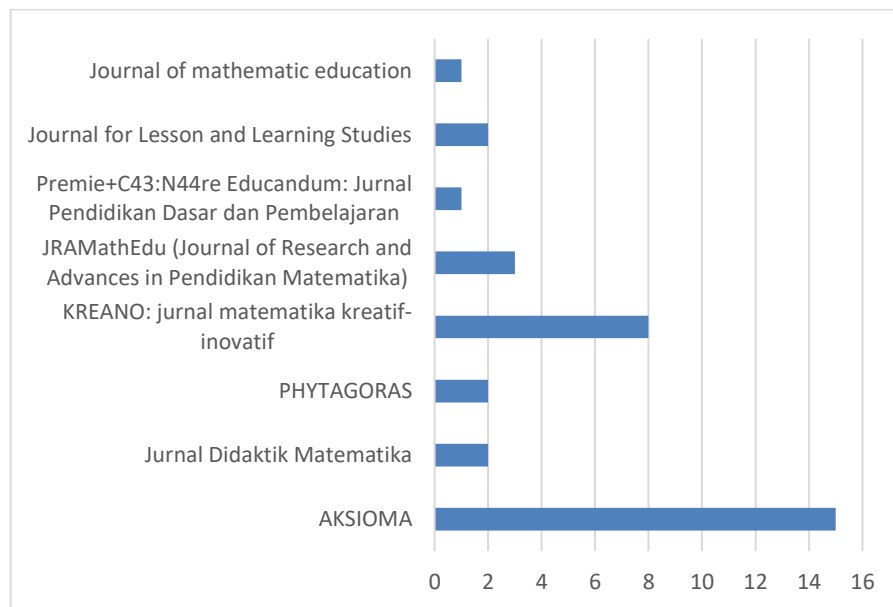


Figure 1. List of Journal Names on Mathematical Problem Solving Ability

There were 8 journals from 2019 to 2021 which did not experience an increasing decline, but there was an increase in the number of articles in 2020, the largest in AKSIOMA, Jurnal Didaktik Matematika, Kreano: Jurnal Matematika Kreatif-Inovatif, JRAMath Edu. But journal publications decreased in 2019. Journals from 2019-2021 are presented in Figure 2.

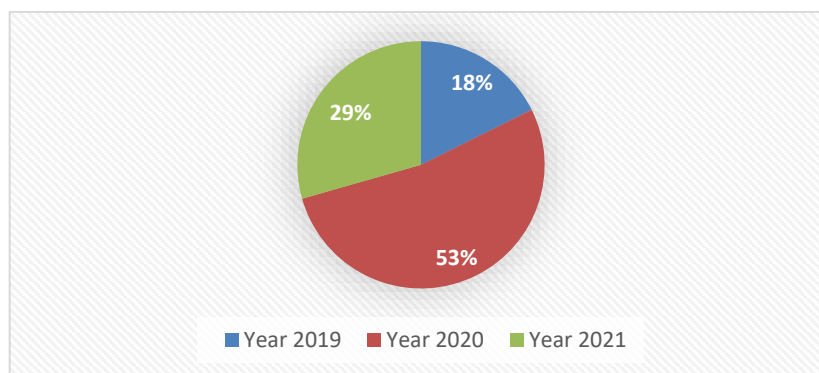


Figure 2. Year of publication of the article about Mathematical Problem Solving Ability

Many problem solving ability articles were published in 2020 because learning that started off face-to-face (offline) became online learning (online) which motivated researchers to solve various problems in education. As written in existing research, it is stated that when conducting interviews in class, students have low problem solving abilities because students are not ready to face math problems due to the lack of students' willingness to learn (Artika & Karso, 2019; Mulyasari, 2018; Septian, Inayah, et al., 2019).

The method used in the Research on the Assessment of Students' Mathematical Problem Solving Ability in Indonesia

Articles on mathematical problem solving abilities in 8 journals are the result of research using various methods. The methods used include qualitative, quantitative, experimental, descriptive, survey, research and development, and case studies.

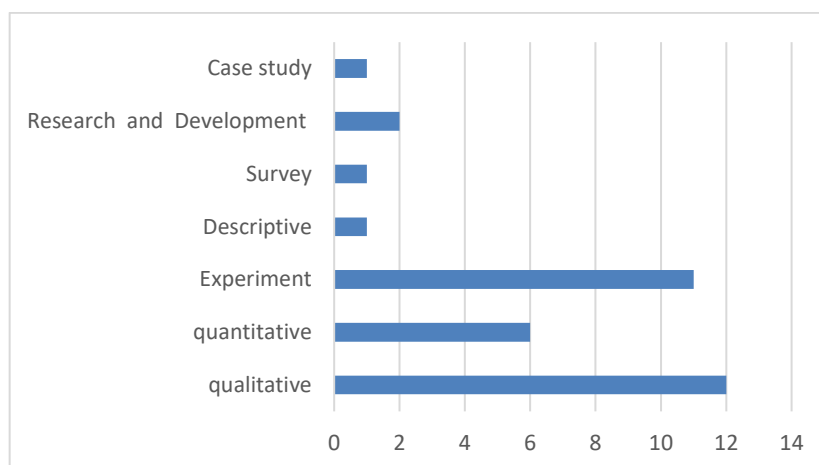


Figure 3. Methods Used in Research Mathematical Problem Solving Ability of Students in Indonesia

The data shows that most of the research on mathematical problem solving abilities using qualitative research methods reaches 12 articles. Research using qualitative methods is found in the journal AKSIOMA and Kreano, then the rest is spread in other journals. In other words, almost all journals on mathematical problem solving ability use qualitative methods. The second research method used by the researcher is the experimental method. The number of articles using the

experimental method in the AKSIOMA journal is 5 articles, Kreano is 2 articles and the others are 1 article each. The third largest research method is the quantitative method with a total of 5 articles. The fourth research method is research and development with 2 articles. The fifth, sixth and seventh largest research methods are descriptive, survey, and case studies with 1 article each. The above statement is listed in Figure 3.

Qualitative research methods are widely used in articles about research on the assessment of students' mathematical problem solving abilities in Indonesia. This is because qualitative methods allow researchers to examine selected issues, cases or events in depth and detail, facts in the form of data collections are not limited by predetermined categories. Furthermore, qualitative methods help provide rich descriptions of phenomena. Qualitative encourages understanding of the substance of an event. Thus, qualitative research is not only to fulfill the researcher's desire to get an overview/explanation, but also to help get a deeper explanation (Ardianto, 2019). Thus, in qualitative research, researchers need to equip themselves with adequate knowledge related to the problems to be researched.

Research Subjects Assessment of Students' Mathematical Problem Solving Ability in Indonesia

Articles on mathematical problem solving abilities have varied research subjects. There were 8 research subjects including fourth grade elementary school students, 7th grade of junior high school, 8th grade of junior high school, 10th grade of senior high school, 11th grade of senior high school, 10th grade of vocational high school, university students, and others mentioned. The majority of the subjects of this study were students of 8th grade of junior high school from 11 articles.

The research was dominated by 8th grade of junior high school, for example the problem found in the research conducted by Jana and Fahmawati (2020) that students' mathematical problem solving abilities were still very low. Students are still very difficult to work on problems in the form of problems. Students also have difficulty in what steps to take first to solve the problem. Then 7th grade of junior high school is contained in 6 articles. Research subjects that are rarely used are 10th grade of senior high school, 11th grade of senior high school, 10th grade of vocational high school, each of which is in 1 different article. The research subject of the Assessment of Students' Mathematical Problem Solving Ability in Indonesia can be seen in Figure 4.

The study was dominated by 8th grade of junior high school because many mathematical problems were found at the 8th grade junior high school level, for example the problems found in the research conducted by Jana and Fahmawati (2020) that students' mathematical problem solving abilities were still very low. Students still have difficulty working on problems in the form of problems (Parlina, Septian, & Inayah, 2021; Septian, Komala, & Komara, 2019). Students also find it difficult what steps to take first to solve the problem (Jana & Fahmawati, 2020). Likewise, research conducted by (Yuli et al., 2020), states that Based on preliminary studies obtained from mathematics teachers in 8th grade of junior high school that there are still many students who have not reached the KKM set by the school, which is 60.

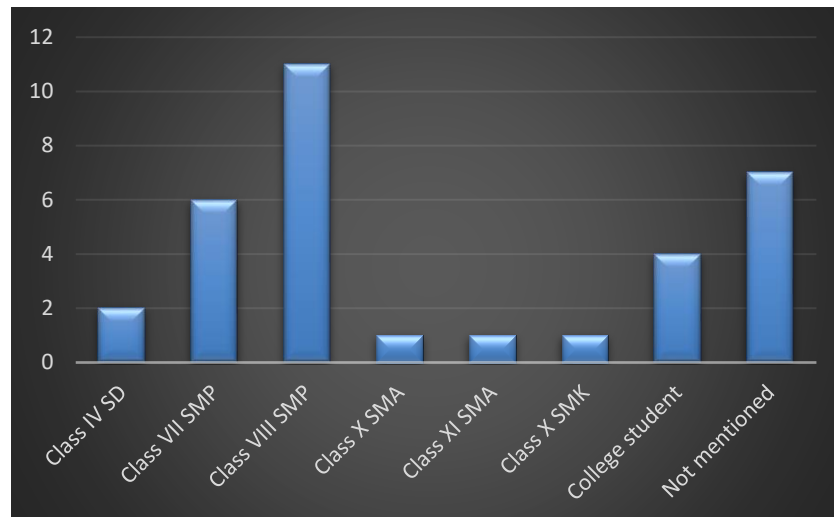


Figure 4. Research Subjects of Student Ability Assessment in Indonesia in Solving Mathematical Problems

Teaching Materials used in Research on the Assessment of Students' Mathematical Problem Solving Ability in Indonesia

The use of teaching materials in research on the assessment of mathematical problem solving abilities varies widely, namely the material of flat side shapes, trigonometry, cubes and blocks, social arithmetic, integral calculus, functions, matrices, exponentials and logarithms, elementary mathematics, number operations and geometry, pythagoras, calculus, two-variable system of linear equations, variable solving, mathematical statistics. Then the research on the assessment of mathematical problem solving abilities that used certain teaching materials amounted to 19 articles compared to those that did not mention certain teaching materials which only amounted to 14 articles.

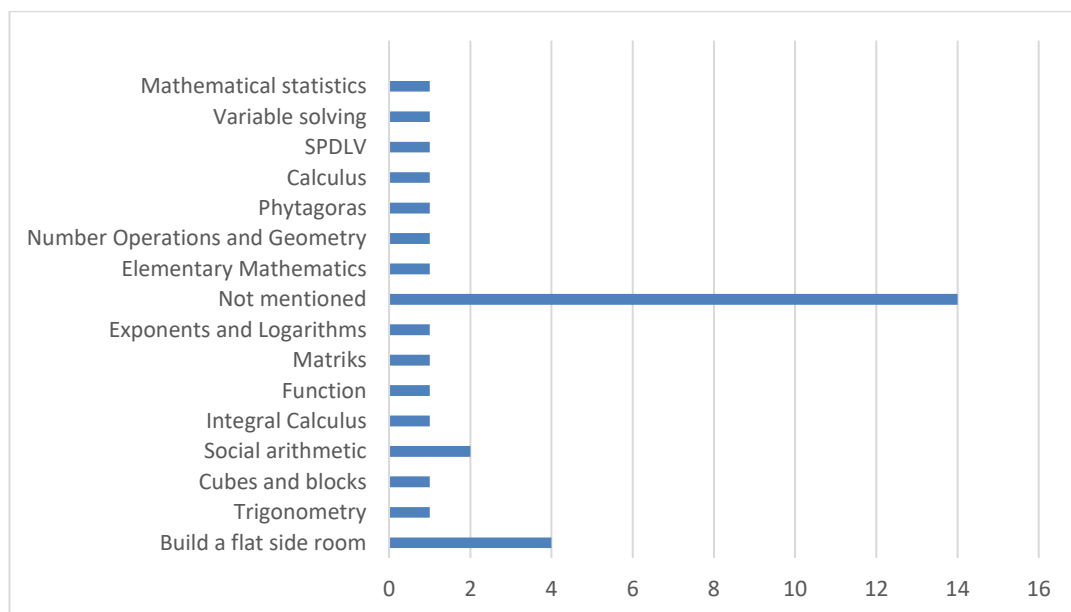


Figure 5. Teaching Materials used in Assessment Research Mathematical Problem Solving Ability of Students in Indonesia

The teaching materials used in the research on the assessment of mathematical problem solving abilities are listed in Figure 5. The material that is widely used from several articles on mathematical problem solving abilities is spatial structure, because the material is deepened in the 8th and 9th grade of junior high school. Which the researchers collected were dominated by the junior high school level. The material for building space in 8th grade of junior high school is contained in Chapter 8 concerning Constructing Flat Side Spaces, and in 9th grade of junior high school it is contained in Chapter 6 concerning Constructing Curved Side Spaces.

Research Results on Articles About Mathematical Problem Solving Ability

The results of research on articles about mathematical problem solving abilities. Most of the research results have a good influence on mathematical problem solving abilities. The results of the study showed that the ability to solve mathematical problems was low. From 33 articles there are 12 articles which show that research has a good influence on mathematical problem solving and there is 1 research article which shows that the subject has low mathematical problem solving abilities. The results of the research on the assessment of mathematical problem solving abilities in Indonesia are listed in Figure 6.

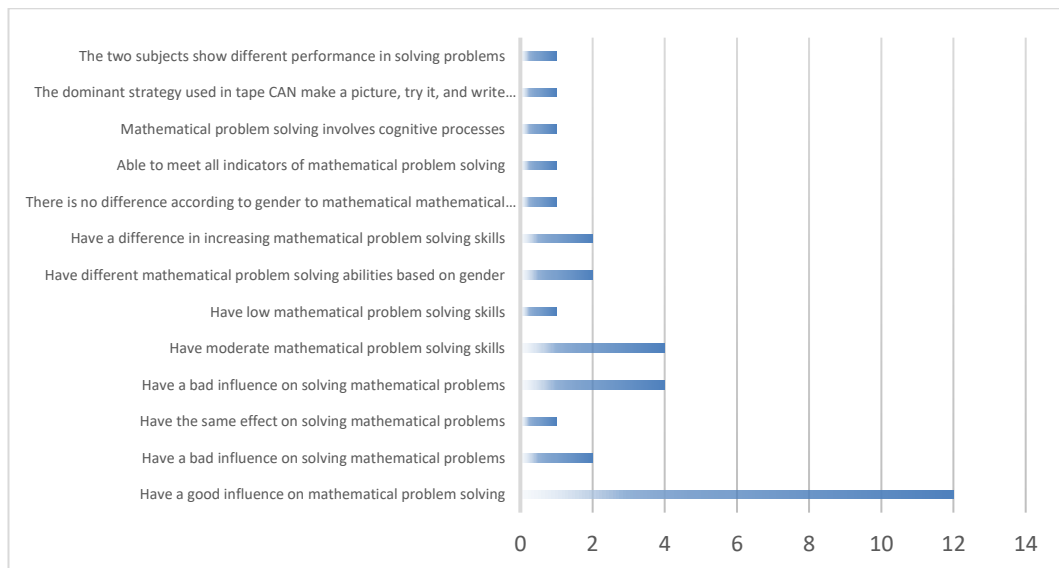


Figure 6. Assessment Research Results
Mathematical Problem Solving Ability in Indonesia

The results show that the mathematical problem solving ability that has been studied has a good effect on various school circles, especially for Junior High School students, as seen in the research conducted by Nuraini, Maimunah, and Roza (2020), stating that based on the analysis of the results of the validity and practicality of the research This is a mathematics learning tool in the form of Syllabus, RPP, LKPD and Mathematical Problem Solving Ability Problems in the Problem Based Learning model that have met the valid and practical criteria, so it is stated that these devices can be used in learning mathematics on social arithmetic material.

Research Articles on Assessment of Student Mathematical Problem Solving Ability in Indonesia during 2019-2021

A total of 33 research articles on mathematical problem solving abilities in Indonesia from 8 journals accredited by the Science and Technology Index (SINTA) which assess the performance of journals based on accreditation and citation standards, by indexing all national journals that have been accredited by the National Journal Accreditation (ARJUNA). All published journals must be available online or have an E-ISSN (online ISSN) so that articles can be searched, can be checked transparently, especially related to plagiarism or so that there is no overlap in scientific development, and improve reading power (journals are proven to have attractiveness to read and cite).

CONCLUSION

Researchers have summarized the 33 articles listed in the table, then grouped them into 6 discussions, namely a list of journal names, year of publication of articles, methods used, research subjects, teaching materials used and research results. Most of the articles on research on mathematical problem solving abilities were found in the journals AKSIOMA and KREANO, with the most widely used research method being qualitative research methods. The majority of the research subjects were 8th grade of junior high school, but it was also found that 10th grade of senior high school, 11th grade of senior high school, 10th grade of vocational high school were also the subjects of this research. Most of the materials used in the research on the assessment of mathematical problem solving abilities in Indonesia are flat-sided shapes. The results of this study can serve as information and reference material for researchers as a basis that will be used in further research.

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