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Learning Obstacles Faced by Elementary Students in Solving Mathematical Problems on Rectangles and Squares

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ABSTRACT

Objective: This study aims to identify student learning obstacles in solving mathematical problems on rectangular and square materials in grade IV elementary school. Method: The study employed a Didactical Design Research (DDR) method with a descriptive qualitative approach. The research involved 20 students, with six selected for in-depth interviews. Data were collected through diagnostic tests, semi-structured interviews, observation, and documentation. Data analysis followed the three stages of DDR: prospective analysis to identify potential learning obstacles before instruction, metapedadidactic analysis to examine learning interactions during instruction, and retrospective analysis to evaluate overall learning outcomes. Results: The results revealed five major difficulties encountered by students: understanding problem contexts, representing problems in mathematical form, performing arithmetic operations, communicating answers, and generalizing solutions. These difficulties indicate learning barriers categorized as ontogenic (related to students' cognitive readiness and development), epistemological (related to students' understanding of mathematical concepts), and didactic (related to instructional approaches and strategies). Novelty: This study highlights the necessity of contextual, interactive, and visually concrete learning supports to foster meaningful understanding of geometry concepts. It also underscores the significance of DDR-based instructional design in addressing student learning needs and promoting innovative mathematics teaching strategies in primary education.

INTRODUCTION

Mathematics is one of the disciplines that plays an important role in developing students' critical, logical and analytical thinking skills. In the context of the basic education curriculum, geometry is one of the fundamental materials that form the basis for understanding advanced mathematics (Pratama et al., 2023). One of the geometry sub-materials taught in elementary school is flat shapes, especially rectangles and squares. This material includes the concepts of side length, area, and perimeter which are part of the basic competencies that students must master. However, in reality, many students experience obstacles in understanding and solving problems related to these concepts, especially when presented in the form of problem solving problems (Febriani & Sidik, n.d.) Problem solving ability is one of the key skills in learning mathematics. Problem solving does not only require the application of formulas, but also includes the ability to analyze information, formulate solution strategies, and evaluate results (Hidayah & Maemonah, 2022). Unfortunately, many students still have difficulty connecting the understanding of theoretical concepts with their application in real-life contexts. Data from the Minimum Competency Assessment (AKM) in 2022 shows that only around 39% of primary school students are able to answer numeracy questions that require appropriate reasoning and contextual understanding (Hapsari & Labib, 2025). This shows that there is a big challenge in the aspect of mathematical problem solving at the elementary school level.

Students' barriers to learning mathematics can be divided into three categories: ontogenetic (mental and cognitive readiness), epistemological (conceptual understanding), and didactic (learning strategies) (Firdaus et al., 2022). These barriers affect students' ability to solve problems, particularly on the topics of rectangles and squares. Conventional teaching methods, such as lectures and problem-solving exercises without concrete media, make it difficult for students to visualize abstract geometric concepts (Agustin & Zakiah, 2024). Students also struggle to solve word problems with more than one instruction (Muslimah & Pujiastuti, 2021). Other factors, such as low interest in learning and anxiety toward mathematics, further exacerbate this (Fatwa & Arifiana, 2025).

This problem not only affects students' academic results, but also hinders the development of higher-order thinking skills. Therefore, a learning approach that is able to systematically identify and overcome students' learning barriers is needed (Zahrah et al., 2024). One of the relevant approaches for this purpose is Didactical Design Research (DDR). DDR is a research method that focuses on designing and analyzing learning design through three main stages: prospective analysis (before learning), metapedidactic analysis (during learning), and retrospective analysis (after learning) (Supriyadi et al., n.d.). This approach allows teachers and researchers to evaluate the effectiveness of learning based on the fit between design, implementation and students' learning needs (Hermawan, 2014). Considering the urgency, this study aims to identify students' learning barriers in problem solving on rectangle and square materials in grade IV elementary school (Yusmin, 2017). The results of this study are expected to be the basis for designing learning designs that are more appropriate, contextualized, and able to help students overcome their learning barriers effectively.

RESEARCH METHOD

This research uses a descriptive qualitative approach because it aims to describe in depth and thoroughly the various learning obstacles experienced by students in solving problem solving problems on rectangular and square materials. The method used is Didactical Design Research (DDR), which is a research approach that emphasizes the design and analysis of mathematics learning design. DDR not only aims to find learning obstacles faced by students, but also to develop didactical designs that can anticipate and overcome these obstacles through continuous cycles that include planning, learning implementation, and data-based reflection.

The research subjects consisted of 20 fourth-grade students at a public elementary school in Tasikmalaya City. These students were selected through purposive sampling because they were studying the topic of plane geometry, specifically rectangles and squares, in accordance with the current curriculum. From the 20 students, the researcher then conducted further selection to determine the main subjects for in-depth interviews. Six students were selected based on specific criteria, namely:

1) Students showed significant learning barriers based on the results of the initial diagnostic test,
2) Students had low academic scores in mathematics,

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3) Students were recommended by the classroom teacher as students who needed special attention in learning, and
4) Students had sufficient verbal skills to express their thoughts, reasons, and learning experiences during the interview.

This purposive selection of subjects aimed to explore in-depth and specific information about complex forms of learning barriers. Thus, the results obtained can represent the actual conditions that occur in the classroom and serve as a strong basis for developing more adaptive and effective learning designs. The diverse characteristics of the six selected students also provide a broad picture of the various learning barriers that may arise in the context of mathematics learning at the elementary school level.

This research was conducted in accordance with the principles of research ethics involving human subjects. Before data collection was carried out, the researcher first obtained official permission from the school and written consent from the students' parents/guardians. Additionally, the students who were the main participants were given an explanation of the research objectives and procedures and were asked to provide verbal informed consent. The confidentiality of participants' identities was ensured by using codes or initials in all forms of documentation and research reports. The collected data was stored securely and used solely for academic purposes and the development of the intended learning design.

The following picture shows the determination of the interview subjects in Figure 1.

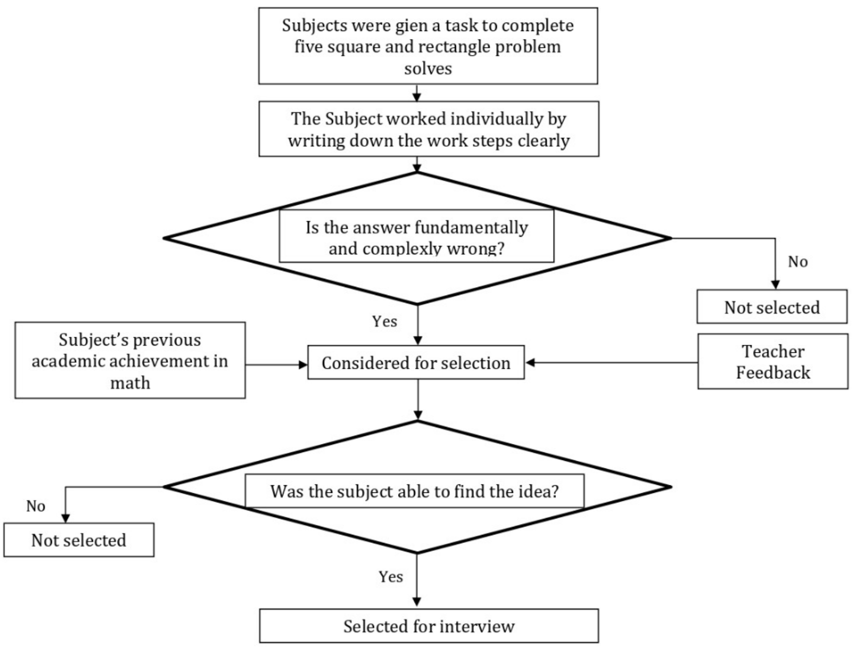

Figure 1. Selection of Interviewed Research Subjects

The data in this study were obtained through four main techniques, namely diagnostic tests, semi-structured interviews, observations during the learning process, and documentation of student work. All data collected were then analyzed using a qualitative descriptive approach which aims to reveal in depth the various forms of difficulties experienced by students in solving problem solving problems on rectangular and square materials.

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Stages of Analysis

The analysis was conducted by referring to the Didactical Design Research (DDR) framework, which consists of three main stages, namely prospective, metapedidactic, and retrospective analysis (Miftah et al., 2020). The first stage, prospective analysis, is a process of initial identification of potential learning barriers that students may face before the learning process begins. At this stage, researchers analyzed the results of diagnostic tests and initial interviews with teachers and students to map students' initial readiness, both in terms of concept understanding and basic mathematics skills. This analysis is used as the basis for designing learning designs that are tailored to the needs and characteristics of students, as well as anticipating the types of barriers such as ontogenic, epistemological, and didactic that are likely to arise (Nurhalimah et al., 2020). Furthermore, at the metapedidactic stage, researchers directly observe the learning process in the classroom and record the dynamics of interaction between teachers and students, including how students respond to learning activities that have been designed previously. This observation was complemented by field notes, documentation of student work during learning activities, and follow-up interviews to clarify student responses or answers that were considered to show symptoms of learning obstacles. The purpose of this stage is to obtain a real picture of the suitability between the learning design and the actual conditions in the field, as well as to detect new barriers that were not identified at the prospective stage. The last stage is retrospective analysis, where researchers evaluate the overall learning implementation. In this stage, the researcher compares the results of the analysis at the prospective and metapedidactic stages to see if the predicted learning barriers match the reality in the classroom. In addition, this analysis aims to assess the effectiveness of the learning design in helping students overcome their difficulties. The findings obtained from this retrospective stage are used to develop a better revision of the learning design in the future, so that it can support the creation of a more adaptive and meaningful learning process for students. The following research implementation scheme is shown in Figure 2.

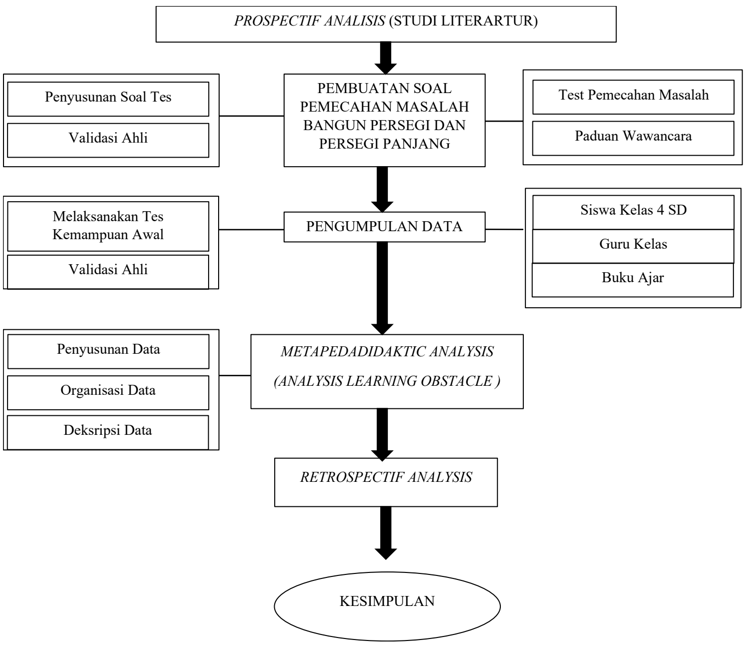

Figure 2. Schematic of the Research Procedure

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RESULTS AND DISCUSSION

Results

This study found five main difficulties faced by fourth grade students in solving rectangular and square problems. First, students have difficulty understanding the context of story problems which is an ontogenic barrier because their reading-comprehension skills are still weak. Second, they have difficulty translating verbal information into mathematical representations either sketches, tables, or symbols as a form of epistemological barriers. Third, the difficulties that often arise in arithmetic operations show that the basic concepts of geometry and arithmetic are not yet solid, which also shows didactic obstacles when learning emphasizes procedures without exploring alternative strategies or using props. Fourth, the ability to communicate answers orally and in writing is still low, indicating ontogenic (language skills) and epistemological barriers (not understanding the structure of arguments), so strengthening mathematical communication is needed. Fifth, students have difficulty generalizing answers to other situations, indicating that conceptual understanding and reflection are still limited, reflecting epistemological barriers, namely general principles not yet understood. These five difficulties are interrelated and strengthen the findings of the conclusion that learning barriers are ontogenic, epistemological, and didactic, so contextual, interactive, and concrete visual-based learning is needed so that the concept of flat shapes can be understood in a more meaningful and applicable way.

1. Understanding the Context and Content of Story Problems

This difficulty reflects epistemological barriers because students do not understand the concept asked in the problem, as well as ontogenic barriers because students are not cognitively ready to interpret information in story form. In this finding, students showed difficulties in understanding the context and content of story problems. For example, S5 did not fully understand the instructions given in the problem, as shown in Figure 3.

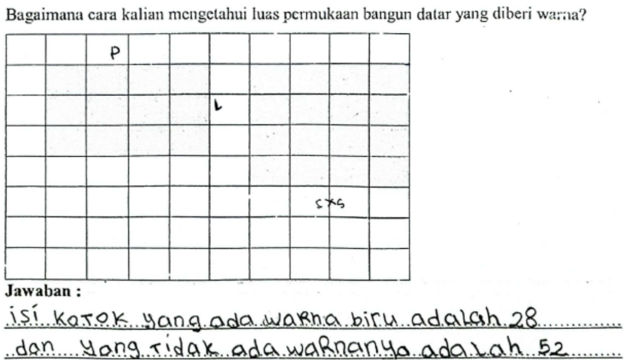

Figure 3. S_5's answer to Q_1

In solving Q1, S5 answered that there were 28 blue squares and 52 uncolored squares. This answer did not show an understanding of the surface area of the required flat shapes. S5 seemed to have difficulty connecting the visual data in the problem with the concept of square and rectangle area. When interviewed, S5 stated:

P : Where did you get this answer?
S_5 : Counting the contents of the boxes that are colored and not colored, ma'am.

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This statement shows that S5 had difficulty understanding the meaning of the problem, namely the inability to connect the information in the problem with the appropriate mathematical concept.

The same thing was shown by S1 in Q2. The difficulties experienced by S1 also reflect epistemological barriers, because students have not mastered the formula for the area of flat shapes, as well as didactic barriers, if the teacher does not provide learning that emphasizes visualization and understanding of concepts.

Rina mempunyai sebuah benda berbentuk persegi panjang yang luas permukaannya 50 cm, coba kalian gambarkan benda tersebut dan tentukan berapa panjang dan lebarnya ? Bagaimana cara kalian mengetahui panjang dan lebarnya ?

Jawaban :

Panjang 20 cm lebar 5 cm

Figure 4. S_1's answer to Q_2

S1 was asked to draw a rectangle and determine the length and width with an area of 50 cm². However, S1 only wrote numbers without calculations or visualizations that showed the relationship between length, width and area. When asked:

S_1 : Where did you get the answer twenty centimeters long and five centimeters wide?
P : Multiply ma'am

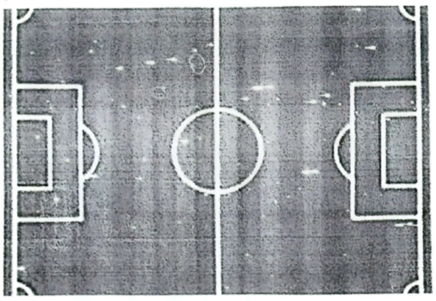
Despite mentioning "multiplied," S1 did not show an understanding of the calculation process and did not know the formula for rectangular area.

Based on the description above, students had difficulty understanding the content of the problem, applying the formula, and composing the steps of the solution. These difficulties include epistemological (concept stuttering), ontogenic (low cognitive readiness), and didactic (possible teaching approaches that do not support visualization and contextual understanding) barriers.

2. Representing Story Problems into Mathematical Forms

These difficulties reflect epistemological barriers, as students do not yet understand how to convert verbal information into mathematical form, as well as didactic barriers, as the learning approach may not have adequately trained students in modeling story problems. Many students had difficulty in translating the story problem into the correct mathematical form. S3, for example, in Q3 only answered "with a large walking area" (Figure 5), even though the question asked students to determine the shape of the soccer field and calculate its circumference based on an area of 700 m².

Menurut kalian apa bentuk dari lapangan bola ? Jika kalian ingin berjalan mengelilingi lapangan bola yang luas permukannya 700 m2, bagaimanakah cara kalian menghitung kelilingnya?



Jawaban :

dengan berjalan kaki yang luas

Figure 5. S_3's answer to Q_3

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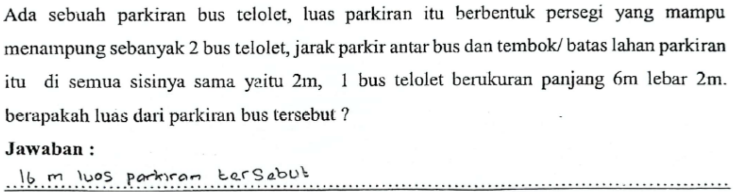
S1 also experienced confusion when working on Q5. In Figure 6, S1 answered "16 m parking lot area," even though the question asked for the calculation of the square parking lot area, with information that the parking lot can accommodate two buses and there is a distance of 2 meters on each side between the bus and the parking lot boundary.


Ada sebuah parkiran bus telolet, luas parkiran itu berbentuk persegi yang mampu menampung sebanyak 2 bus telolet, jarak parkir antar bus dan tembok/ batas lahan parkiran itu di semua sisinya sama yaitu 2m, 1 bus telolet berukuran panjang 6m lebar 2m. berapakah luas dari parkiran bus tersebut ?

Jawaban :

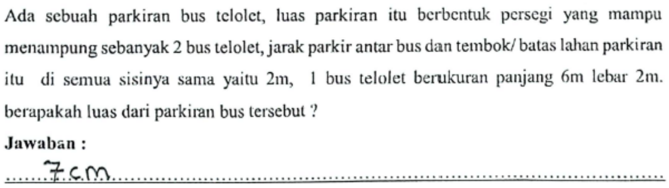
16 m luas parkiran tersebut

Figure 6. S_1's answer to Q_5

In solving math story problems, students still have difficulty converting sentences into appropriate mathematical models. This indicates an epistemological barrier, because students do not understand the content or structure of the information in the story problem, as well as a didactic barrier, because learning has not emphasized representation and modeling strategies enough. In addition, students also appear to lack readiness in processing complex information, which also indicates ontogenic barriers.

3. Performing Counting Operations

This difficulty is included in epistemological barriers, because students do not understand the basic concepts of arithmetic operations such as multiplication and units, and reflects ontogenic barriers if students do not have the cognitive readiness to calculate logically and systematically. At this stage, some students had difficulty in performing arithmetic operations. For example, when S5 was asked to calculate the parking lot area in Q5 (Figure 7), students did not understand how to calculate and tended to fill in the answer randomly.


Ada sebuah parkiran bus telolet, luas parkiran itu berbentuk persegi yang mampu menampung sebanyak 2 bus telolet, jarak parkir antar bus dan tembok/ batas lahan parkiran itu di semua sisinya sama yaitu 2m, 1 bus telolet berukuran panjang 6m lebar 2m. berapakah luas dari parkiran bus tersebut ?

Jawaban :

7cm

Figure 7. S_5's answer to Q_5

In Q5, S5 answered "7 cm," indicating that he may have added the length of the bus (6 meters) and the additional distance (2 meters) incorrectly, or confused the use of units of measure. When interviewed:

P : For number seven, how did you answer seven centimeters?
S_5 : From one two-meter bus

The statement shows that S5 performed erroneous addition and mixed meters and centimeters, indicating a lack of mastery of the concept of units and basic operations-a form of epistemological and ontogenic barriers.

Similarly, when working on Q4 (Figure 8), S4 answered "130 cm," even though the question asked for the calculation of the area of a mattress with a length of 120 cm for three people, each requiring 30 cm of space.

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Figure 8. S_4's answer to Q_4

S4's difficulty can be seen from his inability to compile the correct calculation steps. When interviewed:

P : How did number four become one hundred and thirty?

S_4 : From thirty plus three to one hundred and twenty plus thirty-three.

This answer shows that S4 mixed various numbers without proper mathematical logic. S4 did not understand the concept of area and could not connect the information with relevant formulas or calculation operations.

Based on observations and tests, it was found that students had difficulty in performing basic operations, especially multiplication, when solving story problems. This indicates an epistemological (mastery of the concept of counting operations), ontogenic (students' mental and cognitive readiness in counting), and potentially also reflects didactic barriers if learning does not provide enough concrete and gradual practice in developing counting skills.

4. Communicating Oral and Written Answers

This difficulty indicates the existence of ontogenic barriers, because it is related to the limitations of students' cognitive abilities and communication readiness, as well as didactic barriers, if learning has not provided sufficient space for students to practice expressing ideas in writing and orally. Almost all research subjects showed difficulties in communicating answers, both orally and in writing. For example, S4 had difficulty when asked to explain the answer verbally, even though he had written the answer on the problem sheet.

Likewise S1, who felt confused in writing the answer, as shown in Figure 9. Although during the interview S1 could explain orally better, his statement was still limited in concept:

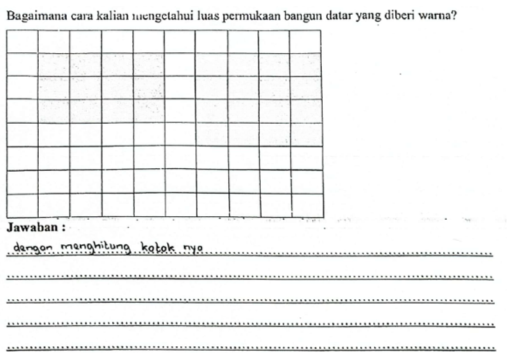

Figure 9. S_1's answer to Q_1

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P : Where did you get the answer to question number one?
S_1 : From the box here.
P : So the boxes are all counted?
S_1 : Yes

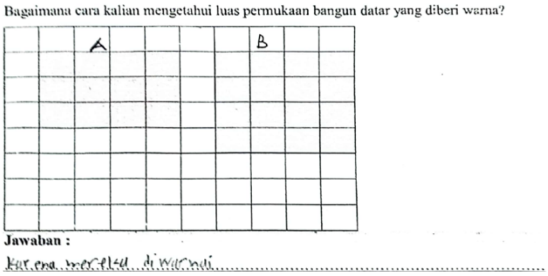

Figure 10. S_4's answer to Q_1

P : Why did you answer because they are colored?
S_4 : Just

In written communication, students often face difficulties in constructing sentences with proper structure and using appropriate vocabulary. This indicates an ontogenic barrier, as they are not sufficiently developed in the skill of conveying thoughts logically. In addition, the lack of practice in conveying ideas in a structured manner in the learning process also indicates a didactic barrier, as students are not used to expressing their understanding, either in writing or orally.

5. Generalizing Answers to Story Problems

This difficulty reflects epistemological barriers, because students have not been able to relate the results of calculations to the core of the problem being asked, and also ontogenic barriers, due to the low ability of reflective and logical thinking needed to draw conclusions. Students have difficulty in making conclusions or generalizing answers from story problems. For example, S2 and S5 were unable to relate their answers to the original question logically and thoroughly, as shown in Figures 11 and 12.

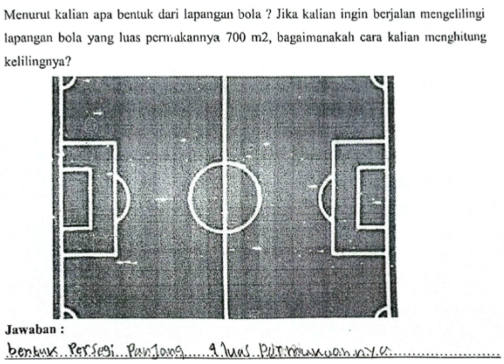

Figure 11. S_2's answer to Q_3

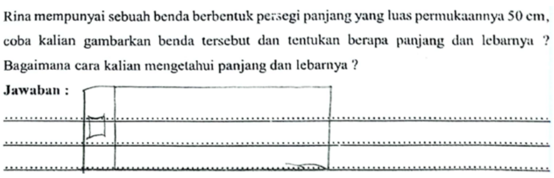

Figure 12. S_4's answer to Q_2

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The answers given by students are often not related to the context of the problem and do not solve the problem as a whole. This shows limitations in seeing the relationship between calculations and the final interpretation of the problem.

Based on the research results, generalization difficulties are quite prominent because students fail to connect the process and results with the actual question. This shows epistemological (lack of conceptual schema), ontogenic (limited reasoning power and reflection), and didactic barriers, if students are never trained to solve problems systematically or given space to conclude understanding explicitly.

Discussion

The results of this study reveal five main forms of difficulties experienced by students in solving mathematical problems on the material of square and rectangular flat shapes, namely: (1) understanding the context of the story problem, (2) representing the problem in mathematical form, (3) performing calculation operations, (4) communicating answers, and (5) generalizing solutions. These five difficulties are interconnected and can be categorized based on Didactical Design Research (DDR) theory into three types of learning barriers: ontogenic, epistemological, and didactic.

Ontogenic barriers are related to students' internal cognitive and linguistic readiness. Most students have difficulty understanding the context of story problems, which is attributed to weak literacy skills, limited vocabulary, and lack of contextually relevant experiences (Ramadhani, 2025). hese barriers can also arise in other mathematical domains, such as fractions or scale, where students are expected to imagine situations of comparison or estimation. Therefore, teachers need to anticipate ontogenic barriers by integrating visual and verbal literacy scaffolding activities from the beginning of learning, for example by using pictures of everyday situations, story-based logic puzzles, or simulations of real problems familiar to students' experiences (Sidik, Suryadi, et al., 2021). Epistemological barriers arise when students are unable to represent verbal information into the form of mathematical symbols, models, or images, as well as difficulties in drawing logical conclusions from the calculation process (Indrawati, 2019). Such representation errors are common in various mathematics topics, including measurement, graphing, and basic algebra. One approach that can effectively bridge this gap is Realistic Mathematics Education (RME). In RME, students are invited to discover mathematical strategies independently through real contexts. For example, in overcoming area and perimeter misconceptions, teachers can use a real-size model of a sports field, then ask students to compare drawing and calculation strategies using non-standard units before moving on to formal symbolization (Sidik, Maftuh, et al., 2021). This also trains the transition from model of to model for - that is, from concreteness to abstraction (Sidik et al., 2023). Didactic barriers reflect limitations in the strategies and media used by teachers . Findings show that learning focuses more on formal procedures and written exercises, with minimal use of concrete media and activities that encourage mathematical communication (Ningtyas et al., 2024). In fact, in an ideal learning approach, students need to be encouraged to not only find the final result, but also be able to explain their thinking process systematically. Strategies such as think aloud, thinking maps, or post-solving reflection formats can be practiced early on to foster this ability (Nurani et al., 2021).

This study confirms that learning barriers are not caused by a single factor, but are the result of the interaction between student characteristics, material complexity, and

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classroom learning approaches (Mustofa et al., 2022). Compared to other DDR research in geometry, this study shows that the combination of barriers is more visible in the transition process between problem solving steps, not just at the point of representation or strategy alone (Fuji Amanda et al., 2024). Thus, the uniqueness of this study lies in the comprehensive mapping from the initial to the final stages of problem solving.

To respond to this, teachers can design adaptive and responsive learning through the following steps:

1) Using problem posing and open-ended problems to train reflective thinking and multiple representations.
2) Making room for mathematical communication, either through small class discussions, visual presentations or math journals.
3) Utilize concrete props such as square blocks, geometry boards, and non-standard measuring tools to enhance visualization.
4) Designing worksheets based on guided discovery and multiple representation tasks that present different ways to solve one problem.

Although the study was limited to one primary school in Tasikmalaya, the findings provide a sharp picture of the complexity of mathematics learning barriers and the relevance of the DDR approach in identifying them. The practical implications of this research are the importance of teacher training in designing barrier-based learning strategies, as well as the need for a collaborative approach in developing didactical designs that are appropriate to the characteristics of students.

CONCLUSION

Fundamental Findings: This research highlights the multifaceted nature of math problem-solving difficulties and the critical need for responsive didactic design. Grade IV students not only experienced cognitive difficulties, but also faced intertwined ontogenic, epistemological and didactic barriers. The five forms of difficulty identified - understanding the context of the problem, representing mathematically, performing calculations, communicating solutions, and generalizing answers - reflect challenges in developing coherent mathematical thinking. These findings emphasize the need for learning approaches that are not only procedural, but also conceptual, contextual, and reflective, so that students are able to build understanding gradually and meaningfully. **Implication:** The results of this study indicate that conventional learning strategies strategy is not adequate in supporting students' mathematical thinking process as a whole. students' mathematical thinking process thoroughly. Therefore, teachers need to design learning experiences that foster exploration, representation and reflection. foster exploration, representation, and reflection. Approaches such as Problem Based Learning (PBL), Realistic Mathematics Education (RME), as well as the use of manipulative media and mathematical communication activities. use of manipulative media and mathematical communication activities are very important to adopt. important to adopt. Another practical implication is the need for continuous teachers in designing learning based on barriers to learning, so that they can act as facilitators of students' critical and reflective thinking, not only critical thinking and reflective thinking of students, not only as a deliverer of procedures. **Limitations:** The study was limited to one primary school in the Tasikmalaya area with a specific topic coverage on square and rectangle materials. This narrow scope limits the generalizability of the

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results to a wider population. However, this limitation also provides an opportunity for a more comprehensive replication study to test the consistency of the findings in different contexts and topics. **Future Research:** Further research should be conducted in more diverse populations and regions, involving schools from various social and geographical characteristics, and covering other mathematics topics such as fractions, measurement and data processing. In addition, the development of Didactical Design Research (DDR)-based learning models for various mathematics domains would be an important contribution in supporting teachers to design learning that is responsive to different types of learning barriers. In this way, basic mathematics education can be more inclusive, contextualized and sustainable in developing long-term mathematical thinking.

REFERENCES

Agustin, F., & Zakiah, N. E. (2024). Kemampuan Pemahaman Konsep Matematis Siswa pada Materi Persegi dan Persegi Panjang. 4.

Fatwa, A. N., & Arifiana, I. Y. (2025). Deteksi Kesulitan Belajar Pada Siswa Dengan Nilai Matematika Rendah. Jimmi: Jurnal Ilmiah Mahasiswa Multidisiplin, 2(1), 9–18. https://doi.org/10.71153/jimmi.v2i1.194

Febriani, W. D., & Sidik, G. S. (n.d.). Pengaruh Pembelajaran Realistic Mathematics Education Dan Direct Instruction Terhadap Kemampuan Pemecahan Masalah Dan Komunikasi Matematis Siswa SD.

Firdaus, R., Sa'ud, U. S., & Arisetyawan, A. (2022). Desain Didaktis Untuk Mengatasi Hambatan Belajar Pada Keliling Dan Luas Persegi Serta Persegi Panjang. AKSIOMA: Jurnal Program Studi Pendidikan Matematika, 11(4), 3632. https://doi.org/10.24127/ajpm.v11i4.5592

Fuji Amanda, Sahrun Nisa, & Ari Suriani. (2024). Analisis Kesulitan Dalam Pembelajaran Matematika Pada Siswa Sekolah Dasar Ditinjau Dari Berbagai Faktor. Dewantara : Jurnal Pendidikan Sosial Humaniora, 3(2), 282–293. https://doi.org/10.30640/dewantara.v3i2.2652

Hapsari, W. P., & Labib, U. A. (2025). Two-Tiers Test Berbasis Everyday Life Activity Stimulus untuk Meningkatkan Kemampuan Numerasi AKM Siswa Sekolah Dasar. Jurnal Didaktika Pendidikan Dasar, 9(1), 129–156. https://doi.org/10.26811/didaktika.v9i1.1764

Hermawan, A. (2014). Konsep Belajar Dan Pembelajaran Menurut Al-Ghazali. 1.

Hidayah, A., & Maemonah, M. (2022). Analisis Hambatan Belajar Siswa Kelas IV Pada Mata Pelajaran Matematika. Symmetry: Pasundan Journal of Research in Mathematics Learning and Education, 7(2), 232–240. https://doi.org/10.23969/symmetry.v7i2.6737

Indrawati, F. (2019). HAMBATAN DALAM PEMBELAJARAN MATEMATIKA.

Miftah, R., Kurniawati, L., & Solicha, T. P. (2020). MENGATASI LEARNING OBSTACLE KONSEP TRANSFORMASI GEOMETRI DENGAN DIDACTICAL DESIGN RESEARCH. ALGORITMA: Journal of Mathematics Education, 1(2), 156–166. https://doi.org/10.15408/ajme.v1i2.14076

Muslimah, H., & Pujiastuti, H. (2021). Analisis Kemampuan Literasi Matematis Siswa dalam Memecahkan Masalah Matematika Berbentuk Soal Cerita. Jurnal Pendidikan Matematika dan Sains, 8(1), 36–43. https://doi.org/10.21831/jpms.v8i1.30000

Mustofa, R., Anif, S., & Muhibbin, M. (2022). Analisis Kesalahan dalam Menyelesaikan Soal Cerita Matematika pada Siswa Sekolah Dasar. Jurnal Basicedu, 6(3), 3492–3502. https://doi.org/10.31004/basicedu.v6i3.2635

Ningtyas, I., Suastika, I. K., & Wahyuningtyas, D. T. (2024). Analisis Keterampilan Komunikasi Matematis Dalam Pemecahan Masalah Pada Materi Keliling Bangun Datar Persegi Dan Persegi Panjang Siswa Kelas III Sekolah Dasar. 06.

Nurani, L. A., Nur'aeni, E., Apriani, I. F., & Muharram, M. R. W. (2021). Analisis Learning Obstacle Siswa Pada Materi Pecahan Senilai di Kelas IV Sekolah Dasar. 04(05).

Nurhalimah, S., Nur'aeni, E., & Nugraha, A. (2020). Desain Didaktis Sifat-sifat Persegi Panjang Berbasis Model Pembelajaran SPADE untuk Siswa Kelas III Sekolah Dasar. PEDADIDAKTIKA: Jurnal Ilmiah Pendidikan Guru Sekolah Dasar, 7(3), 235–245. https://doi.org/10.17509/pedadidaktika.v7i3.28705

Pratama, S. N., Lidinillah, D. A. M., & Apriani, I. F. (2023). Analisis Hambatan Belajar Siswa dalam Pembelajaran Aljabar di Kelas V Sekolah Dasar. DWIJA CENDEKIA: Jurnal Riset Pedagogik, 7(3). https://doi.org/10.20961/jdc.v7i3.80014

Ramadhani, D. D. (2025). Pengaruh Hambatan Ontogenik Terhadap Keefektifan Pembelajaran Statistika Dalam Kurikulum Merdeka. 3(1).

Sidik, G. S., Maftuh, A., & Salimi, M. (2021). Analisis Kesulitan Belajar Matematika pada Siswa Usia 6-8 Tahun. Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini, 5(2), 2179–2190. https://doi.org/10.31004/obsesi.v5i2.1137

Sidik, G. S., Suryadi, D., & Turmudi, T. (2021). Learning Obstacle on Addition and Subtraction of Primary School Students: Analysis of Algebraic Thinking. Education Research International, 2021, 1–10. https://doi.org/10.1155/2021/5935179

Sidik, G. S., Zahrah, R. F., Hariyani, M., & Fadhilaturrahmi, F. (2023). Development of Mathematics Teaching Materials Using Didactical Design Research: A Study on Enhancing Pedagogical Content Knowledge in Quadratic Inequalities. Journal of Education For Sustainable Innovation, 1(1), 39–48. https://doi.org/10.56916/jesi.v1i1.489

Supriyadi, E., Suryadi, D., Turmudi, T., Juandi, D., & Dahlan, J. A. (n.d.). DIDACTICAL DESIGN RESEARCH: A BIBLIOMETRIC ANALYSIS. 3.

Yusmin, E. (2017). Kesulitan Belajar Siswapada Pelajaran Matematika (Rangkuman Dengan Pendekatan Meta-Ethnography). Jurnal Visi Ilmu Pendidikan, 9(1). https://doi.org/10.26418/jvip.v9i1.24806

Zahrah, R. F., Prabawanto, S., & Febriani, W. D. (2024). Research trend mathematics problem solving in primary school: A bibliometric analysis using VOSviewer.

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