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INVESTIGATING PROBLEM-SOLVING SKILLS IN GEOMETRY WORD PROBLEMS: A GENDER PERSPECTIVE IN ELEMENTARY EDUCATION

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Abstract

This study aims to analyze the problem-solving abilities of elementary school students in solving story problems related to spatial geometry, as viewed from gender differences. The approach used is descriptive qualitative, with 128 students from several elementary schools in Muara Bungo City who have studied spatial geometry as the research subjects. The research instrument consists of an essay test designed based on four problem-solving ability indicators, namely: (1) understanding the problem, (2) developing a solution plan, (3) solving the problem according to the plan, and (4) reviewing the results obtained. Data were collected through tests, interviews, and documentation, then analyzed through data reduction, data presentation, and conclusion drawing stages. The research results showed differences in strategies and achievements between male and female students on each indicator. Female students excelled in the indicators of understanding the problem and reviewing the results of their work, with characteristics of high accuracy and consistency in verifying answers. Conversely, male students were more prominent in the indicators of developing a solution plan and solving problems according to the plan, tending to choose quick and practical strategies. These differences reflect the influence of psychological characteristics and thinking styles specific to each gender. These findings are expected to serve as a reference for teachers in designing mathematics learning strategies that accommodate the strengths of both genders so that all students can optimize their problem-solving abilities.

Keywords: problem-solving skills, gender

Abstrak

Penelitian ini bertujuan untuk menganalisis kemampuan pemecahan masalah siswa sekolah dasar dalam menyelesaikan soal cerita materi bangun ruang ditinjau dari perbedaan jenis kelamin. Pendekatan yang digunakan adalah deskriptif kualitatif dengan subjek penelitian sebanyak 128 siswa dari beberapa sekolah dasar di Kota Muara Bungo yang telah mempelajari materi bangun ruang. Instrumen penelitian berupa tes uraian yang disusun berdasarkan empat indikator kemampuan pemecahan masalah, yaitu: (1) memahami masalah, (2) menyusun rencana penyelesaian, (3) menyelesaikan masalah sesuai perencanaan, dan (4) memeriksa kembali hasil yang diperoleh. Data dikumpulkan melalui tes, wawancara, dan dokumentasi, kemudian dianalisis melalui tahapan reduksi data, penyajian data, serta penarikan kesimpulan. Hasil penelitian menunjukkan adanya perbedaan strategi dan capaian antara siswa laki-laki dan siswa perempuan pada setiap indikator. Siswa perempuan unggul pada indikator memahami masalah dan memeriksa kembali hasil pekerjaan, dengan karakteristik ketelitian tinggi dan konsistensi dalam verifikasi jawaban. Sebaliknya, siswa laki-laki lebih menonjol pada indikator menyusun rencana penyelesaian dan menyelesaikan masalah sesuai rencana, cenderung memilih strategi cepat dan praktis. Perbedaan ini mencerminkan pengaruh karakteristik psikologis dan gaya berpikir yang khas pada masing-masing jenis kelamin. Temuan ini diharapkan dapat menjadi acuan bagi guru untuk merancang strategi pembelajaran matematika yang mengakomodasi keunggulan kedua jenis kelamin sehingga seluruh siswa dapat mengoptimalkan kemampuan pemecahan masalah mereka.

Kata kunci: kemampuan pemecahan masalah, jenis kelamin

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INTRODUCTION

Education is a conscious and planned effort to create a learning environment that enables students to develop their full potential, both spiritually, emotionally, intellectually, and in terms of life skills. (Hanggara et al. 2022) Mathematics is a universal science that plays an important role in education because it requires students to think logically, critically, creatively, and systematically in solving problems. Mastering basic mathematical concepts from elementary school forms a crucial foundation for students' success at higher levels of education. This aligns with the view that mathematical skills, particularly problem-solving abilities, are not only useful for tackling routine classroom problems but can also be applied to address the ever-evolving challenges of real-life situations.

Mathematics is one of the basic sciences that is important for all students to learn, from elementary school to college (Miftahul Jannah dan Miftahul Hayati 2024). This science equips students with thinking skills that enable them to adapt to changes in life and developments in the world. Therefore, mastery of mathematical concepts needs to be done early on so that they can be understood in depth (Diri et al. 2021).

In the learning process, mathematics should not only focus on mastering the material, but also on its application in solving everyday problems. One of the most important skills is problem-solving, which is a scientific process involving problem interpretation, information gathering, solution determination, strategy implementation, and result evaluation (Prasetyo 2025). This skill has become one of the main objectives of mathematics learning in elementary school, as stated in the national education standards.

Improving problem-solving skills will help students solve problems effectively while expanding their knowledge in real life (Yulius dan Zainil 2025). Understanding will be deeper and more lasting if students can connect mathematical concepts with other subjects or personal experiences. Additionally, problem-solving can foster curiosity, increase motivation, encourage creativity, and develop analytical and evaluative thinking skills (Sudarmin dan Fathurrahman 2024).

One effective form of exercise to develop this skill is story problems. Through story problems, students learn to transfer the mathematical knowledge they have acquired at school to real-life situations. These problems are typically drawn from issues in the surrounding environment, thereby sparking students' enthusiasm to solve them. To answer

story problems, students must understand the text, identify key information, model it into mathematical form, and select the appropriate strategy to solve it.

Solid geometry is one topic that is particularly suitable for training problem-solving skills based on story problems. Solid geometry combines mathematical concepts with real-life situations, so students learn to identify information, choose strategies, and apply volume or surface area formulas in everyday contexts. This exercise not only strengthens conceptual understanding but also sharpens critical and creative thinking skills (Verdian 2024).

However, students often experience difficulties in solving spatial geometry story problems. These difficulties can include a lack of conceptual understanding, calculation errors, or errors in modeling the problem. The causes of these difficulties can originate from within the student, such as a negative attitude, low motivation to learn, and limited abilities, or from external factors, such as monotonous teaching methods, a lack of learning media, and an unsupportive environment.

Another factor that influences student success is gender differences. Previous research has shown variations in problem-solving strategies and achievements between male and female students. (Annisa et al. 2021) found that female students were superior in the indicators of understanding the problem, planning, and implementing the solution, although both were equally low in the aspect of checking the results. Women tend to be more meticulous and systematic, while men often use more intuitive spatial strategies (Mz, 2013; Susilowati, 2016). These results emphasize that gender is an important factor that needs to be considered in mathematics learning. Additionally, gender differences can also influence problem-solving abilities. Boys generally excel in drawing conclusions and applying logic, while girls tend to be more meticulous, cautious, and accurate. Understanding these differences is important so that teachers can adjust their teaching strategies to optimize each student's potential (Amir 2017).

Based on the above, there is a need for a learning approach that can develop students' problem-solving skills in spatial geometry through story problems, while considering the differences in student characteristics, including gender differences. This effort is expected to enhance thinking skills, strengthen conceptual understanding, and equip students with the ability to solve problems they encounter in their daily lives.

METHODS

This research is qualitative research using a survey method (Hanggara et al. 2022). (Nafisatur 2024) The survey research method is a method in which data collection can be done using questionnaires and interviews obtained from a sample of people, where the data can represent a specific population in accordance with the research interests, whether to find out who they are, what they think, feel, or their tendencies toward certain actions.

This study was conducted at an elementary school in Muara Bungo City with an A accreditation. The study was conducted in the second semester of the 2024/2025 academic year. This study will collect data on the analysis of elementary school students' problem-solving abilities in solving story problems related to spatial geometry, viewed from a gender perspective. The subjects of this study were 128 students who had studied spatial geometry. The object of this study was the analysis of elementary school students' problem-solving abilities in solving story problems related to spatial geometry, viewed from a gender perspective. Data collection in this study was conducted using a descriptive narrative approach, where the data collected consisted of tests, interviews, and documentation. Data was collected through in-depth interviews and documentation studies. To ensure the validity of the data, this study used triangulation techniques, both source triangulation (comparing data from male and female students) and method triangulation (combining test results, interviews, and documentation) so that the data obtained was more valid and reliable. The following are the guidelines for assessing problem-solving abilities in the indicators.

Table 1. Problem Solving Ability Scoring Guidelines

Aspects Assessed	Description	Value
Understanding the problem	No response at all	0
	Writing down what is known and asked but misunderstanding the information	1
	Write down the information and understand the question correctly.	2
Developing a resolution plan	No response at all.	0
	Writing down the steps to solve the problem is not quite right.	1
	Write down the steps to the solution with the correct answer but incomplete	2
	Write down the steps to solve the problem correctly.	3
	No response at all.	0

Finalizing the settlement plan	Wrote down the solution to the problem according to the planned steps and wrote the conclusion, but made a mistake in calculating the answer.	1
	Write down the solution to the problem according to the steps that have been planned correctly, but do not write down the conclusion.	2
	Solve problems according to the planned steps, perform calculations correctly, and write conclusions accurately.	3
Double-checking	No response at all.	0
	Performing checks inaccurately.	1
	Check the answers carefully.	2

Source: (Rahma dan Sutami 2023)

Table 2. Problem Solving Skills Assessment Qualifications

value	Criteria	Predicate
85,00 – 100	Very Good	A
71,00 - 84,99	Good	B
58,00 – 70,99	Fair	C
44,00 – 57,99	Poor	D
0 – 43,99	Very Poor	E

source: (Rahma dan Sutami 2023)

RESULTS AND DISCUSSION

Gender is the difference in roles, behaviors, and characteristics that are socially and culturally constructed between men and women. (Saguni 2020). These differences are not only physical or biological, but also affect the way of thinking, learning strategies, and tendencies in problem solving. Psychologically, men generally have a dominance in logical, analytical, and abstract thinking abilities related to left brain activity. Conversely, women tend to rely more on imaginative, intuitive, and visual thinking skills associated with right brain dominance.

According to cognitive theory, these differences can influence individuals' approaches to problem solving. Men tend to use direct strategies, focus on the end goal, and prioritize speed of completion. Meanwhile, women tend to prioritize accuracy, systematic processes, and ensuring that each step follows the correct procedure. Previous research has also shown that these differences in thinking styles impact students' performance on math tests,

particularly on questions that require in-depth analysis and double-checking of answers. (Ulandari et al. 2025).

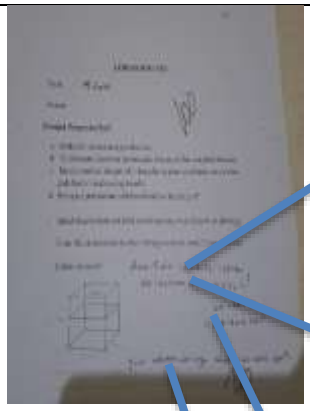
A number of relevant studies support this finding. (Annisa et al. 2021) found that female students' mathematical problem-solving abilities were superior to those of male students, with a higher percentage of correct answers on almost all indicators. (Wahyudi 2022) reported that in the high ability category, both males and females met all indicators, but male students tended to be less thorough. In the moderate category, both met three indicators, but males made more calculation errors. Meanwhile, in the low category, only one indicator was met. Similar findings were also obtained by (Sabrina Ovi Saffanah 2022) which identifies variations in problem-solving abilities in flat-sided spatial material with different distributions of high, medium, and low abilities among students. These results show that gender differences affect mathematical problem-solving strategies and outcomes.

Table 3. student ability indicator score

Indicator	Score	Male	Famale
1	0	20 %	15 %
	1	52 %	48 %
	2	28 %	37 %
2	0	20 %	15 %
	1	36 %	31 %
	2	30 %	28 %
	3	15 %	25 %
3	0	20 %	15 %
	1	59 %	51 %
	2	7 %	12 %
	3	15 %	22 %
4	0	20 %	15 %
	1	66 %	58 %
	2	15 %	27 %

Students' Problem-Solving Skills

Students with problem-solving skills in solving story problems on spatial geometry, reviewed by gender in the high category, numbered one male student and one female student. Regarding the results of the problem-solving answers of students with high abilities, see Figure 1 below:



1. Problem-solving indicator 1 (IP.1)

understanding the problem

- students understand the problem to be solved

2. Problem-solving indicator 2 (IP.2)

developing a solution plan

• students are able to develop strategies/use block formulas

3. Problem-solving indicator 3 (IP.3)

solving problems according to plan

• students are able to perform calculations

correctly according to the planned strategy

4. Problem-solving indicator 4 (IP.4)

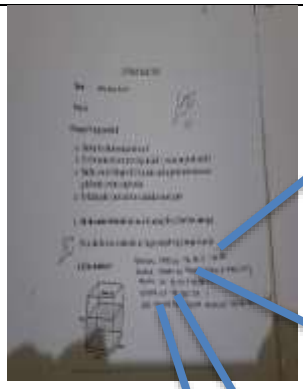
rechecking the results obtained

• students are able to evaluate answers and conclude the

final results logically.

Figure 1. Abilities of Male Students

Based on Figure 1, it can be explained that in the answer sheets of high-ability male students, it was found that they made mistakes in the planning section. This can be seen from the absence of the requested or known information in their answers. Although the students understood the question format, they did not write that section in their answers. In contrast, female students provided more accurate and complete answers, from the first to the last problem-solving indicator.



1. Problem-solving indicator 1 (IP.1)

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4. Problem-solving indicator 4 (IP.4)

rechecking the results obtained

• students are able to evaluate answers and conclude the

final results logically.

Figure 2. Female Students' Abilities

Female students demonstrated a more significant role in solving problems with higher and different problem-solving abilities. The answers given by male students differed from those given by female students because female students did not make the same mistakes as male students. Female students work on the problem with greater focus, thoroughness, and precision, resulting in higher scores than male students. This is clearly evident from the interview results, where both male and female students worked on the problem following the teacher's instructions and examples, but there were differences in thoroughness and strategy. Male students tend to use formulas without double-checking their answers, leading to errors due to lack of thoroughness. Meanwhile, female students not only use appropriate

formulas but also systematically outline their steps and review their work from start to finish, enabling them to solve problems correctly and achieve higher scores than male students.

Indicator 1 Understanding the problem

Female students showed high accuracy in reading questions, marking keywords, and writing down important information before starting calculations. Meanwhile, male students tended to immediately connect the information in the question with the formula, but at the risk of missing important details. This is in line with the characteristics of women, who are more meticulous and systematic in the early stages of problem solving.

Indicator 2 Develop a resolution plan

Male students excel at choosing quick and practical solution strategies, often using experience-based approaches or memorized patterns. Female students are also capable of planning well, but tend to take longer because they consider several alternatives before deciding.

Indicator 3 Resolving issues according to plan

Both groups were able to carry out the plan well, although male students showed higher calculation speed. However, in the case of complex calculations, female students had an advantage in maintaining consistency in the steps of the solution, resulting in fewer procedural errors.

Indicator 4 Reviewing the results obtained

Female students were more consistent in double-checking their answers, checking the units, and comparing the results of their calculations with the logic of the question. Male students only double-checked if they were unsure of their answers. This difference reinforces the view that women have a higher tendency to ensure the accuracy of their work.

Research conducted by (Sabrina Ovi Saffanah 2022) shows that junior high school students' problem-solving abilities in flat-sided spatial geometry still vary, with most students falling into the moderate and low categories. The difficulties experienced by students include carelessness in calculations, errors in formulating mathematical models, and failure to double-check their answers. These findings align with the results of this study, which also identified differences in precision and problem-solving strategies. However, this study provides additional insights by highlighting gender aspects, where female students tend to be more systematic, meticulous, and consistent in checking results, while male students are

faster in calculations but less attentive to details. Thus, this study complements the findings of (Sabrina Ovi Saffanah 2022) by confirming that gender differences also influence variations in problem-solving strategies and quality in mathematics on flat-sided geometric shapes.

CONCLUSION

Based on the research results, it can be concluded that there are differences in the mathematical problem-solving abilities of elementary school students in spatial geometry material when viewed from the perspective of gender. Female students show superiority in the indicators of understanding problems and rechecking results, which are characterized by high accuracy, systematic information processing, and consistency in verifying answers. Meanwhile, male students excel in the indicators of formulating a solution plan and solving problems according to the plan, with a tendency to use quick and practical strategies. These differences reflect the influence of psychological characteristics and distinctive thinking styles of each gender on the mathematical problem-solving process. These findings enrich our understanding of how gender factors can shape strategies and outcomes in problem solving, especially in the context of spatial story problems.

Based on these results, teachers are advised to develop teaching methods that accommodate the strengths of both genders, such as combining exercises that emphasize both precision and speed. In this way, all students can optimize their potential in solving mathematical problems. For further research, it is recommended to expand the scope of the study by adding other variables, such as problem complexity levels, the application of specific learning models, or differences in school backgrounds, to obtain more comprehensive results.

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