

Math Anxiety Reviewed From Meaningful Learning Through Role Playing

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ABSTRACT. Mathematics anxiety is one of the psychological factors that can influence students' engagement, confidence, and performance in mathematics learning. Learning approaches that are contextual, interactive, and connected to students' real-life experiences are therefore needed to create a more supportive mathematics learning environment. This study aims to describe students' mathematics anxiety through the implementation of meaningful learning using role-playing activities. This research employed a descriptive qualitative approach integrated with Classroom Action Research (CAR), which was conducted through several cycles consisting of planning, action, observation, and reflection. The subjects were seventh-grade students at a junior high school in Blitar Regency. Data were collected through classroom observations, mathematics anxiety questionnaires, student responses, and learning achievement tests. The data were analyzed descriptively by comparing students' participation, attitudes, confidence, and responses across the learning cycles. The findings indicate that the implementation of meaningful learning through role-playing created a more active, contextual, enjoyable, and interactive mathematics learning environment. Students became more actively involved in learning activities, demonstrated greater willingness to participate in mathematical discussions, and showed more positive attitudes toward mathematics. The results also indicate a decrease in observable manifestations of mathematics anxiety, particularly in students' hesitation, fear of making mistakes, reluctance to participate, and lack of confidence when solving mathematical problems. The integration of meaningful learning and role-playing enabled students to connect mathematical concepts with concrete situations and social interactions, thereby making mathematics learning more meaningful and less threatening. These findings suggest that role-playing-based meaningful learning can be considered an alternative pedagogical strategy for addressing mathematics anxiety while simultaneously promoting student engagement and confidence in mathematics learning.

Keywords: Mathematics anxiety, meaningful learning, role playing, similarity, junior high school students.

INTRODUCTION

Mathematics learning is not only oriented towards achieving students' cognitive abilities, but also needs to pay attention to the student's affective condition during the learning process (Karadona & Sari, 2025; Nurfadhilah et al., 2026; Rahma et al., 2024; Sholehh & Viktoria, 2026). One of the affective problems that often arise in mathematics learning is mathematics anxiety. Mathematics anxiety is an emotional condition in the form of fear, tension, worry, nervousness, and lack of confidence when students are faced with learning, assignments, and mathematical evaluations. This condition can hinder concentration, reduce learning motivation, and affect students' ability to understand mathematical concepts optimally (Adzahra & Effendi, 2024; Gumilar, 2023; Prasetyaningtyas et al., 2022). Math anxiety often arises because the learning process is still teacher-centered and does not actively involve students. One-way learning, emphasizing memorization of formulas, and lack of connection with students' real experiences cause mathematics to be considered a difficult and stressful subject (Purba & Silalahi, 2026; Ramadhani

& Rezkillah, 2025). In addition, the presentation of abstract and complex material can increase the cognitive load of students during learning. Because human working memory is limited, according to cognitive load theory, students who are exposed to too much information at once, students will have difficulty processing information which has an impact on the emergence of confusion, depression, and anxiety in learning mathematics (Lailli et al., 2026; Sari et al., 2025; Sweller, 1988). Learning conditions that lack meaningful learning experiences also cause students to tend to be passive and have difficulty understanding mathematical concepts in depth (Prasetyo & Juandi, 2023). These problems were also found in mathematics learning in grade VII E SMP Negeri 01 Garum. Based on the results of initial observations, there are still students who show signs of math anxiety, such as being afraid to ask questions, reluctant to express opinions, lack of confidence when working on problems in front of the class, and looking tense when participating in mathematics learning. This condition is increasingly evident when students study regeneration materials that require an understanding of concepts and abstract thinking skills. Consequently, an educational setting that can foster a more active, fun, and meaningful learning atmosphere is needed so that students can better understand mathematical concepts and reduce anxiety experienced during learning.

One approach that can be used to overcome these problems is meaningful learning. Meaningful learning theory Ausubel explained that learning will be easier to understand if new knowledge is connected to the initial knowledge that students already have. Students who engage in meaningful learning not only retain topics but also comprehend how they relate to real-world events. Students can have a deeper understanding of the subject matter by learning in a context that is pertinent to their experiences and reduce the pressure on learning maths (Hayati et al., 2025; Kusuma et al., 2025; Nuriana & Hotimah, 2023). Meaningful learning also involves the interconnectedness between the intellectual and emotional aspects of students so that the learning process becomes more effective and lasts longer in students' memories (Nurahlina & Aprilia, 2025). The role-playing method is one of the methods that is in accordance with the principle of meaningful learning because it involves students directly in the learning experience. The role-playing method is a way of presenting learning through the demonstration of a certain behavior or situation so that students can learn through direct experience and social interaction (Rizkiyatul Musthofiyyah, 2025). Through role-playing, students can act out certain situations related to learning materials so that learning becomes more active, communicative, and fun. In building materials, role play can be applied through simulation of photo printing activities. In this activity, students play the role of printing operators, designers, quality control, observers, and customers to understand the concept of comparing the size of a photo that is enlarged or reduced without changing its original shape. These activities allow students to understand the concept of revival concretely through direct experience.

Several previous studies have shown that the application of meaningful learning and role-playing methods has a positive impact on mathematics learning. Research (Yulianeta, 2024) It shows that *role playing* techniques can help reduce student learning anxiety because students are actively involved in learning and feel more comfortable during the learning process. In addition, Fibra Dio Kusuma's research, (2025) shows that Ausubel's meaningful learning can help improve students' understanding of mathematical concepts by associating the material with the cognitive structure that students already have. However, research examining the application of meaningful learning through role-playing methods to students' mathematical anxiety in the material is still limited. This study has novelty in the application of meaningful learning combined with role-playing methods in mathematics learning to describe students' mathematical anxiety in development materials. Learning is designed through photo printing simulations that are close to students' experiences so that students can understand the concept of coexistence in a more concrete, active, and contextual way. It is anticipated that this research will offer an alternative to teaching mathematics that considers students' affective states throughout the learning process in addition to their cognitive abilities. This study aims to characterize the mathematical anxiety of students in

grade VII E SMP Negeri 01 Garum through the application of meaningful learning through role play in the recovery material.

METHOD

This research is a class action research (PTK) with one cycle, consisting of three meetings. The subjects in this study are students in grade VII E SMP N 01 Garum which totals 30 students. The instruments used to collect data included student mathematics anxiety questionnaires, observation sheets on the implementation of teacher and student learning, and final cycle tests. The level of anxiety experienced by students can be seen from the results of the calculation of the answers given by students on the following anxiety scale:

Table 1. Likert Anxiety Scale

Statement	Interval Scale			
	SS	S	TS	STS
Positive	4	3	2	1
Negative	1	2	3	4

The total number of scores can be obtained by summing each answer score on each statement. Anxiety levels can be categorized in the following table:

Table 2. Math Anxiety Level

Total Score	Anxiety Level
40 - 50	High Anxiety
30 - 39	Moderate Anxiety
20 - 29	Low Anxiety
10 - 19	Not Experiencing Anxiety

Source: Adaptation of Freedman (2020)

To analyze the results of observations on the implementation of teacher and student learning, the following formula is used:

$$NP = \frac{R}{SM} \times 100\%$$

Description:

NP: the percentage value sought or expected

R : the raw score obtained by the teacher

SM: the ideal maximum score of the observer in question is a fixed number

The percentage obtained is then classified with the following criteria:

Table 3. Criteria for Observation Sheet Analysis Results

Percentage	Criteria
$85,00, \% \leq NP < 100,00\%$	Excellent
$75,00, \% \leq NP < 85,00\%$	Good
$65,00, \% \leq NP < 75,00\%$	Enough
$55,00, \% \leq NP < 65,00\%$	Less
$00,00, \% \leq NP < 55,00\%$	Less Than Once

Source: Adaptation of Arikunto (2017)

RESULT AND DISCUSSION

Result

The following table displays data from the analysis of how teachers and students implemented learning through role-playing in the first cycle:

Table 4. Results of Observation of the Implementation of Teacher Learning Cycle I

Meetings	Observer	Age	Percentage (%)	Average	Criteria
1	1	94	84%	87%	Excellent
	2	101	90%		Excellent
2	1	113	97%	92%	Excellent
	2	101	87%		Excellent

Table 5. Results of Observation of the Implementation of Student Learning Cycle II

Meetings	Observer	Age	Percentage (%)	Average	Criteria
1	1	93	83%	81%	Excellent
	2	89	79%		Good
2	1	104	90%	87%	Excellent
	2	98	84%		Good

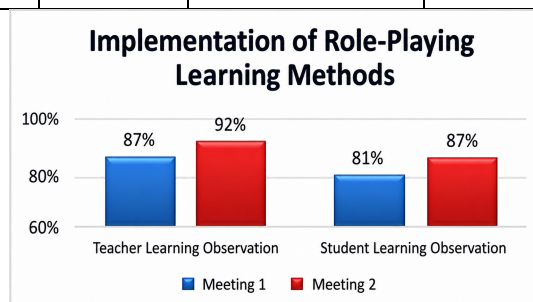


Figure 1. Improving the Implementation of Learning Meetings 1 and 2

From the results of the average percentage of teacher learning implementation of meetings 1 and 2 respectively 87% and 92% where both have achieved very good criteria. Likewise, the average percentage of learning implementation scores of students in meetings 1 and 2 who have achieved the criteria is very good and good, namely 81% and 87% respectively. This demonstrates that the teacher and student learning implementation has satisfied the research success indicators, namely the score on good criteria. Diagram 2 shows how the application of the lessons learned from meetings 1 and 2 has improved. From meeting 1 to meeting 2, there was a 5% increase in observations of teacher learning implementation and a 6% increase in observations of student learning implementation. This increase occurred due to the efforts made by the researcher at meeting 2 to overcome the obstacles that arose at meeting 1 as explained at the reflection stage. In addition to increasing the learning implementation activities of teachers and students, the application of role-playing learning methods can reduce students' anxiety levels in meetings 1 and 2 which can be seen in the following table:

Table 6. Analysis of Students' Mathematics Anxiety Questionnaire

Total Score	Math Anxiety Level	Meeting 1	Meeting 2
40 - 50	High Anxiety	38%	23%
30 - 39	Moderate Anxiety	41%	63%
20 - 29	Low Anxiety	17%	10%
10 - 19	Not Experiencing Anxiety	3%	3%

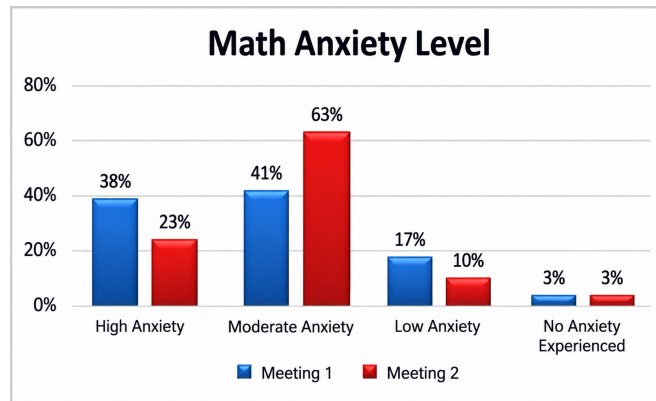


Figure 2. Student Mathematics Anxiety Level Questionnaire Recapitulation

At meeting 1, most of the students were in the category of moderate anxiety, which was 41%. Furthermore, 38% of students were in the high anxiety category, 17% of students were in the low anxiety category, and only 3% of students did not experience math anxiety. According to this statistics, most kids still have moderate to severe arithmetic anxiety. At meeting 2, there was a change in the student's anxiety level. The percentage of students who experience high anxiety decreased from 38% to 23%. Meanwhile, the category of anxiety is increasing from 41% to 63%. The low anxiety category decreased from 17% to 10%, while the non-anxiety category remained at 3%. Overall, the results showed a decrease in the number of students experiencing high math anxiety by 15%, which indicates that students' math anxiety began to decrease after the implementation of learning at the second meeting. The decrease in the high anxiety category and the increase in the moderate anxiety category indicate that some students who previously experienced high anxiety switched to lower anxiety levels. Thus, applied learning has a positive impact on the reduction of students' math anxiety, although most students are still in the category of moderate anxiety. Based on the results of tests and observations, it can be concluded that their response since the application of the role-playing learning method feels happy, because it is interspersed with drama scenes in learning, so that they are entertained and reduce their fear of mathematics. Students' enthusiasm for learning mathematics increases because the anxiety symptoms they experience decrease. In fact, some of them hope that the role-playing learning method will also be applied in other subjects.

Discussion

The study's findings demonstrated that from the first to the second meeting, more role-playing learning techniques were used. The implementation of learning rose from 87% in the first meeting to 92% in the second, according to the findings of the teachers' observations. In the meantime, student activity observation results rose from 81% to 87%. According to the research, role-playing learning is more successful when students can actively participate in the learning process and start to comprehend how the activities flow. This rise in use suggests that role-playing techniques can provide students directly involved in the mathematics learning process with a more significant, dynamic, and captivating learning environment. Meaningful learning through role-play provides students with the opportunity to connect mathematical concepts with real-life experiences they encounter in everyday life. When students engage in a particular role, they not only passively receive information, but also build understanding through hands-on experience. This condition contributes to the reduction of fear and tension towards mathematics which has been one of the causes of *mathematics anxiety*. Through role-playing activities, students can learn in a more relaxed atmosphere so that the psychological stress that often arises during math learning can be minimized. The results of this study are consistent with research by (Ghina Muthia Afifah, 2025), who discovered that the role-playing approach might boost student engagement and foster an

enjoyable learning environment, increasing students' confidence in adhering to the learning process. Students who are more confident feel more at ease asking questions, having discussions, and finishing tasks, all of which help to reduce learning anxiety. The study's findings also corroborate Ausubel's idea of meaningful learning, which holds that students will comprehend new material more readily if it is connected to their prior knowledge and experiences.

Teachers are becoming more adept at handling role-playing learning, as seen by the rise in teacher activity implementation from 87% to 92%. In addition to presenting the subject, the teacher also serves as a facilitator, guiding students to discover the purpose of their learning through the activities they engage in. Teachers' skills in managing the classroom are crucial because the success of role-playing methods depends on the teacher's ability to create situations that encourage students' active participation. The better the implementation of learning by teachers, the greater the chance for students to have a positive and meaningful learning experience. In addition, the increase in student activity from 81% to 87% shows that students are increasingly involved in the learning process. This active involvement is one of the indicators that meaningful learning through role play can increase students' motivation to learn. According to Anisa Masyitoha's research, (2024) active involvement in learning can reduce academic anxiety because students feel in control of the learning process they are undergoing. When students are actively engaged, they tend to focus more on the problem-solving process than on the fear of making mistakes. In the context of mathematical anxiety, the results of this study show that meaningful learning through role play can be an effective alternative learning strategy. Math anxiety often arises because students perceive math as a difficult, abstract, and stressful subject. Through role-playing, mathematical concepts are presented in a more concrete form and close to students' lives so that negative perceptions of mathematics can be reduced. When students feel comfortable and enjoy the learning process, their anxiety levels tend to decrease and their ability to understand math concepts improves. The findings of this study are also reinforced by research published in the *International Journal of Instruction*, which shows that active and collaborative learning strategies can increase student engagement as well as reduce learning anxiety in subjects that are considered difficult. Learning that puts students at the center of learning activities is proven to be able to create a more positive learning experience and support the development of students' cognitive and affective aspects. Therefore, the increase in the implementation of role-playing methods seen in this study shows that meaningful learning through role-playing has the potential to be a solution in overcoming mathematical anxiety in students.

CONCLUSION

The implementation of meaningful learning through the role-playing approach in the recreation material in grade VII E SMP Negeri 01 Garum is able to generate an active, engaging, and student-centered learning process, according to the research and discussion findings. This is demonstrated by the rise in student learning implementation from 81% to 87% and instructor learning implementation from 87% to 92%, both of which fall into the good to very good range. The improvement demonstrates the effectiveness of using role-playing techniques in mathematics education. Additionally, students' levels of math anxiety are positively impacted by the application of meaningful learning through role play. At the first meeting, 38% of students reported having severe arithmetic anxiety; at the second meeting, that number had dropped to 23%. This program demonstrates how kids can feel more at ease and confident when learning arithmetic by practical experience, social interaction, and application to real-world scenarios. The findings of the students' observations and answers further demonstrate that the role-playing approach improves the learning environment, eases the stress associated with learning mathematics, and boosts student engagement and excitement. As a result, meaningful learning through role-playing techniques can be employed as an alternate teaching method to lessen arithmetic anxiety while raising the standard of instruction in the classroom. To get a more complete picture of its efficacy on students' cognitive

and affective features, more research is advised to apply this method to other mathematics materials and over a longer time period.

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