

Skills in Solving Mathematical Problems in the Statistics Subject Using Interactive Multimedia in Grade VI of Elementary School

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ABSTRACT

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Problem-solving skills are one that students shall have in learning mathematics. To assist students in developing problem-solving skills, Information and Communication Technology (ICT) may be used, one of which is interactive multimedia. Therefore, this research aims to use interactive multimedia to describe students' mathematical problem-solving skills in statistics at the elementary school level. This research uses descriptive qualitative research with a case study model. Research subjects aged 11-12 years in collecting data, the researcher used an instrument for performance indicators and then strengthened interviews (unstructured) with educators and students. Then analyzed using an In this study, researchers used the theory of Miles and Huberman. Overall, the analysis of students' problem-solving skills is already very skilled. It has been proven that almost all students achieve performance indicators, namely, capable of understanding the problems presented, carrying out solution planning, solving problems according to plan indicators, and conducting re-examinations to re-examine them. This research implies that teachers can apply interactive multimedia to increase student activity in learning.



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A. INTRODUCTION

Mathematics learning in elementary schools is not only aimed at increasing the ability of students to count or apply formulas in solving problems, but at improving the problem-solving skills of students as well, both in mathematical problems and other problems which use mathematics to solve them (Al-Kharousi & Al-Abed, 2021) This ability is necessary for students because it is related to the needs of students to solve the problems they face in daily life and to be able to develop themselves.

Therefore, problem-solving skills require special attention in the mathematics learning process from the most basic level of formal education, which is elementary (Mulyati, 2016). Several definitions of problem-solving in mathematics, including the one from (Hendriana et al., 2018), stakadarsihte that mathematical problem solving is one of the essential goals in learning mathematics; even solving mathematical problems is the core of mathematics. Mathematical problem solving is a critical skill for teaching mathematics. Hence it helps help

individuals develop their analytical thinking skills, assists students in becoming critical and creative, and improves other mathematical abilities (Riati & Farida, 2017; Surya et al., 2016).

Problem-solving is how an unknown situation is solved (Darkis, 2020a). Such conditions cause students to be not determined as desired or challenging to achieve goals (Schunk, 2013). Armed with the essential skills students already have, there are various unique ways or strategies to solve problems. With this view, everyone has a different way of finding the correct answer (Bradshaw & Hazell, 2017). Teachers shall be prepared to accept different ways of working towards the solutions. Problem-solving is essential for students because students become more critical in analyzing problems with this approach (Lee Swanson et al., 2021). There are countless types of questions and their solving strategies as us; students must be ready and able to understand the situation well. According to (Muzanni & Muhyadi 2016), teachers in learning settings have to prepare students to be competent in memorizing and skilled in solving everyday problems faced by students.

Currently, the learning process in elementary schools is carried out in a limited face-to-face learning manner; with the present limitation on learning time, an effective learning media is required in delivering messages or information. The Regulation of the Minister of Education and Culture No. 22 of 2016 states that one of the learning principles is utilizing Information and Communication Technology (ICT) (Kemendikbud, 2016). One of the flexible, innovative, and interactive learning media is multimedia which various media such as text, images, sound, animation, video, etc. Numerous media, including books, pictures, and videos can help teaching and learning activities.

In the current implementation of learning, teachers may no longer be the sole provider of information or a source of information for students. The present conditions require teachers to use learning media that utilizes technology as optimally as possible to ease learning activities during the pandemic. Teachers need media assistance which may be used as learning resources and media for delivering learning information, or learning media that are effective and efficient during learning material within students can't happen in just a short time. In comprehending a material, students have to learn. Thus, the teacher must do something to direct students in learning during the learning process. The use of media connects the teacher's concepts and the student's process knowledge. It is functional, but the media can attract students' interest. Therefore, interactive multimedia is suitable to be implemented in learning mathematics.

The results of previous research conducted by (Kusumaningpuri et al., 2022) on the difficulties of students in working on statistical problems in grade VI of Elementary School, the results state that students have not been able to understand the basic concepts of statistics, communicate issues with mathematical models and conclude. At the elementary school level, statistics subjects are taught in stages starting from grade IV. In grade IV, the subject materials are still on the step of preparation of students in reading data, while for grade V, the material includes collecting and presenting data. At this level, students are not only able to read data but are also able to collect data through several techniques and present it in several ways. Materials in grade VI discuss mode, median, and average or mean topics.

Based on the matters above, the writer will conduct research with Skills in Solving Statistics Problems Using Interactive Multimedia in Grade VI of Elementary School. This study

aims to describe students' mathematical problem-solving skills in statistics subjects at the elementary school level using interactive multimedia. This matter is important to be studied because, in higher-level education, students' problem-solving skills depend on students' learning experience at the elementary level (Suhartono, 2018). In elementary school, mathematical problem solving for VI graders is a basis for teachers and policymakers planning and developing innovative learning to develop mathematical problem-solving skills.

B. METHODS

This research uses descriptive qualitative research with a case study model. The research was conducted at SDIT Majelis Tafsir Al Qur'an (MTA) Matesih in one school, Java Island. The subjects of this research are the students of grade VI, totalling 24 students. Research subjects aged 11-12 years in collecting data, the researcher used an instrument for performance indicators and then strengthened interviews (unstructured) with educators and students. Then analyzed using an inductive model; This model is intended to clarify the process of reducing data to create meaning from the raw data that has been collected. These findings were obtained to interpret the basic information; In the end, the researcher also added observation as an essential source of data triangulation. Data validity was carried out with content validity, technical triangulation, and reference triangulation.

In this study, researchers used the theory of Miles and Huberman (Sugiyono, 2015) to analyze the data, namely: 1) Data reduction (reducing selection and focusing, and changing the data obtained from field notes. In this study, the data were in the form of unstructured interviews and observations distributed to respondents. Then, a summary was made more easily accessible to analyze the data and proceed to the next step 2) Data display (displays compressed data organized from a collection of information so that it is possible to conclude later. In this step, the researcher shows or displays the data according to the data that has been prepared). Obtained and presented sequentially 3) Drawing conclusions (after completing data reduction and displaying the data obtained, the researcher concludes the findings in the field and based on the research problem.

This study used a problem-solving skills instrument, problem-solving, and categorization through an assessment table that was converted based on the scores obtained by learners. The assessment and categorization table details as shown in Table 1.

Table 1. Categorization of Problem Solving Skills

Score Range	Remarks
89 - 100	Very skilled
75 - 88	Skilled
65 - 74	Fairly skilled
49 - 64	Unskilled
< 49	Very unskilled

Modification of Arikunto (2015:281)

C. RESULT AND DISCUSSION

1. RESULT

a. Result of problem-Solving Skill

Before answering the research questions, the researcher first calculates based on the results obtained from the problem-solving skill instrument. In this section, the researcher wants to present the results of the study derived from the interpretation of raw data based on the results of observations that have been shared with learners regarding the findings obtained for further exploration. Starting with the results of the problem-solving instrument, it was found that class VI students showed almost all students showed excellent problem-solving skills reaching 92% or 22 students in class VI. The result of the percentage is presented in Figure 1.

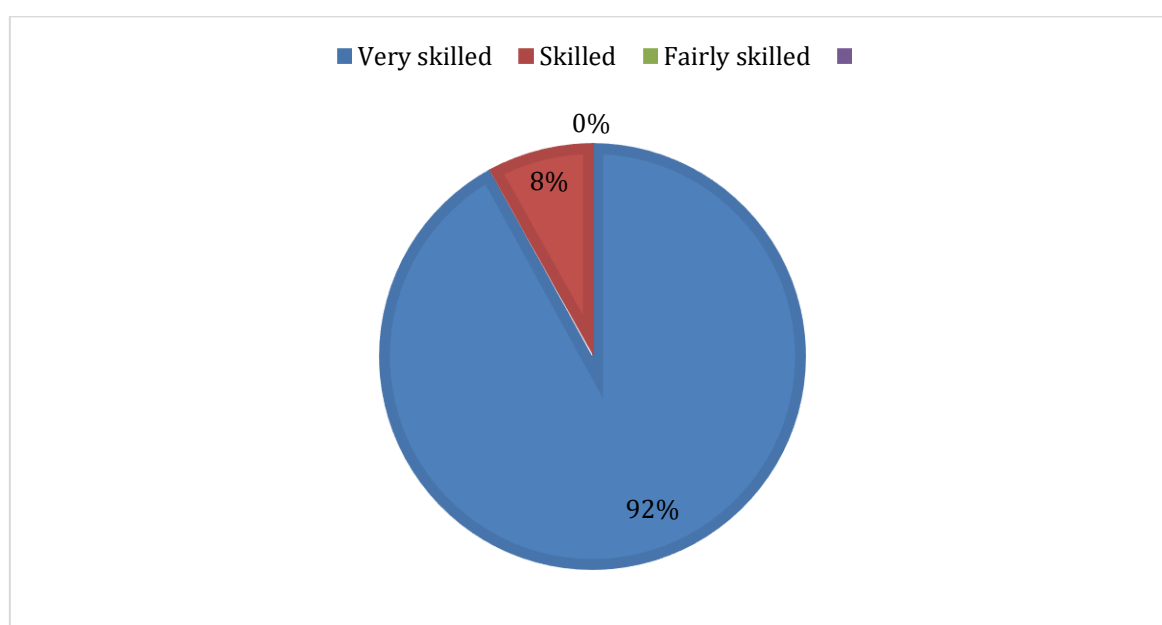


Figure 1. Percentage Results of Analysis of Problem-Solving

b. Result in exploration of problem-solving indicator factors

This finding is corroborated by several causal factors based on the results of instruments and observations, which are the basis for the cause of 92% of students having highly professional problem-solving skills. Based on the results of the device and interview unstructured, it was found that students were skilled in understanding the problems presented (92% met the performance indicators); carried out excellent solution planning (88% met the performance indicators); solved issues according to the plan indicators (88% met the performance indicators) and conducted re-examinations to re-examine (96% met the performance indicators). Thus, overall, class VI students of SD IT MTA Matesih have completed the problem-solving hands well.

2. DISCUSSION

From the findings that have been presented, it can be shown that students can describe the basic knowledge to solve the problem in understanding problems. In preparing a problem-solving plan, students inspect the suitability of the argument with the

implementation of the program made with related expertise in the situation described. In the step of reinspecting the problem-solving results, students go through the process stage to explore interpretations and connections by analyzing the suitability of the results with the achievement of the intended purposes.

Students provide logical reasons for solving problems. In the third stage, critical thinking prioritizes alternatives and communicates the conclusions. Students can compose arguments to solve the issues and prioritize ideas in developing problem-solving plans to understand the problem. In the stage of developing a solution plan, students estimate the formula which is used in problem-solving. The next step is to implement the solution plan through the thinking process stage, prioritizing conclusions by taking decisions and actions by determining the final results and communicating the findings as described in the research results.

A person is said to be critical in problem-solving if he can make decisions and choose ideas among available options (Mughtar et al., 2021). The stage of re-checking the results of problem-solving, this step is carried out after students have completed the whole problem. A critical person means integrating the results obtained and rearranging all visible elements. Integrating requires solid analytical thinking because this may only be performed if one knows all the details. In the interim, students can integrate, monitor, and filter strategies for problem-solving in the steps of understanding the problem, implementing plans, and reinspecting the results of trial solving (Yasa, 2018).

The research results above are relevant to the research by (Hendriani et al., 2021), which states that the skills of the students when solving problems are hampered in the third indicator, which is completing problems with a percentage of 34% (31 students), this is caused by the poor ability of students in processing number operations, the use of formulas and the poor ability of the students to relate the elements that are known in the problem. The results of this study are by the report of the Program for International Student Assessment (PISA); in 2018, out of the 78 participating countries, the Mathematics score of Indonesian students was ranked 72nd. In 2015, Indonesia was ranked 69th out of 79 participating countries. Based on the analysis results, Indonesian students have difficulty solving level 5 questions that require problem-solving skills. Of all participants from Indonesia, only 1% of students were able to complete the level 5 questions (OECD, 2018).

The implementation of interactive multimedia can describe problem-solving skills on statistical subjects. This matter refers to the research results, which contain four indicators, including (1) understanding the problem; (2) planning the solution; (3) implementing the settlement according to the plan, and (4) reinspection. With the help of interactive multimedia, students are trained to build their knowledge independently. Interactive media acts as a tutor which asks questions that guide students to understand concepts. When students answer questions, interactive media will immediately provide feedback. Hence, students can change the answer each time the application judges their response as wrong until the correct answer is obtained. Therefore, students became more active in learning and motivated to complete all the tasks. Moreover, web-based interactive multimedia may make it easier for students to learn independently (Pramesti & Prasetya, 2021). On the use of multimedia, the results show that the average SRL (self-regulated learning) of students is in the medium category and student learning outcomes are adequate. -regulated learning in students causes positive

effects on learning outcomes (Lestari & Wirasty, 2019). Thus, interactive multimedia encourages students to be more independent in learning to improve self-regulation learning abilities and ultimately improve their learning outcomes, enthusiasm, and motivation for learning (Ayuni et al., 2022; Purba et al., 2022).

Learning resources may support the success of learning and increase student learning success (M. Ramadhani et al., 2019). Interactive multimedia is a learning resource with the help of computers to support learning activities. Computers are learning resources that can display student results after studying (Rachmadtullah et al., 2019). Other than computers, interactive multimedia is also used in smartphones or android. Students can learn on their own because students may operate multimedia freely (R. Ramadhani & Muhtadi, 2018)

D. CONCLUSION AND SUGGESTIONS

Overall, the analysis of students' problem-solving skills is already very skilled. It has been proven that almost all students achieve performance indicators. Namely, experience in understanding the problems presented, carrying out solution planning, solving problems according to plan indicators, and conducting re-examinations to re-examine them. This research implies that teachers can apply interactive multimedia to increase student activity in learning. Interactive multimedia is suitable for solving problems. Therefore, teachers can use it in learning activities. For students, the author recommends that students be more careful in performing arithmetic operations so that the results are optimal, and students are accustomed to writing down steps and conclusions after completing the stages of arithmetic surgery. For schools, it is necessary to improve the implementation of various innovative learning models, methods, and media so that the quality of learning is practical and avoids monotony.

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REFERENCES

- Al-Kharousi, A. M., & Al-Abed, A. S. (2021). The effectiveness of a program based on problem-solving in mathematical problem solving among grade ten students. *Journal of Educational, Cultural and Psychological Studies*, 2021(23), 71–88. <https://doi.org/10.7358/ecps-2021-023-khab>
- Ayuni, N. W. D., Putrawan, A. A., & Dewi, K. C. (2022). Strengthening Students' Motivation in Statistics Online Learning Through Interactive Animation Media on Android Smartphone. *Proceedings of the Eighth Southeast Asia Design Research (SEA-DR) & the Second Science, Technology, Education, Arts, Culture, and Humanity (STEACH) International Conference (SEADR-STEACH 2021)*, 627, 108–115. <https://doi.org/10.2991/assehr.k.211229.018>
- Darkis, J. M. (2020). Views and challenges in teaching mathematics of elementary teachers in rural and Urban school districts. *Journal of Critical Reviews*, 7(4), 107-114. <https://doi.org/10.31838/jcr.07.04.19>

- Hendriani, M., Melindawati, S., & Mardicko, A. (2021). Keterampilan Pemecahan Masalah Matematika di Era Revolusi Industri 4.0 Siswa SD. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, 5(2), 892–899. <https://doi.org/10.31004/cendekia.v5i2.477>
- Kadarsih, I., & Fitria, Y. (2022). *Implementation of Learning Using Interactive Multimedia Based on Android On Theme 9 be Class V SD*. 6(1), 57–65. <https://doi.org/10.23887/jisd.v6i1.41651>
- Kusumaningpuri, A. R., Murtiyasa, B., Fuadi, D., & Hidayati, Y. M. (2022). Analisis Kesulitan Matematika Pokok Bahasan Statistika pada Siswa Sekolah Dasar. *Jurnal Basicedu*, 6(1), 933-942. <https://doi.org/10.31004/basicedu.v6i1.2058>
- Lestari, N., & Wirasty, R. (2019). Pemanfaatan Multimedia Dalam Media Pembelajaran Interaktif Untuk Meningkatkan Minat Belajar Siswa. *Amaliah: jurnal pengabdian kepada masyarakat*, 3(2), 349-353. <https://doi.org/10.32696/ajpkm.v3i2.289>
- Lee Swanson, H., Arizmendi, G. D., & Li, J.-T. (2021). Working memory growth predicts mathematical problem-solving growth among emergent bilingual children. *Journal of Experimental Child Psychology*, 201, 104988-104994. <https://doi.org/10.1016/j.jecp.2020.104988>
- Muchtar, F. Y., Nasrah, N., & Ilham S, M. (2021). Pengembangan Multimedia Interaktif Berbasis I-Spring Presenter untuk Meningkatkan Keterampilan Berpikir Kritis Siswa Sekolah Dasar. *Jurnal Basicedu*, 5(6), 5520-5529. <https://doi.org/10.31004/basicedu.v5i6.1711>
- Mulyati, T. (2016). Kemampuan Pemecahan Masalah Matematis Siswa Sekolah Dasar. *EduHumaniora | Jurnal Pendidikan Dasar Kampus Cibiru*, 3(2), 338-324. <https://doi.org/10.17509/eh.v3i2.2807>
- Muzanni, A., & Muhyadi, M. (2016). Pengembangan Perangkat Pembelajaran Problem Solving Mata Pelajaran Ipa Terhadap Hasil Belajar Kognitif Siswa SD. *Jurnal Prima Edukasia*, 4(1), 230-236. <https://doi.org/10.21831/jpe.v4i1.7746>
- OECD. (2018). Programme for international student assessment (PISA) results from PISA 2018. *Oecd*, 1–10.
- Pramesti, C., & Prasetya, A. (2021). Analisis Tingkat Kesulitan Belajar Matematika Siswa dalam Menggunakan Prinsip Matematis. *Edumatica : Jurnal Pendidikan Matematika*, 11(02), 9-17. <https://doi.org/10.22437/edumatica.v11i02.11091>
- Rachmadtullah, R., Zulela, M. S., & Syarif Sumantri, M. (2019). Computer-based interactive multimedia: A study on the effectiveness of integrative thematic learning in elementary schools. 012028- 012034. *Journal of Physics: Conference Series*, 1175(1). <https://doi.org/10.1088/1742-6596/1175/1/012028>
- Ramadhani, M., Gafari, M. O. F., & Marice, M. (2019). Development of Interactive Learning Media on Material Writing Short Story Texts Based on Experience. *Budapest International Research and Critics in Linguistics and Education (BirLE) Journal*, 2(1), 91–102. <https://doi.org/10.33258/birle.v2i1.189>
- Ramadhani, R., & Muhtadi, A. (2018). Development of Interactive Multimedia in Learning Islamic Education. *International Journal of Multicultural and Multireligious Understanding*, 5(6), 9-15. <https://doi.org/10.18415/ijmmu.v5i6.488>
- Riati, T., & Farida, N. (2017). Pengaruh Model Pembelajaran Quantum Learning Terhadap Kemampuan Pemecahan Masalah Matematika Siswa Kelas VIII SMP PGRI 02 Ngajum. *Pi: Mathematics Education Journal*, 1(1), 15-21. <https://doi.org/10.21067/pmej.v1i1.1999>
- Sugiyono. (2015). *Metode Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif, dan R&D)*. . Alfabeta.
- Surya, E., Putri, F. A., & Mukhtar, M. (2016). Improving Mathematical Problem-Solving Ability and Self-Confidence of High School Students Through Contextual Learning Model. *Journal on Mathematics Education*, 8(1), 85-94. <https://doi.org/10.22342/jme.8.1.3324.85-94>

- Yasa, A. D. (2018). Pengembangan Modul Tematik Berbasis Stm (Sains, Teknologi dan Masyarakat). *Jurnal Pemikiran Dan Pengembangan Sekolah Dasar (JP2SD)*, 6(1).21-26. <https://doi.org/10.22219/jp2sd.v6i1.5899>
- Yusuf Al Amin, B. M. (2021). *Analisis Kesulitan Belajar Matematika pada Proses Pembelajaran Daring Menggunakan Metode Pembelajaran Berbasis Masalah*. 5(1). 49-65. <http://dx.doi.org/10.30659/kontinu.5.1.49-65>