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Examining the Influence of Lecturer Support and Classroom Environment on Mathematical Resilience, Self-Efficacy, and Self-Confidence

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Abstract:

This study aims to investigate the relationship between lecturer support, classroom environment, and several student psychological factors such as mathematical resilience, self-efficacy, and self-confidence. The research subjects consisted of 77 mathematics education students. The research instrument was a 38-question questionnaire. The results of data analysis showed that students gave positive responses with an average of 80.03 to lecturer support, 75.66 to the classroom environment, 79.15 to mathematical resilience, 80.57 to self-efficacy, and 75.95 to self-confidence. Furthermore, multiple linear regression analysis showed that lecturer support and classroom environment significantly influenced students' mathematical resilience by 26.7%, self-efficacy by 25.5%, and self-confidence by 30.2%. It can thus be concluded that improvements in lecturer support and the quality of the classroom environment can contribute significantly to improving students' resilience, self-efficacy and self-confidence. Therefore, it is important for educational institutions to continuously improve support and create a conducive learning environment to support students' psychological and academic development. It also provides a deeper understanding of the factors that contribute to students' learning experience. The implications of this finding suggest developing strategies to improve the quality of learning by taking into account aspects of lecturer support and physical and social environmental conditions. Thus, it is expected to support students' academic achievement and personal development optimally.

Keywords: Learning Environments, Lecturer Support, Mathematical Resilience, Self-Efficacy, Self-Confidence

1. INTRODUCTION

Mathematics is often perceived as a challenging subject for many students due to its complexity and the requirement for a deep understanding of related concepts and techniques. Many students experience anxiety or loss of confidence when faced with mathematics lessons Stoehr (2017), particularly due to feelings of inadequacy in comprehending the material or solving problems accurately. In overcoming these difficulties, the classroom environment and support from both lecturers and peers play crucial roles. The support provided by lecturers through clear explanations and approaches tailored to students' abilities can help alleviate confusion and enhance confidence (Miller et al., 2013). Additionally, an inclusive and collaborative classroom environment enables students to share ideas, understandings, and strategies in solving mathematical problems. Group discussions, tutoring sessions, or peer mentoring can also aid in improving comprehension and addressing any arising difficulties.

In an academic context, lecturers are entrusted not only as conveyors of subject matter but also bear the responsibility of providing personal guidance, emotional support, and constructive feedback to students (Nurhayati, 2018). Personal guidance from lecturers may entail individual consultations to assist students in grasping challenging materials or resolving issues encountered during learning. Emotional support from lecturers, such as active listening and offering positive encouragement, is also crucial in helping students cope with academic stress and anxiety (Hsu & Goldsmith, 2021). Constructive feedback

provided by lecturers, whether through performance assessments or direct discussions, enables students to rectify their weaknesses and develop skills continuously.

The classroom environment significantly influences students' perceptions of mathematics (Fan & Williams, 2018). An inclusive classroom atmosphere, where every student feels accepted and valued regardless of background or ability level, can help alleviate anxiety and boost confidence in learning mathematics. Adequate availability of resources such as textbooks, online materials, and computer software also provides students with better access to delve into the subject matter and practice independently. Positive social interaction among peers and with lecturers also plays a crucial role in creating a supportive classroom environment. Group discussions, collaborative task completion, and support from classmates and lecturers can help reinforce understanding and motivate students to learn more effectively (Wong, 2018).

Lecturer support plays a crucial role in students' ability to overcome mathematical challenges (Santosa et al., 2023). Previous research has shown a significant positive relationship between peer social support and student academic resilience (Muhammad & Angraini, 2023). Additionally, the concept of psychological safety, as highlighted in the Mathematical Resilience Toolkit, emphasizes the importance of addressing emotional aspects in learning mathematics to overcome barriers (Arjun & Muntazhimah, 2023). Moreover, studies have indicated that mathematical resilience has a notable impact on students' problem-solving abilities (Apostolidu & Wilder, 2023),(Yendi et al., 2023). Therefore, lecturer support, which can encompass emotional support and encouragement, is essential in fostering students' mathematical resilience and aiding them in effectively tackling mathematical difficulties.

Lecturer support plays a crucial role in strengthening students' confidence in understanding and solving math problems (Wang et al., 2017). Research indicates that collaborative learning with effective instructional methods, facilitated by lecturers, enhances students' conceptual knowledge and confidence in topics like confidence intervals (Solahudin et al., 2022). Additionally, the presence of lecturer support in asynchronous discussion forums can impact student performance positively, although findings may vary (Lawson et al., 2022). Moreover, the digital era emphasizes the importance of students' digital literacy ability and self-confidence, which can be positively influenced by social support from lecturers, ultimately boosting student self-efficacy (Assuah et al., 2022). Therefore, strong lecturer support not only aids in improving students' math problem-solving abilities but also correlates with increased self-efficacy Schunk (2023), highlighting the significant role of lecturer support in enhancing students' overall academic performance and confidence in mathematical skills.

A positive and supportive classroom environment has been shown to significantly impact students' confidence levels in their math abilities. Research indicates that positive attitudes displayed by teachers can enhance students' positive feelings towards mathematics Voisin et al. (2023), while a supportive school and classroom climate can contribute to increased student achievement and compensate for factors like low socioeconomic status (Busari et al., 2023). Additionally, the academic support environment can play a crucial role in enhancing students' affective states Sadoughi & Hejazi (2021), leading to decreased anxiety and increased confidence, ultimately improving academic performance and retention rates (Su, 2023). These findings highlight the importance of fostering a conducive learning environment, cultivating positive attitudes towards mathematics, and investing resources in promoting positive school and classroom climates to boost students' confidence levels and academic outcomes.

Based on the summarized research findings, several gaps can be identified. Despite the research indicating that lecturer support and classroom environment have a positive impact on students' mathematical resilience, self-efficacy, and self-confidence, there are aspects that require further investigation. Firstly, while there is emphasis on the

importance of lecturer support in strengthening mathematical resilience and enhancing students' problem-solving abilities, there is still a lack of understanding regarding concrete strategies that lecturers can employ to provide effective support. Secondly, although the research highlights the significance of a positive classroom environment in increasing students' confidence and skills in mathematics, it remains unclear how to practically create an inclusive and supportive environment across various contexts in mathematics education. Therefore, to address these research gaps, further studies could focus on developing specific strategies for lecturers to offer effective support to students, as well as conducting additional research on the factors influencing the formation of positive and inclusive classroom environments in the context of mathematics education. Thus, the purpose of this research is to determine the level of influence of lecturer support and classroom environment on students' mathematical resilience, self-efficacy, and self-confidence; and to identify strategies and best practices to support the achievement of mathematics education goals at the tertiary level.

2. METHOD

This research uses a quantitative correlational approach to explore the relationship between lecturer support and classroom environment on several variables including mathematics resilience, self-efficacy, and self-confidence in mathematics education study program students. The subjects of this study consisted of 77 students consisting 26 subjects from the 2nd semester, 24 from the 4th semester, 21 from the 6th semester, and 6 from the 8th semester. The sample was taken using purposive sampling method, where students were selected based on certain criteria relevant to the research objectives. The instrument used in this research is a questionnaire consisting of three parts, namely (1) a questionnaire about the classroom environment, used to measure students' perceptions of the classroom environment in the context of mathematics learning; (2) a questionnaire about lecturer support, used to measure students' perceptions of the level of support provided by lecturers in the process of learning mathematics, (3) a questionnaire about student psychology (mathematical resilience, self-efficacy, and self-confidence) which is used to measure their level of ability to understand and solve mathematical problems. Thus, statistically there are two independent variables, namely lecturer support (X1) and classroom environment (X2; and three dependent variables namely mathematical resilience (Y1), self-efficacy (Y2), and self-confidence (Y3).The research procedure is as shown in Figure 1.

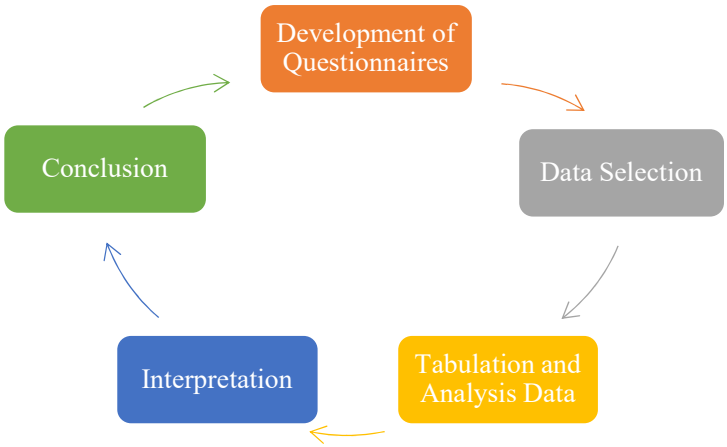

Figure 1. Research Procedure

Figure 1 shows that the first stage was conducted (1) questionnaire development: designing questionnaires for each variable to be measured, namely classroom environment, lecturer support, and math resilience, self-efficacy, and self-confidence. Second, questionnaire distribution: collecting data by distributing questionnaires to purposively selected respondents from both institutions. The questionnaire was prepared using Google Form. Third, data tabulation: collecting and organizing the data obtained from the questionnaire into microsoft excel for processing. Fourth, data analysis: conducting descriptive statistical analysis to describe the characteristics of the sample and analyzing the relationship between variables using multiple linear regression techniques. In this case, researchers used JASP software to facilitate calculations. Fifth, interpretation and conclusion: interpreting the findings of the data analysis results and concluding the research results based on these findings.Data analysis was conducted using multiple linear regression techniques to determine the joint effect of lecturer support and classroom environment on students' math resilience, self-efficacy, and self-confidence. In addition, descriptive statistical analysis was also conducted to provide a more detailed picture of the sample characteristics and variable distribution.

3. RESULT AND DISCUSSION

The data collection process was carried out for a week by paying attention to the accuracy of subjects who fit the criteria, namely mathematics education students. Variables with indicators of lecturer support were 9 questions, classroom environment were 7 questions, mathematical resilience were 7 questions, self-efficacy were 5 questions, and self-confidence were 10 questions. The results of the responses from 77 students on each variable according to Figure 2.

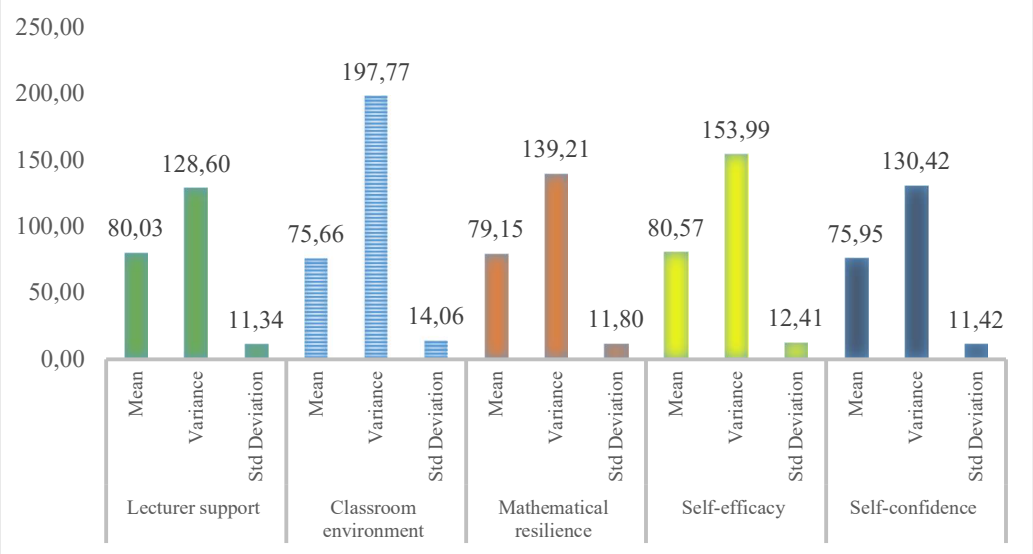

Figure 2. Student response to each variable

Figure 2 shows that on average students gave a response of 80.03 to lecturer support, 75.66 to classroom environment, 79.15 to mathematical resilience, 80.57 to self-efficacy, and 75.95 to self-confidence. Figure 2 shows that students gave a fairly positive response to the implementation of learning both in class and outside the classroom. This can be seen in Figure 2 which shows that on average students gave a response of 80.03 to lecturer support, 75.66 to the classroom environment, 79.15 to mathematical resilience, 80.57 to self-efficacy, and 75.95 to self-confidence. Overall, students feel that they get

good support from lecturers and the classroom environment is also considered quite conducive. Students also showed good resilience in facing mathematical challenges as evidenced by scores that almost reached 80 on mathematical resilience. The students' level of self-efficacy was also very high, indicating that they felt capable and confident in completing their academic tasks. However, their confidence in the context of learning is slightly lower compared to other aspects.

Furthermore, based on the variance and standard deviation values of student responses, it was found that the standard deviation value for lecturer support was 11.34 with a variance of 128.60. This indicates that student responses to lecturer support have a relatively small spread, meaning that student perceptions of lecturer support tend to be consistent. On the other hand, the classroom environment has a standard deviation of 14.06 and a variance of 197.77 which indicates greater variation in student responses to the classroom learning environment. Similarly, mathematical resilience, self-efficacy, and self-confidence each show different standard deviations and variances.

Based on the descriptive statistical results, we conducted hypothesis testing to determine the correlation of each variable. The hypotheses tested are (H1) lecturer support and classroom environment affect mathematical resilience, (H2) lecturer support and classroom environment affect self-efficacy, (H3) lecturer support and classroom environment affect self-confidence. Hypothesis testing using multiple linear regression. The results can be seen in Table 1.

Table 1. Hypothesis test statistic values

Hypothesis	r-value	R^2	F	Sig.	Regression Equation
H1	0,517	0,267	13,474	<0,001	Y = 35,894 + 0,314X1 + 0,239X2
H2	0,505	0,255	12,682	<0,001	Y = 38,592 + 0,217X1 + 0,325X2
H2	0,549	0,302	16,004	<0,001	Y = 39,841 + 0,052X1 + 0,422X2

Table 2 shows that in testing the first hypothesis (H1), the correlation coefficient (r) between lecturer support and mathematical resilience is 0.517. This value indicates a moderate positive relationship between the two variables. The coefficient of determination (R-square) of 0.267 indicates that 26.7% of the variation in mathematical resilience can be explained by lecturer support and classroom environment together. Furthermore, the ANOVA test results showed that the F-value of 13.474 with a significance (sig.) of less than 0.001 confirmed that the regression model constructed as a whole was statistically significant. The regression equation obtained Y1 = 35.894 + 0.314X1 + 0.239X2 illustrates that how much change is expected in mathematical resilience for each unit increase in lecturer support and classroom environment ignoring other variables in the model. Thus, this finding implies that to improve students' mathematical resilience, it is important to strengthen the support provided by lecturers in the learning process and create a conducive learning environment in the classroom.

Furthermore, in testing the second hypothesis (H2), information was obtained that the variables had a significant effect on each other. The correlation coefficient (r-value) of 0.505 indicates a moderate positive relationship between lecturer support and classroom environment with student self-efficacy. The coefficient of determination (R-square) of 0.255 indicates that 25.5% of the variation in self-efficacy can be explained by the two independent variables. The ANOVA test results show an F value of 12.682 with a significance level (Sig.) of less than 0.001 which confirms that the regression model built as a whole is statistically significant. The regression equation obtained, namely Y2 = 38.592 + 0.217X1 + 0.325X2, illustrates the relationship between positive mutual

influence. This result illustrates that lecturer support and classroom environment have a significant contribution in improving students' self-efficacy. Students' self-efficacy in their ability to complete academic tasks can be improved through the active role of lecturers in providing support and creating a conducive learning environment.

Finally, in testing the third hypothesis (H3), information was obtained that there is a significant relationship between lecturer support and classroom environment conditions with student self-confidence. The correlation coefficient between lecturer support and self-confidence is 0.549 which indicates a moderate positive relationship between the two variables. The coefficient of determination (R-square) of 0.302 indicates that 30.2% of the variation in self-confidence can be explained by lecturer support and classroom environment together. Furthermore, the ANOVA test results obtained an F-value of 16.004 with a significance (sig.) of less than 0.001 which indicates that the regression model constructed as a whole is statistically significant. The regression equation obtained Y3 = 39.841 + 0.052X1 + 0.422X2 illustrates the positive relationship between lecturer support (X1) and classroom environment (X2) with self-confidence (Y). By strengthening these factors, educational institutions can potentially increase students' self-confidence in facing academic challenges and other situations in the future.

Some of these findings indicate a degree of variation in student perceptions and responses to the aspects assessed. These results provide a deeper understanding of how students respond to various elements in the learning process which can be used as a basis for improving the quality of learning in the future. One of the benchmarks for the improvement of learning output is to statistically improve student learning outcomes. Nazeri(2016) has examined 50 students to find out the factors that affect self-efficacy and he found that family support and stress control are very influential on student self-efficacy. On the other hand,Radite & Retnawati(2023)has examined 88 teachers and found that competence and self-efficacy are determined by beliefs in oneself, principals (leaders), and aspects of difficulties experienced by teachers. Furthermore, Tania et al.(2024) have conducted a meta-analysis of 9 other research results and found that mathematical resilience has a positive effect on mathematical problem solving ability by 44.49%. Finally, Nabilah et al. (2024) explained that there is a significant influence of resilience, family environment, and ability to self-regulate on mathematics learning outcomes.

The results of this study are in line with several other research results as described. Thus, my study reinforces previous findings on the importance of external support (such as lecturers and family) and a conducive environment in enhancing various positive aspects in students, including mathematical resilience, self-efficacy and self-confidence. However, my study focuses more on the contribution of lecturer support and classroom environment, while other studies highlight aspects of family support and personal factors such as stress control and self-efficacy.

4. CONCLUSION

The results of data analysis showed that on average students gave a response of 80.03 to lecturer support, 75.66 to the classroom environment, 79.15 to mathematical resilience, 80.57 to self-efficacy, and 75.95 to self-confidence. These results indicate that students respond quite well to the implementation of learning both inside and outside the classroom. Furthermore, the results of hypothesis testing show that the variables of lecturer support and classroom environment have an influence of 26.7% on mathematical resilience, 25.5% on self-efficacy, and 30.2% on self-confidence. These findings provide a deeper understanding of the factors that contribute to students' learning experience. The implications of these findings can be used to develop strategies to improve the quality of learning, both in terms of lecturer support and the physical and social conditions of the

learning environment, so as to support students' academic achievement and personal development optimally.

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