



Students' Learning Difficulties and Self-Efficacy in Mathematics Learning: An Analysis of the Relationship Between Cognitive and Affective Aspects

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Abstrak

Penelitian ini bertujuan untuk mendeskripsikan kesulitan belajar siswa serta menganalisis dampaknya terhadap kepercayaan diri dalam pembelajaran matematika pada siswa kelas XI di SMAN 4 Parepare. Penelitian ini menggunakan pendekatan deskriptif dengan jenis penelitian kualitatif deskriptif. Subjek penelitian berjumlah 25 siswa. Data diperoleh melalui angket (profiling siswa) yang disusun berdasarkan indikator kesulitan belajar dan kepercayaan diri, kemudian dianalisis secara deskriptif menggunakan skor rata-rata. Hasil penelitian menunjukkan bahwa kesulitan belajar siswa berada pada kategori sedang, dengan skor rata-rata kemampuan berpikir logis sebesar 2,69 dan pemahaman konsep sebesar 3,06. Sementara itu, tingkat kepercayaan diri siswa berada pada kategori rendah, dengan skor rata-rata sebesar 2,05. Temuan ini menunjukkan adanya kesenjangan antara aspek kognitif dan afektif, dimana kemampuan memahami konsep tidak diikuti oleh tingkat kepercayaan diri yang memadai. Kesulitan dalam berpikir logis dan pemecahan masalah berkontribusi terhadap rendahnya kepercayaan diri siswa, yang berdampak pada rendahnya partisipasi dalam pembelajaran. Dengan demikian, dapat disimpulkan bahwa kesulitan belajar tidak hanya berdampak pada aspek kognitif, tetapi juga berpengaruh terhadap aspek afektif siswa, khususnya kepercayaan diri. Oleh karena itu, diperlukan strategi pembelajaran yang tidak hanya berfokus pada peningkatan pemahaman konsep, tetapi juga pada penguatan kepercayaan diri siswa dalam pembelajaran matematika.

Kata Kunci: kesulitan belajar, kepercayaan diri, berpikir logis, pemahaman konsep

Abstract

This study aimed to describe students' learning difficulties and explore their relationship with students' self-efficacy in mathematics learning among eleventh-grade students at SMAN 4 Parepare. A descriptive qualitative approach was employed, involving 25 students as the research participants. Data were collected using a student profiling questionnaire developed based on indicators of learning difficulties and self-efficacy and were analyzed descriptively using mean scores. The findings revealed that students' learning difficulties were categorized as moderate, with mean scores of 2.69 for logical thinking and problem-solving skills and 3.06 for conceptual understanding. In contrast, students' self-efficacy was categorized as low, with a mean score of 2.05. These findings indicate a discrepancy between the cognitive and affective domains, where relatively adequate conceptual understanding is not accompanied by strong self-efficacy. Difficulties in logical thinking and problem-solving appear to reduce students' confidence in their ability to perform mathematical tasks, which subsequently limits their participation in classroom learning. It can therefore be concluded that learning difficulties

influence not only students' cognitive development but also their affective domain, particularly their self-efficacy. These findings suggest that mathematics instruction should focus not only on strengthening conceptual understanding but also on enhancing students' self-efficacy to encourage more active, confident, and meaningful learning.

Keywords: *Learning difficulties, self-efficacy, logical thinking, conceptual understanding*

Introduction

Mathematics is a fundamental discipline that plays a crucial role in developing students' logical, analytical, and systematic thinking skills. However, in educational practice, mathematics is still widely perceived as a difficult subject because it requires students to understand abstract concepts and solve complex problems. Students frequently encounter difficulties in understanding mathematical concepts, interpreting problem statements, and solving mathematical problems across various levels of education. These learning difficulties are generally associated with limited conceptual understanding, inadequate problem-solving skills, and low mathematical literacy, all of which are recognized as essential factors influencing students' academic achievement (Syakur et al., 2021; Sitorus et al., 2025). In the global educational context, mathematical literacy has also become an important indicator for assessing students' higher-order thinking skills (Nisa & Arliani, 2023).

Learning difficulties in mathematics affect not only students' cognitive achievement but also their affective characteristics, particularly their self-efficacy. Self-efficacy refers to an individual's belief in their capability to successfully perform specific tasks and has been consistently identified as a significant predictor of mathematics learning achievement (Nurbayan & Basuki, 2022). Recent studies have demonstrated that self-efficacy enhances students' learning engagement, motivation, and persistence when facing challenging tasks (Meng & Zhang, 2023). Furthermore, self-efficacy has been shown to be a strong predictor of mathematical problem-solving ability (Jamaluddin et al., 2022). These findings suggest that success in mathematics learning is determined not only by cognitive competence but also by students' psychological readiness.

Furthermore, learning difficulties and self-efficacy are closely interconnected. Repeated experiences of learning difficulties may gradually diminish students' self-efficacy, leading to lower engagement in classroom learning. Conversely, students with low self-efficacy are more likely to avoid challenging tasks, demonstrate limited persistence, and exert less effort in solving mathematical problems, thereby exacerbating their learning difficulties (Aswin & Herman, 2022). This reciprocal relationship indicates that cognitive and affective factors should not be viewed as separate components but rather as mutually reinforcing elements within the mathematics learning process.

Despite the growing body of literature on self-efficacy in mathematics education, previous studies have predominantly examined self-efficacy as an independent variable influencing learning outcomes rather than as a consequence of students' learning difficulties. Although empirical evidence has indicated an association between learning difficulties and lower self-efficacy (Supandi et al., 2021), studies specifically positioning learning difficulties as a factor influencing students' self-efficacy remain limited, particularly at the senior high school level.

A preliminary study conducted among eleventh-grade students at SMAN 4 Parepare revealed that students experienced moderate difficulties in logical thinking and problem-solving (mean score = 2.37) as well as in understanding mathematical problems (mean score = 2.66). These conditions were accompanied by a relatively low level of self-efficacy (mean score = 2.50). These preliminary findings suggest that students' learning difficulties may contribute to lower levels of self-efficacy in mathematics learning.

Based on these considerations, the novelty of the present study lies in positioning

learning difficulties as a factor associated with students' self-efficacy rather than treating self-efficacy solely as a predictor of learning outcomes. Therefore, this study aims to describe students' learning difficulties in mathematics learning and explore their relationship with students' self-efficacy. The findings are expected to provide a more comprehensive understanding of the interplay between cognitive and affective aspects of mathematics learning and to serve as a foundation for designing instructional strategies that strengthen not only students' conceptual understanding but also their self-efficacy.

Method

This study employed a descriptive approach using a descriptive qualitative research design. This approach was selected to provide an in-depth description of students' learning difficulties and their relationship with self-efficacy in mathematics learning. The selection of this method was aligned with the research objective, which focused on exploring the relationship between cognitive aspects, represented by learning difficulties, and affective aspects, represented by students' self-efficacy, as identified in the introduction and supported by previous literature.

The participants of this study were 25 eleventh-grade students from SMAN 4 Parepare. Participants were selected using purposive sampling to represent the actual conditions experienced by students in mathematics learning, particularly regarding learning difficulties and self-efficacy. The participants were considered appropriate because they were at an educational stage that requires higher levels of abstract reasoning and mathematical problem-solving. Since the participants were drawn from a single school using purposive sampling, the findings should be interpreted within the context of the participants involved and should not be generalized to broader populations without further investigation.

Data were collected using a student profiling questionnaire designed to identify students' levels of learning difficulties and self-efficacy. The questionnaire was developed based on indicators identified in previous studies concerning mathematics learning difficulties and students' self-efficacy. The use of a questionnaire as the research instrument was considered appropriate because both learning difficulties and self-efficacy can be examined through students'

perceptions of their learning experiences (Kaufmann et al., 2022).

The indicators of learning difficulties included logical thinking ability, problem-solving skills, and conceptual understanding. These indicators were selected because they represent the principal dimensions of mathematics learning difficulties identified in previous studies, particularly those related to conceptual understanding and problem interpretation (Samosir et al., 2024). Moreover, these indicators reflect higher-order thinking skills that are closely associated with mathematical literacy.

The indicators of self-efficacy included students' willingness to answer questions, express their opinions, and actively participate in classroom learning. These indicators were derived from the theoretical concept of self-efficacy, which emphasizes individuals' beliefs in their capability to successfully perform specific tasks (Ibrahim & Aldawsari, 2023). In the context of mathematics learning, these observable classroom behaviors were regarded as behavioral manifestations of students' self-efficacy. Students with higher self-efficacy are generally more willing to participate actively in learning activities, respond to teachers' questions, and express their ideas during classroom discussions because they have greater confidence in their capability to perform academic tasks. Therefore, these indicators were considered appropriate for reflecting students' mathematics self-efficacy within the classroom context. This justification is also supported by previous studies reporting that students' self-efficacy is associated with greater classroom participation and engagement (Nasution et al., 2023).

The questionnaire employed a four-point Likert scale consisting of *strongly agree*, *agree*, *disagree*, and *strongly disagree*, which were assigned scores of 4, 3, 2, and 1, respectively. The score for each item was calculated to obtain the mean score for each indicator. The use of a four-point Likert scale was intended to quantify students' perceptions systematically within the descriptive research framework (Koo & Yang, 2025).

To facilitate data interpretation, the mean scores were classified into three categories: high (3.25–4.00), moderate (2.75–3.24), and low (1.00–2.74), based on the score intervals of the Likert scale employed in this study (Kusmaryono & Wijayanti, 2022). These categories were used

to describe students' levels of learning difficulties and self-efficacy systematically.

Data were analyzed using the interactive analysis model proposed by Matthew B. Miles, A. Michael Huberman, and Johnny Saldaña (2014), which consists of three stages: data reduction, data display, and conclusion drawing. Questionnaire data were first organized according to the predetermined indicators and then presented descriptively using mean scores. Finally, the findings were interpreted to identify patterns indicating the relationship between students' learning difficulties and their self-efficacy in mathematics learning. This analytical procedure was conducted to provide a comprehensive description of the cognitive and affective conditions experienced by the participants.

Result and Discussion

Result

This section presents the findings obtained from the validated student profiling questionnaire administered to the research participants. The data analysis was conducted to provide a comprehensive description of students' learning difficulties and their levels of self-efficacy in mathematics learning. In accordance with the research objectives, the analysis focused on two major aspects: the cognitive aspect, represented by indicators of learning difficulties, and the affective aspect, represented by students' self-efficacy.

The questionnaire data were analyzed by calculating the mean score for each indicator and subsequently interpreting the results based on the predetermined categories of high, moderate, and low. These findings were used not only to describe the condition of each variable but also to identify the tendency of the relationship between students' learning difficulties and self-efficacy. The results are presented systematically according to each research variable.

Students' Learning Difficulties

The analysis of the validated questionnaire revealed that students' learning difficulties in mathematics were generally categorized as moderate. This finding indicates that although students were able to follow the learning process, they continued to encounter challenges in several

aspects of understanding and applying mathematical concepts.

The indicator of logical thinking and problem-solving obtained a mean score of 2.69, which falls within the moderate category. This result suggests that students were generally capable of participating in mathematics learning; however, they still experienced difficulties when solving problems requiring higher-order reasoning and more complex analytical thinking.

Meanwhile, the conceptual understanding indicator achieved a mean score of 3.06, which also belongs to the moderate category and represents the highest score among all learning difficulty indicators. This finding indicates that students demonstrated relatively better conceptual understanding, particularly when mathematical concepts were presented in contextual situations or connected to everyday experiences. Nevertheless, this level of understanding was not consistently reflected in students' ability to apply mathematical concepts to more complex problem-solving situations.

Overall, these findings suggest that students' primary learning difficulties were associated not with understanding fundamental mathematical concepts but with logical reasoning and the application of concepts in problem-solving. In other words, a gap remains between students' conceptual understanding and their ability to apply that understanding when solving mathematical problems. Table 1 summarizes the mean scores for each learning difficulty indicator.

Tabel 1. *Mean Scores of Students' Learning Difficulties*

Learning Difficulty Indicator	Mean Score	Category
Logical thinking and problem-solving	2.69	Moderate
Conceptual understanding	3.06	Moderate

As shown in Table 1, conceptual understanding obtained a higher mean score than logical thinking and problem-solving. Although both indicators were classified as moderate, the difference between the two scores suggests that students experienced greater difficulty in applying mathematical concepts than in understanding them. This finding indicates that the major challenge in mathematics learning lies in transferring conceptual knowledge into problem-solving situations rather than in acquiring basic conceptual understanding.

Students' Self-Efficacy

The results of the validated questionnaire indicate that students' self-efficacy in mathematics learning was categorized as low, with a mean score of 2.05. This finding suggests that many students lacked confidence in their capability to successfully perform mathematical tasks despite participating in classroom learning.

Low self-efficacy was reflected in several classroom behaviors, including students' reluctance to express their opinions during discussions, hesitation when answering teachers' questions, and fear of making mistakes. Although some students demonstrated effort in completing mathematical tasks, many remained uncertain about the correctness of their answers and their ability to solve mathematical problems successfully.

These findings indicate that students had not yet developed adequate mathematics self-efficacy. Limited confidence in their own capabilities appeared to reduce active participation in classroom learning and discouraged students from engaging with more challenging mathematical tasks. Consequently, self-efficacy represents an important affective factor that should receive greater attention in mathematics instruction. Table 2 presents the descriptive results for students' self-efficacy.

Tabel 2. Mean Score of Students' Self-Efficacy

Self-Efficacy Indicator	Mean Score	Category
Students' self-efficacy	2.05	Low

As presented in Table 2, students' self-efficacy was classified as low, indicating that many participants were still hesitant to answer questions, express their ideas, and actively engage in mathematics learning activities. These findings demonstrate that students' confidence in their capability to perform mathematical tasks remains relatively limited.

The Relationship Between Learning Difficulties and Students' Self-Efficacy

The descriptive findings indicate a tendency toward a relationship between students' learning difficulties and their self-efficacy in mathematics learning. This tendency is reflected in the comparison of the mean scores, where learning difficulties were categorized as moderate (logical thinking and problem-solving = 2.69; conceptual understanding = 3.06),

whereas self-efficacy was categorized as low (2.05).

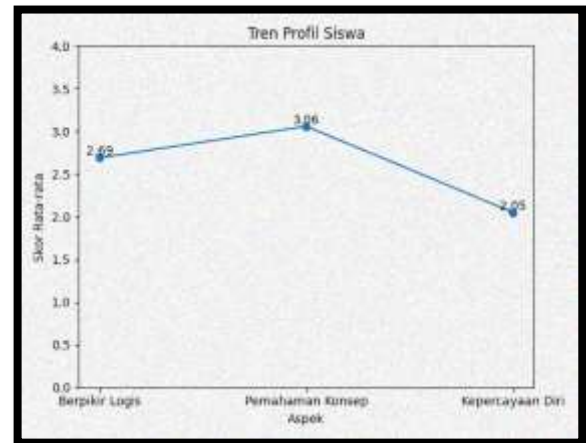


Figure 1. Students Profil Trend

Figure 1 illustrates that students demonstrated relatively stronger conceptual understanding than logical thinking ability, while their self-efficacy remained substantially lower than both cognitive indicators. This pattern suggests that adequate conceptual understanding was not consistently accompanied by strong beliefs in students' capabilities to perform mathematical tasks.

Furthermore, students who experienced greater difficulty in logical thinking and problem-solving tended to demonstrate lower levels of self-efficacy. Although the present study employed descriptive analysis and therefore does not establish causal relationships, the observed pattern indicates that cognitive difficulties may be associated with students' beliefs about their mathematical capabilities.

Conversely, limited self-efficacy may also discourage students from participating actively in classroom learning, asking questions, and attempting more challenging mathematical problems. Consequently, learning difficulties and self-efficacy appear to be closely interconnected within the mathematics learning process. These findings highlight the importance of addressing both cognitive and affective aspects simultaneously to promote more effective mathematics learning.

Discussion

The findings of this study indicate that students' learning difficulties in mathematics were generally categorized as moderate, with logical thinking and problem-solving receiving lower mean scores than conceptual understanding. These findings suggest that although students have acquired an adequate

understanding of mathematical concepts, they continue to experience challenges when applying those concepts to solve more complex mathematical problems. This pattern indicates that students' primary difficulties lie not in conceptual acquisition but in the transfer and application of mathematical knowledge to unfamiliar situations. Such findings are consistent with those reported by Samosir et al. (2023), who found that students frequently encounter difficulties in conceptual interpretation and problem-solving, as well as by Kurniawan et al. (2021), who emphasized the importance of mathematical literacy in supporting successful mathematics learning. The relatively lower performance in logical thinking and problem-solving also suggests that students' higher-order thinking skills require further development. Although conceptual understanding achieved a higher mean score, students appeared to encounter difficulties when transferring their knowledge to analytical and non-routine mathematical tasks. This finding indicates that mathematics instruction may still place greater emphasis on conceptual understanding than on developing reasoning and problem-solving abilities. Consequently, instructional strategies that encourage mathematical reasoning, critical thinking, and authentic problem-solving experiences are essential to bridge the gap between conceptual understanding and practical application.

From the affective perspective, this study found that students' self-efficacy was categorized as **low**, despite their moderate level of conceptual understanding. This finding suggests that cognitive competence alone does not necessarily translate into strong beliefs in one's capability to perform mathematical tasks successfully. Students may understand mathematical concepts but still hesitate to express their ideas, answer questions, or engage actively in classroom learning because they doubt their own abilities. This finding is consistent with Herlawan et al. (2022), who reported that students with low self-efficacy tend to participate less actively in mathematics learning and often demonstrate greater hesitation when solving mathematical problems.

The present findings can be interpreted through the theoretical perspective of Albert Bandura's Social Cognitive Theory, which proposes that self-efficacy is developed through mastery experiences, vicarious experiences,

verbal persuasion, and physiological or emotional states. Students who repeatedly encounter difficulties in logical reasoning and mathematical problem-solving may accumulate unsuccessful learning experiences, which gradually weaken their beliefs in their own capabilities. As a result, they may become less willing to participate actively in mathematics learning despite possessing adequate conceptual knowledge.

A similar interpretation can also be provided through the concept of learned helplessness, which explains that repeated experiences of failure may reduce students' motivation to attempt challenging tasks. When students perceive mathematics as a subject in which success is difficult to achieve, they may avoid participating in classroom discussions, hesitate to answer questions, and become increasingly dependent on teachers or peers. Such behavioral patterns are consistent with the low level of self-efficacy observed in the present study.

An important finding of this study is the descriptive pattern indicating that students who experienced greater learning difficulties also tended to demonstrate lower levels of self-efficacy. Although the present study was not designed to establish causal relationships, the findings suggest that cognitive and affective aspects of mathematics learning are closely interconnected. Students' difficulties in logical thinking and problem-solving appear to coexist with weaker beliefs in their mathematical capabilities, whereas limited self-efficacy may further discourage active engagement in learning. This reciprocal tendency highlights the importance of addressing both domains simultaneously in mathematics education rather than treating them as independent constructs.

These findings have important implications for mathematics instruction. Improving students' mathematics achievement should not focus exclusively on strengthening conceptual understanding. Teachers should also create learning environments that foster students' self-efficacy by providing meaningful mastery experiences, encouraging active classroom participation, offering constructive feedback, and presenting learning activities that enable students to experience gradual success. Such instructional practices may strengthen students' confidence in their mathematical capabilities while

simultaneously enhancing their reasoning and problem-solving skills.

Overall, the findings emphasize that learning difficulties and self-efficacy represent two closely related dimensions of mathematics learning. Effective mathematics instruction should therefore integrate cognitive and affective support, enabling students not only to understand mathematical concepts but also to develop the confidence necessary to apply those concepts successfully in various learning situations.

Conclusion

The findings of this study indicate that students' learning difficulties in mathematics were generally categorized as moderate, with the greatest challenges observed in logical thinking and problem-solving rather than conceptual understanding. Although students demonstrated a relatively adequate understanding of mathematical concepts, they experienced greater difficulty applying these concepts to solve more complex mathematical problems. In contrast, students' self-efficacy was categorized as **low**, indicating that many students lacked confidence in their capability to successfully perform mathematical tasks despite possessing sufficient conceptual knowledge.

The descriptive findings indicate a tendency toward a relationship between students' learning difficulties and their self-efficacy. Students who experienced greater difficulties in logical thinking and problem-solving generally demonstrated lower levels of self-efficacy. Although the present study was not intended to establish causal relationships, the findings suggest that cognitive and affective aspects of mathematics learning are closely interconnected

and should therefore be addressed simultaneously in classroom instruction.

This study contributes to the existing body of knowledge by positioning learning difficulties as a factor associated with students' self-efficacy, whereas previous studies have more commonly examined self-efficacy as a predictor of learning outcomes. In this way, the study provides a broader perspective on the reciprocal relationship between cognitive and affective aspects in mathematics learning and highlights the importance of considering both dimensions when designing instructional interventions.

The findings have important educational implications for mathematics teachers. Efforts to improve mathematics learning should extend beyond strengthening students' conceptual understanding and higher-order thinking skills. Teachers are also encouraged to implement instructional strategies that enhance students' self-efficacy by providing meaningful learning experiences, constructive feedback, opportunities for active participation, and progressively challenging mathematical tasks. Such learning environments may support both students' cognitive development and their confidence in applying mathematical knowledge.

This study was conducted with a limited number of participants from a single senior high school using purposive sampling. Therefore, the findings should be interpreted within the context of the participants involved and should not be generalized to broader populations. Future research is recommended to involve larger and more diverse samples and to employ inferential statistical analyses to examine the relationship between learning difficulties and mathematics self-efficacy more comprehensively

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