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Mapping the Mathematical Resilience of Prospective Elementary Teachers: A Large-Scale Survey Analysis

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Abstrak

Ketahanan matematis merupakan sikap positif agar siswa tidak mudah menyerah dalam menghadapi kesulitan dan menjadi hal yang sangat penting dalam pembelajaran matematika. Tujuan penelitian ini untuk menganalisis dan mendeskripsikan tingkat mathematical resilience mahasiswa calon guru di sekolah dasar. Penelitian ini menggunakan metode survey tipe cross sectional survey yang dilaksanakan di Institut Pendidikan Indonesia (IPI) Garut. Teknik pengambilan sampel ditentukan berdasarkan teknik sampling jenuh. Sampel penelitian ini yaitu mahasiswa Program Studi Pendidikan Guru Sekolah Dasar IPI Garut dengan jumlah 876 mahasiswa. Instrumen yang digunakan dalam penelitian ini adalah kuisioner. Instrument ini digunakan untuk mengukur resiliensi matematika yang memuat empat indicator (nilai, perjuangan, pertumbuhan, dan resiliensi) dan pilihan jawaban, yaitu sangat setuju sampai sangat tidak setuju. Penelitian ini menyimpulkan bahwa tingkat resilience matematis mahasiswa Program Studi Program Studi Pendidikan Guru Sekolah Dasar IPI Garut sudah memadai dengan terpenuhinya setiap indikator resiliensi. Sebagian besar mahasiswa telah memiliki ketahanan dalam menghadapi segala kesulitan selama belajar matematika, seperti meminta bantuan orang lain dan berdiskusi.

***Kata Kunci**: Mathematical Resilience; nilai; perjuangan; pertumbuhan; dukungan.*

Abstract

Mathematical resilience is a positive attitude that encourages students to not give up easily when facing difficulties and is very important in mathematics learning. The purpose of this study is to analyze and describe the level of mathematical resilience of prospective elementary school teacher students. This study used a cross-sectional survey method conducted at the Indonesian Education Institute (IPI) Garut. The sampling technique was determined based on saturated sampling techniques. The sample of this study was 876 students of the Elementary School Teacher Education Study Program at IPI Garut. The instrument used in this study was a questionnaire. This instrument was used to measure mathematical resilience, which contained four indicators (value, struggle, growth, and resilience) and answer options, from strongly agree to strongly disagree. This study concluded that the level of mathematical resilience of students of the Elementary School Teacher Education Study Program at IPI Garut was adequate, with each resilience indicator fulfilled. Most students had resilience in facing all difficulties while learning mathematics, such as asking for help from others and discussing.

Keywords: Mathematical Resilience; value; struggle; growth; support.

I. INTRODUCTION

Mathematics is often perceived as difficult and challenging. Therefore, it is essential to foster students' positive adaptive attitudes toward mathematics to encourage continuous learning (Efwan et al., 2024). This positive adaptive attitude is referred to as mathematical resilience (Ariyanto et al., 2017; Suri & Herman, 2020; Arwadi et al., 2024). The concept encompasses the readiness to face challenges and the ability to adapt in overcoming difficulties.

Resilience relates to one's affective capacity to confront and overcome obstacles and negative situations, transforming them into positive and supportive experiences (Halini et al., 2023; Ariyanto, Supandi, & Kusumaningsih, 2024). Mathematical resilience involves flexibility and the ability to manage emotional challenges that may arise during learning (Johnston-Wilder & Lee, 2024a).

It is not an innate trait but develops through environmental and societal influences, requiring significant effort to face and manage difficulties (Nurhaliza et al., 2024). Mathematical resilience enables students to maintain a positive attitude and perseverance in learning, not only in mathematics, but also in developing soft skills necessary to confront challenges and seek solutions (Iswanto & Faradillah, 2023).

Unfortunately, this anxiety is still common among both teachers and students. Previous research found that teachers in Tasikmalaya City experienced moderate levels of anxiety, characterized by feelings of worry, anxiety, and apprehension about not being able to stimulate their students' development (Ulya et al., 2024). Teachers experience anxiety, fear, and uncertainty about teaching under the current conditions (Nuraeni et al., 2023). They face numerous challenges that make them anxious. Teachers also lack a thorough understanding of child development and experience limited communication.

On the same note, research by Rawa and Yasa (2019) reported that most prospective elementary school teachers exhibited severe levels of math anxiety. This anxiety stems from low confidence in learning, low learning frequency, less conducive learning environments, low mathematical backgrounds, and complex material. Other findings report teacher anxiety that stems from several concerns, including teaching delivery, student preparation for exams, teacher correction, speaking skills, administrative tasks, student demotivation, and even student-induced anxiety (Resmini & Kareviati, 2020).

Based on previous research findings, this phenomenon is concerning because it carries the risk of transmitting anxiety to students. Teachers are the foundation, and their resilience is crucial. Teachers need to transform from anxiety to calm so that this transformation can impact students' anxiety levels (Sopiatunnisa, Afriansyah, & Mardiani, 2024; Maharani & Rahmawati, 2025). Teachers need regular self-management training. Schools must also support this by fostering a positive school culture (Nurpadillah & Afriansyah, 2025).

Teachers' detection of student anxiety is crucial because they are the ones who interact most directly with students in the classroom. Teachers play a strategic role in

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identifying early signs of student learning anxiety through observation, interactions, and learning dynamics. Positive experiences with teachers can help students feel more confident and comfortable (Kristiyanti & Ardhanaputra, 2025).

Research on students' attitudes toward mathematics has been well-documented and has received considerable attention over the years (Fennema & Sherman, 1976; Frost et al., 1994; Hannula, 2002). Several studies in Indonesia—from elementary to higher education—indicate that the level of mathematical resilience (high, moderate, or low) is one of the factors influencing students' academic success (Arjun & Muntazhimah, 2023; Harsela & Asih, 2020a; Hutauruk & Priatna, 2017a; Nurhayati & Ni'mah, 2023; Suprijono, 2020; Wibowo et al., 2018).

Findings from Sari and Untarti (2021) reveal that: (1) students with high mathematical resilience can present multiple solutions and generate new ideas with well-structured and detailed responses; (2) students with moderate resilience offer more than one alternative solution with structured but less detailed answers; and (3) students with low resilience are still able to solve problems with systematic responses. Another study by Marlina and Harahap (2018) suggests that individuals with strong mathematical resilience can face and analyze problems, make appropriate decisions, transform problems into engaging challenges, and turn failure into success and weaknesses into strengths.

Reivich and Shatte (2002) identified seven factors that build resilience: emotional regulation, impulse control, optimism, causal analysis, empathy, self-efficacy, and reaching out. Meanwhile, Kooken et al. (2016) proposed four interrelated components of resilience: value, struggle, growth, and resilience. Johnston-Wilder and Lee (2024) emphasized the influence of interconnected environmental factors—value, growth, struggle, and support—that enable students to develop mathematical resilience.

These factors are generally reflected in the indicators of mathematical resilience proposed by Sumarmo et al. (2019), which include: (1) perseverance, confidence, hard work, and persistence in facing problems, failure, and uncertainty; (2) willingness to socialize, help others, engage in peer discussions, and adapt to the environment; (3) curiosity, reflection, research, and use of various resources; (4) language skills, self-control, and emotional awareness; and (5) the ability to recover from failure to improve and build self-motivation.

These indicators play a significant role in shaping mathematical resilience and serve as the basis for its assessment. Mathematical resilience is a soft skill that prospective teachers must develop (Ariyanto et al., 2017; Muntazhimah & Ulfah, 2020; Suri & Herman, 2020). Being an elementary school teacher is a demanding role. Therefore, students in elementary teacher education programs must prepare themselves to face the challenges of the Industrial Revolution 4.0 and transition toward Society 5.0.

Mathematical resilience can be used to predict students' academic performance (Harsela & Asih, 2020a) and contributes to mathematical literacy skills (Afriyanti et al., 2018). According to Johnston-Wilder and Lee (2024), mathematical resilience reflects students' perseverance and willingness to think, reflect, and explore in learning mathematics. It also represents one's attitude and persistence in solving mathematical problems. This study offers a novel perspective by examining mathematical representation ability through the lens of mathematical resilience indicators, namely value, struggle, growth, and resilience, an aspect not yet explored in previous research.

Based on the above, this study aims to analyze and describe the level of mathematical resilience among prospective elementary school teachers. The findings are expected to serve as a foundation for evaluating and refining instructional tools that support students' resilience levels.

II. METHOD

This study employed a survey method. A survey is a method used to collect information about a large population by using a smaller sample (Rahman, 2023). Specifically, this study used a cross-sectional survey design, as it aimed to describe the characteristics of the population and collect data at a single point in time. The study was conducted at the Institut Pendidikan Indonesia (IPI) Garut. The sampling technique was determined using saturated sampling. The sample consisted of students from the Elementary Teacher Education Program (PGSD) at IPI Garut, totaling 876 students.

The instrument used in this study was a questionnaire designed to measure students' mathematical resilience. This instrument contains indicators of mathematical resilience. The indicators refer to the Johnston-Wilder theory, which consists of value, growth, struggle, and support. The mathematical resilience scale included statements based on four key indicators. Each item was rated using a four-point Likert scale: strongly agree (SA), agree (A), disagree (D), and strongly disagree (SD). The distribution of indicators and the number of items in the mathematical resilience scale are presented in Table 1.

Table 1.
Indicators of Mathematical Resilience (Johnston-Wilder & Lee, 2024a)

No	Aspect/ Dimension	Indicator	Item
1	Value (V)	- Recognizing the benefits of learning mathematics; - Believing that everyone can learn mathematics	V1, V2, V3, V4, V5, V6, V7, V8, V9
2	Growth (G)	- Willing to face challenges in learning mathematics; - Belief that mathematical ability can improve through effort	G1, G2, G3, G4, G5, G6, G7, G8
3	Struggle (S)	- Hard work - Diligence - Understanding that making mistakes is part of the learning process	S1, S2, S3, S4, S5, S6, S7, S8
4	Support (R)	- Recognizing that support can come from various sources (teachers, peers, internet, educational software); - High curiosity and self-reflection for	R1, R2, R3, R4, R5, R6, R7, R8

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No	Aspect/ Dimension	Indicator	Item
		building motivation	

The questionnaire was distributed to all active students of the Elementary Teacher Education Program (PGSD) at IPI Garut during the odd semester of the 2024–2025 academic year, totaling 876 students, through Google Forms. Respondents' answers were measured using a Likert scale, with scores ranging from 1 to 4 for each item.

The validity of the questionnaire instrument was first tested by conducting content validation. The validation process involved experts to test the instrument, particularly on the suitability of each statement item with the mathematical resilience indicators (Salmond, 2008). Furthermore, an empirical validation test was conducted by piloting it on students outside the research sample. The results obtained valid data with a correlation coefficient value between 0.60 and 0.80, which is categorized as high. This means the questionnaire instrument is valid. Next, a reliability test was conducted. Reliability was measured to determine the consistency of the instrument (Kimberlin & Winterstein, 2008). The formula used was Cronbach's alpha. The results of the reliability test showed that the instrument has a high level of reliability because the coefficient value was greater than 0.897. This means the questionnaire was reliable.

The mathematical resilience scale scores of the students were processed using Microsoft Excel and IBM SPSS Statistics 30.0.0.0 (172), and then analyzed using descriptive quantitative methods. The use of both software programs allowed for faster, more accurate, and easier data tabulation and interpretation to support decision-making based on the research findings. The criteria for categorizing levels of mathematical resilience were determined based on the score ranges shown in Table 2.

Table 2.
Levels of PGSD Students' Mathematical Resilience (Azwar, 2017; Nurhayati & Nimah, 2023)

Score Range	Criteria
Score ≥ mean + Standard Deviation	High
Mean – Standard Deviation ≤ Score < Mean + Standard Deviation	Moderate
Score< Mean – Standard Deviation	Low

III. RESULT AND DISCUSSION

A. Result

This section presents a descriptive statistical analysis of mathematical resilience. The analysis was conducted to examine the distribution of each indicator in terms of minimum value, maximum value, mean, standard deviation, variance, skewness, and kurtosis.

Table 3.
Descriptive Statistics on Mathematical Resilience

	N	Range	Minimum	Maximum	Sum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
						Std. Error				Std. Error		Std. Error
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Value	876	27	9	36	21368	24.39	.195	5,759	33,169	-.411	.083	-.071	.165
Struggle	876	24	8	32	18395	21.00	.159	4,694	22,033	-.347	.083	.269	.165
Growth	876	24	8	32	18421	21.03	.138	4,092	16,743	-.523	.083	1,063	.165
Support	876	24	8	32	19899	22.72	.186	5,506	30,320	-.880	.083	.377	.165
Mathematical Resilience	876	99	33	132	78083	89.14	.580	17,174	294,938	-.824	.083	1,125	.165

	N	Range	Minimum	Maximum	Sum	Mean	Std. Deviation	Variance	Skewness	Kurtosis
Valid N (listwise)	876									

Based on the data in Table 3, the following is a description of each mathematical resilience indicator.

This indicator refers to the extent to which students perceive learning mathematics as important for achieving their goals, both in the present and in the future, and view mathematics as a proven contributing factor to success. This indicator consists of nine items, with the students' responses and corresponding percentages presented in Table 4.

Table 4.
Questionnaire Result for Value

Item	Statement	Responses				Percentage			
		STS	TS	S	SS	STS	TS	S	SS
V1	Mathematics is very important for my future.	103	112	484	177	11.8	12.8	55.3	20.2
V2	Mathematics will help my life and career.	79	158	439	200	9	18	50.1	22.8
V3	Mathematics lessons are very helpful for other subjects.	54	203	497	122	6.2	23.2	56.7	13.9
V4	Understanding mathematics greatly helps me achieve a goal.	70	199	496	111	8	22.7	56.6	12.6
V5	Having a strong understanding of mathematics helps me grasp more complex topics.	76	227	459	114	8.7	25.9	52.4	13
V6	People who understand mathematics have more opportunities than those who do not.	85	330	322	139	9.7	37.7	36.8	15.9
V7	Thinking mathematically can help me with things that matter to me.	54	239	463	120	6.2	27.3	52.9	13.7
V8	Mathematics is the key to success in life.	122	345	342	67	13.9	39.4	39	7.6
V9	Mathematics develops thinking skills necessary for success in various careers.	62	222	481	111	7.1	25.3	54.9	12.7

Based on the data in Tables 3 and 4, the categorization for the value indicator is presented in Table 5.

Table 5.
Descriptive Data on the Value Indicator

Value Indicator Level

		Frequency	Percent	Valid Percent	Cumulative Percent
Category	Low	121	13.8	13.8	13.8
	Moderate	327	37.3	37.3	51.1
	High	428	48.9	48.9	100.0
	Total	876	100.0	100.0	

The data in Table 5 shows that the value indicator has the highest percentage, with a result of 100%. The resilience level of undergraduate students tends to be lower due to the burden of completing their thesis. The opposite is true for freshman students majoring in science, who exhibit a higher level of resilience, as indicated by the 438 students in the high resilience category.

Table 6.
Questionnaire Result on Struggle Indicator

Item	Statement	Responses				Percentage			
		STS	TS	S	SS	STS	TS	S	SS
S1	Everyone struggles with mathematics.	138	294	285	159	15.8	33.6	32.5	18.2

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Item	Statement	Responses				Percentage			
		STS	TS	S	SS	STS	TS	S	SS
S2	People with a good understanding of mathematics will experience difficulties when solving problems.	208	433	185	50	23.7	49.4	21.7	5.7
S3	Successful people working in fields related to mathematics also face difficulties when solving challenging mathematical problems.	125	307	367	77	14.3	35	41.9	8.8
S4	Everyone sometimes makes mistakes when doing mathematics.	73	135	346	322	8.3	15.4	39.5	36.8
S5	Struggling is a normal part of doing mathematics.	131	97	362	286	15	11.1	41.3	32.6
S6	My friends sometimes struggle with mathematics.	99	100	470	207	11.3	11.4	53.7	23.6
S7	People who are good at mathematics may fail a difficult math test.	138	275	388	75	15.8	31.4	44.3	8.6
S8	Math teachers sometimes struggle to answer mathematics questions.	120	288	383	85	13.7	32.9	43.7	9.7

Based on data from Table 3 and Table 6, the categorization for the struggle indicator is presented in Table 7.

Table 7.
Descriptive Data on Struggle Indicator

Struggle Indicator Level

		Frequency	Percent	Valid Percent	Cumulative Percent
Category	Low	91	10.4	10.4	10.4
	Moderate	515	58.8	58.8	69.2
	High	270	30.8	30.8	100.0
	Total	876	100.0	100.0	

The data in Table 7 indicate that the struggle indicator had the highest percentage in the moderate category. This result aligns with students' attitudes, which still reflect difficulties when working on complex mathematical problems. The percentage in the moderate category reached 58.8%.

The third indicator relates to growth. This indicator refers to students' belief that their mathematical ability and knowledge can be improved through effort and perseverance. It consists of eight statements, each with four response options: strongly disagree, disagree, agree, and strongly agree. The complete results are presented in Table 8.

Table 8.
Questionnaire Results on Growth Indicator

Item	Statement	Responses				Percentage			
		STS	TS	S	SS	STS	TS	S	SS
G1	Everyone can get better at math if they try.	109	86	362	319	12.4	9.8	41.3	36.4
G2	Math can be learned by anyone.	118	67	299	392	13.5	7.6	34.1	44.7
G3	If someone isn't a "math person," they can't learn much math.	120	320	347	89	13.7	36.5	39.6	10.2
G4	If someone isn't good at math, there's nothing they can do to change that.	212	436	174	54	24.2	49.8	19.9	6.2
G5	A person is either naturally good at math or not.	153	369	298	56	17.5	42.1	34	6.4
G6	I believe a person's math ability is something they are born with.	114	349	359	54	13	39.8	41	6.2
G7	Some people are incapable of learning math.	64	236	491	85	7.3	26.9	56.1	9.7
G8	I believe my math ability can grow.	80	122	401	273	9.1	13.9	45.8	31.2

Based on Table 8, several points can be drawn: (1) The majority of students agreed that anyone can achieve good results in mathematics through effort and learning. (2) Most students agreed that mathematics is a flexible subject that can be learned by anyone. (3) About half of the students agreed that mathematics is easier to learn

for those who already enjoy it. (4) A significant portion of students believed that difficulties in learning mathematics cannot be changed. (5) Some students disagreed with the notion that success in mathematics is always consistent. (6) Many students were not confident that mathematical ability is innate. (7) A majority of students agreed that some people are unable to learn mathematics. (8) Most students believed that their own mathematical ability can improve.

There are notable discrepancies between some of the statements and the responses. For example, statement G4, "If someone is not good at mathematics, there is nothing they can do to change that," contradicts the outcomes of other statements such as G8, "I believe my mathematical ability can develop," and G1, "Everyone can become better at mathematics if they try." The response to statement G4 implies that mathematical difficulties cannot be overcome regardless of effort, whereas G8 clearly reflects students' belief in the potential for improvement. Similarly, in statement G1, most students agreed that everyone can achieve better outcomes in mathematics through effort. These three results reveal a lack of consistency in students' responses.

Several possible factors may explain this inconsistency, including prevailing suggestions or beliefs about the difficulty of mathematics. For some individuals, mathematics is often perceived as a daunting subject, especially by those who do not enjoy it. Many students, at all educational levels—from elementary to university—tend to avoid mathematics. _ This is in contrast to those who choose to pursue mathematics education or pure mathematics at the university level, as they typically do so based on an existing interest or passion.

In addition to analyzing individual statements, this study also categorizes the growth indicator descriptively. The categorization results are presented in Table 9.

Table 9.
Descriptive Data on Growth

Growth Indicator Level

		Frequency	Percent	Valid Percent	Cumulative Percent
Category	Low	79	9.0	9.0	9.0
	Moderate	673	76.8	76.8	85.8
	High	124	14.2	14.2	100.0
	Total	876	100.0	100.0	

Table 9 shows that the growth indicator is predominantly categorized as moderate, with a percentage of 76.8%. This suggests that most students believe in their ability to improve their mathematical competence and knowledge through sustained effort. The results reflect a perception that mathematical abilities are not innate but rather developed through consistent learning.

The next indicator is Support. This indicator refers to students' positive attitudes or responses when facing difficulties. It is represented through eight statements. The results are shown in Table 10.

Table 10.
Survey Results for the Resilience Indicator

Item	Statement	Responses				Percentage			
		STS	TS	S	SS	STS	TS	S	SS
R1	When I do something poorly in math, I know	62	233	515	66	7.1	26.6	58.8	7.5

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Item	Statement	Responses				Percentage			
		STS	TS	S	SS	STS	TS	S	SS
	how to adapt.								
R2	I sometimes feel discouraged by difficulties in math, but I try to bounce back/keep trying.	72	130	468	206	8.2	14.8	53.4	23.5
R3	I have strategies I can use when I get stuck trying to solve a math problem.	56	223	528	69	6.4	25.5	60.3	7.9
R4	When I fail or get a bad grade on a math test, I know I need to work harder.	88	102	389	297	10	11.6	44.4	33.9
R5	R5: When I struggle with math, I go back and study it until I understand.	86	171	435	184	9.8	19.5	49.7	21
R6	When I face difficulties in something related to math, I seek help from others.	102	108	469	197	11.6	12.3	53.5	22.5
R7	I sometimes feel confused by math, but I keep going.	91	123	530	132	10.4	14	60.5	15.1
R8	When I don't do as well as I hoped on a math assignment or test, I keep trying until I can do it.	71	146	443	216	8.1	16.7	50.6	24.7

Based on Table 10, several key points can be drawn: (1) Most students reported knowing how to adapt when encountering difficulties in mathematics. (2) A majority indicated that they try again when they feel discouraged in learning mathematics. (3) Most students have specific strategies for solving mathematical problems. (4) Many students stated that they work harder when they receive low scores on mathematics exams. (5) The majority also revisit difficult material until they understand it. (6) Most students seek help from others when they struggle with learning mathematics. (7) Many reported persisting through confusion in mathematics. (8) Most students said they keep trying to correct their mistakes in assignments or tests. In general, the majority of students agreed that they are willing to take various approaches and work hard when experiencing mathematical difficulties. This reflects a level of resilience among students in coping with challenges through any available means. This finding correlates with the previous indicator. Difficulties in learning mathematics can be overcome through confidence and maximum effort.

In addition to analyzing responses for each statement, this study also categorizes the resilience indicator descriptively. The results of this categorization are presented in Table 11.

Table 11.
Descriptive Data on Resilience Indicator

Resilience Indicator Level		Frequency	Percent	Valid Percent	Cumulative Percent
Category	Low	94	10.7	10.7	10.7
	Moderate	460	52.5	52.5	63.2
	High	322	36.8	36.8	100.0
	Total	876	100.0	100.0	

Table 11 shows that the resilience indicator falls into the moderate category, with a percentage of 52.5%. This indicates that most students have experienced difficulties in learning mathematics and have successfully overcome them through various means, such as collaboration and seeking help to improve their mathematical skills and understanding. Following the analysis of each indicator, this study also calculated the overall mathematical resilience level of students in the PGSD

program at IPI Garut. The results are shown in Table 12.

Table 13.
Mathematical Resilience Level

Mathematical Resilience Level

		Frequency	Percent	Valid Percent	Cumulative Percent
Category	Low	108	12.3	12.3	12.3
	Moderate	533	60.8	60.8	73.2
	High	235	26.8	26.8	100.0
	Total	876	100.0	100.0	

Table 12 indicates that students' overall mathematical resilience level is categorized as moderate, with a percentage of 60.8%. This means that most students have met the criteria across all four indicators of mathematical resilience: value, struggle, growth, and resilience. Among these four indicators, only value was categorized as high, while the other three indicators were categorized as moderate. Therefore, it can be concluded that students possess an adequate level of mathematical resilience.

B. Discussion

The results of this study show that the mathematical resilience level of students in the PGSD Program at IPI Garut falls into three categories: low, moderate, and high. However, the data reveals that the majority of students are categorized at the moderate level. This finding illustrates how students confront challenges in learning mathematics and their perseverance in developing strategies to solve mathematical problems. They demonstrate commendable abilities in overcoming mathematical difficulties through various available efforts. These results align with the theory of resilience, which emphasizes the importance of understanding the mental endurance factors that help students succeed under difficult conditions (Tarrasch & Russo-Netzer, 2026). Resilience refers to an individual's capacity to maintain optimal functioning and confront various life challenges (Hussain et al., 2025). This ability is closely related to the capacity to recover from setbacks and manage anxiety.

Recognizing the value of learning mathematics and believing that everyone can learn it is strongly connected to the willingness to work hard and persist in achieving success. Mathematics has long been proven as a contributing factor to success. In the first dimension, Value, the data is distributed into three categories: high (48.9%), moderate (37.3%), and low (13.8%).

The results presented in Table 5 indicate that the Value dimension received the highest percentage in the high category. This high percentage aligns with students' attitudes, which reflect that mathematics is perceived as important for their future, beneficial for life and work, and that individuals who understand mathematics have more opportunities than those who do not. The proportion of students in the high category was 48.9%.

The results presented in Table 5 show that the Value dimension received the highest percentage in the high category. This high percentage is in line with students' attitudes, which reflect that mathematics is considered important for their future, useful for life and work, and that individuals who understand mathematics have more opportunities than those who do not. The proportion of students in the high category is 48.9%.

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The resilience level of final year students tends to be lower due to the burden of the demands of completing their thesis. In line with the opinion of (Collier & Blanchard, 2024) that final year students also have lower scores for items related to resilience (resilience 1,2,5,7) which indicates a less optimistic mindset in completing their final assignment. This condition reflects a less optimistic mindset in facing and completing the final assignment. In addition, early year PGSD students also require an adequate level of resilience in facing the process of adjusting to the lecture environment, which is often accompanied by high levels of academic stress.

When reviewed based on the background of the major at the previous level of education, PGSD students who come from science majors tend to show a higher level of mathematical resilience than students who come from social studies majors. Students with a science background are generally accustomed to learning characteristics that require logical reasoning, problem solving, and high intensity of practice questions, so they are better prepared to face difficulties in mathematics courses (Wang et al., 2026). In contrast, PGSD students who come from social studies majors have relatively more limited experience in learning mathematics, so they are more susceptible to anxiety and require a longer adjustment time. This condition indicates that the initial academic background plays a role in shaping the mathematical resilience of PGSD students, especially in facing the demands of mathematics material in higher education (Rahmawati et al., 2026).

Students' opinions about the significance of mathematics in their life determine value in this situation. Students are more driven to learn mathematics and more inclined to persevere despite challenges when they believe it to be important. According to Saha et al., (2024), value is the extent to which students comprehend that mastering mathematics is crucial to reaching their success criteria and present or future objectives.

Students with strong value-based resilience exhibit positive responses toward learning mathematics, high motivation, emotional regulation, curiosity, confidence when explaining their work, and persistence in mathematical resilience—particularly in relation to problem-solving abilities (Attami et al., 2020a, 2020b; Callaman & Palompon, 2026; Harsela & Asih, 2020b). This is in line with (Chinn, 2014a) who state that mathematical resilience fosters students' self-confidence, allowing them to persist even in the face of difficulties. Challenging and demanding conditions can actually help shape a supportive environment that promotes positive mathematical resilience among students.

Students who are aware of their potential are able to solve problems without feeling overwhelmed—even in stressful and demanding situations. Those who understand their own strengths and do not rely heavily on others are more capable of solving problems independently and managing stress without displaying excessive emotional reactions (Zanthy et al., 2019). The ability of students to develop resilience is a form of internal

coping strategy that enables them to deal with stress or pressure when facing difficult situations (Taylor & Tyler, 2012).

In the dimension of struggle, students begin to realize that there are various difficulties faced when solving problems in learning mathematics. Even professionals, such as teachers or those working in fields related to mathematics, also face challenges when dealing with complex mathematical problems. Teachers convey to students that experiencing difficulties in learning mathematics is a normal and expected part of the process. This aligns with (Chinn, 2014b), who state that mathematical resilience is an essential concept in education. Therefore, PGSD students need to work hard and practice consistently in working on challenging mathematical problems, such as trigonometry, algebra, and contextual problem solving so that they can form an adequate mathematical resilience profile. This is in line with the opinion of (Steel et al., 2024) which shows that undergraduate students tend to show high resilience attitudes and behaviors, thus contributing to a strong growth mindset and learning strategies, thus having a positive impact on their resilience.

Resilient mathematics learners enjoy engaging with mathematics, appreciate its value, and understand that learning mathematics inherently involves struggle (Hutauruk & Priatna, 2017b). When facing challenges, resilient learners are aware that they can access support. Resilience can be described as a student's effort in confronting and overcoming obstacles (Nusaibah et al., 2024).

Students in the high category demonstrate strong abilities in dealing with mathematical challenges. They tend to possess effective learning strategies, robust mental endurance, and a positive attitude toward learning mathematics. This indicates that they have a greater potential to succeed in understanding and applying mathematical concepts at a deeper level. These results are consistent with previous research, which has shown that students with high resilience are more capable of solving mathematical problems creatively and tend to experience lower levels of anxiety during examinations (Al Ghifari et al., 2022; Lutfiyana et al., 2023; Ulhasna et al., 2024). In line with these findings, Afrilia & Siregar, (2024) reported that strong resilience helps students manage stress, maintain motivation, and reduce the risk of mental health problems.

However, it is important to note that some students still fall into the low category. This indicates the need for additional support to help this group enhance their mathematical resilience. Such efforts must continue, considering the urgency and significance of resilience in academic success. This phenomenon was also found in a study conducted in Surabaya. According to Erwanto et al., (2022) students in metropolitan areas are more likely to experience higher levels of academic, social, and career-related pressures, which require them to develop greater resilience. Meanwhile, students in Malang also face academic stress that can lead to overwhelming pressure, indicating a need for supportive academic environments. These differences reflect how environmental factors influence

students' resilience patterns in responding to academic pressures (Wiyono et al., 2023).

Every student should be able to overcome the stress they face in order to remain socially, academically, and skillfully competent. The dynamic processes they experience serve as a source of strength and personal resilience, enabling them to recover from negative experiences. Previous studies have identified resilience skills as a protective factor in overcoming learning difficulties (Quintiliani et al., 2022). Similarly, Wilks, (2008) found that students with good resilience tend to achieve adequate academic performance. Students with high resilience are more capable of effectively managing various conditions and pressures.

The highest percentage in this study was found in the moderate category. This finding indicates that the majority of students possess a reasonably good level of resilience, although there is still room for improvement. Students in this category are generally able to overcome learning difficulties in mathematics but may still struggle when faced with more complex or demanding situations. This result aligns with the findings of Wahidah (2018), which showed that academic resilience supports problem-solving in life. Similarly, (Mahirah & Herdajani, 2024) agreed that there is a positive relationship between academic resilience and students' self-esteem. Utami, (2020) also reported that one of the efforts to build academic resilience among students can be achieved through gratitude and calmness when dealing with problems.

The study's overall conclusions emphasize the significance of taking mathematical resilience into account as a critical component of learning. Henderson, G., (1999) identified seven characteristics that impact resilience: self-efficacy, empathy, optimism, causal analysis, impulse control, emotional regulation, and reaching out. Resilience is shaped by the presence of both risk and protective factors. Each individual must be able to adapt well to perceive the powerful influence of these two factors. Efforts that can be taken include adopting more interactive learning approaches, providing motivation, and implementing adaptive teaching strategies tailored to students' needs. The development of learning programs or strategies that enhance students' resilience in facing mathematical challenges is essential for creating more effective and meaningful learning experiences.

IV. CONCLUSION

This study concludes that the level of mathematical resilience among students of the PGSD Study Program at IPI Garut is adequate, as each indicator of resilience is fulfilled. Most students have demonstrated the ability to endure difficulties encountered during mathematics learning, such as seeking help from others and engaging in discussions. The findings of this study may serve as a reference or guideline for teachers in designing didactical anticipations to develop learning programs and tools, as well as to address challenges in specific indicators of mathematical resilience. These findings are limited to a

general overview of students' mathematical resilience levels obtained through a survey method. Mathematics lecturers in elementary school teacher education (PGSD) are advised to design learning by providing challenging problems. Learning reflection, group discussions, and constructive feedback should be optimized to help students become accustomed to facing difficulties. Future research can use longitudinal survey methods to gain a deeper understanding of students' mathematical resilience over time.

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