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Mathematical Anxiety Profile Of Junior High School Students Based On Gender In Artificial Operations

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Abstract

Mathematics anxiety has been widely recognized as a factor contributing to low mathematics achievement, including Indonesia's performance in international assessments. This study aimed to map the level of mathematics anxiety among seventh-grade junior high school students in integer arithmetic and to examine differences based on gender. A descriptive quantitative approach supported by qualitative data was employed, involving 58 seventh-grade students from two classes of a public junior high school in Bitung City, selected through purposive sampling in November 2025. The primary instrument was a 29-item mathematics anxiety questionnaire using a four-point Likert scale adapted from the Short Mathematics Anxiety Scale, complemented by classroom observations and interviews to strengthen the findings. Data were analyzed using descriptive statistics to classify anxiety levels, the Shapiro–Wilk test for normality, and inferential analysis through independent t-tests and the Mann–Whitney U test. The results indicate that students' mathematics anxiety predominantly fell within the moderate category, while low and high anxiety levels were less prevalent. Inferential analysis revealed no statistically significant differences in mathematics anxiety either between classes or across gender, although male students exhibited slightly higher mean anxiety scores than female students. These findings

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highlight the need to develop inclusive mathematics learning strategies that are responsive to students' affective dimensions at the junior high school level.

Keywords: Mathematics Anxiety; Integer Arithmetic; Junior High School Students, Gender

INTRODUCTION

Mathematics own fundamental position in form ability think logical, analytical, systematic, critical, and creative that becomes demands main education 21st century. Role strategic This is universal and becomes prerequisite mastery knowledge knowledge as well as technology at the global level. However Thus, the achievement competence mathematical student often hampered by anxiety mathematically, namely condition emotional in the form of fear, tension and worry when face to face with activity mathematics (Kadarisma et al., 2019). Anxiety This impact directly on the decline capacity cognitive, motivational learning, and quality solution problem. Condition the reflected in the achievements Indonesia's international ranking, where the 2019 TIMSS results placed Indonesia at the top of the world rankings. lower with scores below the international average, while PISA 2022 returns show low literacy mathematics students. More from half participant educate reported experience anxiety tall moment do question mathematics, strengthening indication that problem affective become factor crucial in low performance mathematics national (Cholissodin et al., 2023). Findings This in harmony with national data post-pandemic which shows height proportion junior high school students with anxiety mathematical category currently until tall (Kadarisma et al., 2019).

Anxiety mathematical No only implications for the results Study term short, but also has an impact on trust self, ability concentration and orientation academic and career students in the future. Various study international confirm that student with level anxiety tall tend experience decline significant performance in test mathematics standards, as well as show trend avoid field studies based science, technology, engineering, and mathematics (Zhang et al., 2024). In Indonesian context, the weakness mastery mathematics influenced factor affective This the more widen gap competence, especially when only part small capable students reach standard minimum competency (Yufa et al., 2023). If No handled in a way systematic, condition the potential weaken quality source Power Indonesian people in the midst demands very digital economy depends on ability numeracy and reasoning mathematical (Wahyuningrum & Latifah, 2020).

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Theoretical and empirical studies show that anxiety mathematical influenced by various factors, one of which is is gender. A number of study international report that student Woman tend own level anxiety mathematical more tall compared to student men, even though ability cognitive both of them relatively equivalent (Usman & Widyastuti, 2024). In Indonesia, the findings similar has reported, however part big study Still focused on a particular area and not yet Lots study context non- Javanese areas. Apart from that, research that is specific map anxiety mathematics on the material operation count number round in class VII of junior high school with analysis gender differences and use instrument standardized Still very limited, especially during the period post-pandemic (Center, 2023). Conditions This show existence gap necessary research filled through approach more empirical comprehensive and contextual (Skillen et al., 2018).

Based on framework theory affective in learning mathematics, in particular revision Bloom's Taxonomy by Krathwohl emphasizes role dimensions emotional in achievement cognitive, research This designed use approach quantitative descriptive comparative study (Ramdhani Putri & Bondan Widjajanti, 2019) This aim give description empirical about level anxiety mathematical student class VII SMP on the material operation count number round as well as test the difference based on gender. With involving Public Junior High School students in Bitung City as subject research, results studies This expected can enrich literature education mathematics in Indonesia, at the same time become base development strategy more learning inclusive and responsive to aspect affective students (Putri, 2020). In practical, findings study This expected give recommendation for math teachers in designing intervention capable learning pressing anxiety mathematical and improve quality learning at junior high school level (Yasin et al., 2019).

METHOD

Study This use approach descriptive quantitative with qualitative data support For strengthen interpretation results. Approach This aim For map level anxiety mathematical student as well as review based on gender (Seng, 2020). Research This conducted in November 2025 at one of the public junior high schools in Bitung City North Sulawesi Province in the first semester year academic year 2025/2026 (Noto et al., 2017). Population used in studies This is all over student seventh grade at a junior high school in Bitung City. Subject sample chosen with purposive sampling, then taken two class with a total of 58 students as respondents (Nurkarim et al., 2024). Respondent data as in Table 1.

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Table 1. Distribution Sample based on class and *gender*

Gender	Class		Total
	VII- 1	VII- 2	
Man man	15	14	29
Woman	14	15	29
Total	29	29	58

Procedure study started from manufacturing instruments, taking sample class and distribution questionnaire anxiety In class VII-1 and VII-2, observation and interviews. The instruments used is sheet questionnaire anxiety mathematical as much as two twenty nine statements positive and negative with four Likert scale used For measurement adapted math anxiety from the Anxiety Scale Mathematical Students (SKMS) who have been tested For junior high school students (Ningsih et al., 2023). Analysis This use analysis statistics descriptive and inferential namely the normality test (Shapiro-Wilk), t-test or Mann-Whitney U (if abnormal) (Yapatang & Polyiem, 2022). Criteria score questionnaire with four The Likert scale is presented in table 2 and table 3.

Table 2. Criteria Score Questionnaire Anxiety Mathematical

Choice Answer Statement	Rating Scale Statement Positive
Very agree	1
Agree	2
No agree	3
Very No agree	4

Table 3. Criteria Score Questionnaire Anxiety Mathematical

Choice Answer Statement	Rating Scale Statement Negative
Very agree	4
Agree	3
No agree	2
Very No agree	1

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RESULTS AND DISCUSSION

Analysis anxiety mathematical student in a way classical This For see How anxiety mathematical student For second analyzed class. Anxiety level mathematical student shared become three category, namely high, medium and low. Classification score questionnaire using the ideal mean (Mi) and deviation standard (SDi) with rule where Mi = ½ (score highest + score lowest) and SDi = ⅓ (Mi). Data recapitulation is presented in table 4.

Table 4. Mathematical anxiety scoring criteria.

Interval Value	Criteria	Interval Score
Min score to (Min score + Interval)	Low	29 ≤ X ≤ 58
(Min score + interval +1) to (Min score + 2 x interval)	Currently	59 ≤ X ≤ 88
(Score Min +2 x interval +1 s/d score liver	Height	89 ≤ X < 116

Score anxiety Mathematical (X) in measurement This use score ideal height = 4 x 29 = 116, score lowest ideal 1x29 = 29, Mi = ½ (116 + 29) = 72.5. For share into 3 categories (low, medium, high) with share range score with amount category, interval = (116-29) : 3 = 29. Testing hypothesis use normality (Shapiro-Wilk), t-test and Mann-Whitney U with level tolerance 5% trust. We build hypothesis study quantitative based on established theories, conditions and criteria in study and based on study previously. Questions study First is How level anxiety mathematical students in one school medium The first in Bitung City ? Hypothesis study This is anxiety mathematical students in one school medium first in Bitung City. From observations (Marasabessy et al., 2021), the average students in Bitung City No like lesson mathematics. That is, the score anxiety the minimum average mathematics is in the interval 89 ≤ X < 116. So hypothesis the statistics is the average anxiety minimum score of 89. With statistical hypothesis as following :

Ho: μ ≥89 (level anxiety junior high school students are in category tall)

Ha: μ < 89 (level anxiety junior high school students are in category under level tall)

Following is results descriptive level acquired anxiety student based on amount students in table 5.

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Table 5. Distribution level anxiety student

Anxiety level	Frequency	Percent
Low	21	33.9
Currently	36	58.1
Tall	1	1.6
Total	58	100.0

In a way descriptive, level anxiety incoming students category tall only one person (1.6%), in the category low as many as 21 students (33.9%), while in the category currently there were 36 students (58.1%). This show part big student experience anxiety mathematical.

Table 6. Statistics descriptive anxiety student.

N	Mean	Std. Deviation	Std. Mean Error
58	61.62	11.423	1.4991

The data in table 6 shows that the average level anxiety of 58 students is 61.62 things This show that level anxiety mathematical student is in the category moderate ($59 \leq X \leq 88$). So can predicted suspicion beginning level anxiety student at school medium First No proven. For more evidence valid, we do hypothesis testing use analysis statistics inferential t-test one side because of the data scale interval and distribution normally. The results of the t-test one side found in table 7 below This.

Table 7. Statistics Inferential t-test one side.

T	df	Sig. (2- tailed)	Mean Difference
- 18,254	57	,000	- 27,37931

The data in table 7 shows sig value is 0.000. Because the sig value < $\alpha = 0.05$, it means We reject Ho. So level anxiety mathematical student not enough of 89.

Question study second is whether There is difference level anxiety between students who are in different classes ? Hypothesis question This is that student in different classes have differences level anxiety Because condition background behind students (Nabila et al., 2025). Distribution level anxiety mathematical student based on class presented in table 8:

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Table 8. Distribution of students' anxiety level by class.

Class	Mathematical Anxiety Level			Total
	Low	Moderate	High	
VII-1	10	19	0	29
VII-2	11	17	1	29
Total	21	36	1	58

Distribution level anxiety mathematical student according to class, where out of 58 respondents class VII-1 and VII-2, as many as 21 students (36.2%) experienced anxiety low, 36 students (62.1%) anxiety moderate, and only 1 student (1.7%) at the level high. This pattern signify domination anxiety currently in second place class, with A little variation between group. This is in harmony with Sanger & Lamboan (Mukhlisa et al., 2024) that anxiety currently is condition best For support performance academic. However, the anxiety is excessive can disrupt the learning process and reduce results academic in a way significant. Therefore that 's important For find the right balance in manage anxiety academic (Nabila et al., 2025) . Descriptive statistical distribution anxiety based on class presented in table 9.

Table 9. Descriptive statistics of students' anxiety based on class.

Class	VII-1	VII-2
N	29	29
Mean	60,483	72,759
Std. Deviation	10,8121	12,0850
Minimum	39,00	43,00
Maximum	80,00	107,00
Anxiety Level	Sedang	Sedang

Table 9 shows average level difference anxiety student from every class in a way descriptive. If seen based on criteria second table 3 class is in the interval $59 \leq X \leq 88$. This means that the level anxiety mathematical second class be at the level moderate. For can ensure whether or not there is difference level anxiety between all students, then following This is

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statistical test results inferential using the Mann-Whitney test. We performed this test Because One data group no normally distributed (Muhsana, 2020).

Ho: VII-1 = VII-2 (no There is significant difference improvement anxiety student between second class)

Ha: VII-1 = VII-2 (exists significant difference ranking sub-district student between second class)

Difference ranking second class using the Mann-Whitney test is presented in table 10.

Table 10. Inferential statistics by class.

CLASS	N	Mean Rank	Sum of Ranks
VII-1	29	28,48	826,00
VII-2	29	30,52	885,00
Total	58		

From the Mann Whitney test it was confirmed that the interval between second existing classes own level difference in average rank. In other words, there is difference ranking anxiety mathematical between class VII-1 with class VII-2 (Mangkuwibawa et al., 2024). Although the interval different If seen from category, second class are at the same interval, namely level anxiety currently. Following is statistical test results Mann-Whitney inferential in table 11.

Table 11. Inferential statistical test of Mann-Whitney U

	Skor Kecemasan
Mann-Whitney U	391.000
Wilcoxon W	826.000
Z	-.460
Asymp. Sig. (2-tailed)	.646

The Mann-Whitney U test yields Z value = -0.460 with level significance two direction of 0.646 (p>0.05), so hypothesis zero (H0) is accepted. This is indicates No existence difference significant in distribution score anxiety mathematical between second class.

Question third whether There is difference level anxiety between men and women ? Hypothesis his research is there is significant difference level anxiety mathematical between men

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and women. Anxiety levels woman more tall than men. Based on a number of study previously, in general, women more dominant own anxiety excessive mathematics compared to with man (Ma & Sun, 2025). Statistical test results following using the t-test from two different averages For know whether There is difference level anxiety between boys and girls at school intermediate first. Distribution anxiety student according to type sex below in table 12.

Table 12. Mathematical anxiety distribution of students by gender. Gender The Level of Math Anxiety

	Low	Moderate	High	Total
Man	9	19	1	29

Table the describe distribution level anxiety mathematics student based on gender, where student man own level moderate anxiety like case in point student women. This pattern indicates trend anxiety while the dominant one in both genders, with proportion A little more height in men For category moderate, although chi-square or post-hoc tests are needed. For confirm significance difference ($p>0.05$ if No significant). Findings This in line with literature that highlights minimal gender variation in anxiety mathematics at the level beginning education medium, emphasize the need intervention based group than gender segmentation. The following descriptive anxiety mathematical according to gender in table 13 (Ilham et al., 2025).

Table 13. Descriptive statistics of mathematical anxiety by gender.

JK	N	Mean	Std. Deviation	Std. Error Mean
Man	29	63,793	12,4711	2,3158
Women	29	59,448	10,0164	1,8600

Table 13 presents statistics descriptive anxiety mathematics student based on gender, where the group males (n=29) had an average score of 63.793 (SD=12.4711, SE=2.3158), while group women (n=29) showed a higher average low of 59.448 (SD=10.0164, SE=1.8600). Variability score more height in men compared to women, indicating heterogeneity response more emotional big in group This pattern highlight potential gender differences in intensity anxiety mathematically, only just the difference in a way quantitative. As if see criteria anxiety on the

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table previously, second group men and women Still is at in category moderate. For verify more carry on whether there is the average difference between group men and women or No, we did an inferential test. Because both normally distributed and homogeneous data groups, difference test using the t-test as in table 13 with hypothesis following (Hadi, 2019):

Ho: μ1 = μ2 (no There is significant difference in average anxiety between student men and women) (Darmayanti, 2022).

Ha: μ1 ≠ μ2 (there is significant difference in average anxiety between student men and women)

Table 14. Inferential statistics t test the difference between two averages.

T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
1,463	56	,149	4,2448	2,9703

Table 14 presents independent t-test results For compare anxiety averages mathematics between genders, with t statistic = 1.463 (df = 56, p = 0.149), mean difference = 4.2448, and standard error difference = 2.9703. The significance value two direction (p>0.05) shows No existence difference significant statistics between score anxiety mathematics men and women. Findings This implies homogeneity response emotional to mathematics in both genders, which is consistent with literature contemporary that minimizes gender effects in anxiety mathematics in population teenagers, so that emphasize factor contextual like curriculum and teaching as predictor main rather than variables biological, there are difference in settlement problem mathematics and understanding mathematics (Firdaus et al., 2024).

Although hypothesis beginning predict existence difference significant, the results of the independent t-test (p=0.149>0.05) show that No there is difference level anxiety mathematical significant between student men and women. Findings This interesting Because although student man own average score A little more high (63.79) compared to women (59.44), both still is at in " medium " category (Malasari et al., 2017).

This result in line with study contemporary who stated that at this stage beginning education medium, factor biological gender begins displaced by factors contextual like curriculum and methods teaching in influence aspect affective students. Based on observation data, students man tend respond pressure with strategy avoidance like chatting with friends, meanwhile student

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Woman show reaction more emotional visible like tension physical. This is indicates that differences that emerge more manifestation - based behavior than intensity anxiety That Alone (Asari et al., 2023).

Observation Results

Observation results beginning learning during two hours of lessons on the topic operation number round show that part big students, namely around six tens percent, showing response affective which indicates anxiety mathematical. Indicator the reflected through nonverbal behavior such as fidgeting in seat, avoiding contact eye with the teacher, subduing head when requested answer questions, and low participation active in class (Mardia et al., 2020). Intensity symptom anxiety seen more strong at the moment student do exercise question in a way individual compared to when involved in discussion groups, and achieve level highest when the teacher delivers existence evaluation or test sudden (Arifin & Kismiantini, 2023).

From the side difference behavior, students Woman more often show expression tense and stiff face as form reaction emotional to demands task mathematics, whereas student man tend divert attention with chatting together Friend sitting on the same bench For reduce pressure cognitive (Nurjanah et al., 2021). Notes the field also recorded existence a number of students who leave seating with reason to outside class at the time activity calculation taking place, which indicates strategy avoidance to triggering situation anxiety (Liu et al., 2022). Patterns behavior This in line with results questionnaire that places anxiety mathematical students in the category currently with certain average value (Purba & Napitupulu, 2023). In general overall, findings observational This strengthen results analysis quantitative that anxiety mathematical student especially appear in a situation evaluative and at the time they face to face with understanding draft base mathematics(Amam et al., 2017).

Behavior avoidance (such as permission go out class moment calculation started) which was found in observation field strengthen findings questionnaire that anxiety This appear especially in situations evaluative (Kukreja & Sakshi, 2022). Therefore that, intervention learning at junior high school level must more focus on strategies that are capable reduce pressure cognitive and constructive room safe class in a way emotional without do segmentation solely gender based.

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Interview Results

Qualitative data from results interview reveal three trigger main anxiety students on site research. First : Concerns evaluative that is concern will failure in exam and pressure reach mark high for the sake of parental expectations (Alitani & Wijaya, 2024). Second : Complexity Material that is material operation count number negative considered as draft tiring abstract in a way cognitive. Third : Afraid Social, especially for students women, there are anxiety moment must answer question right in front class Because Afraid do error (Alitani & Wijaya, 2024).

In a way narrative, students Woman tend express related anxiety with afraid do error moment answer questions in front of class, whereas student man more emphasize on perception complexity calculations that are considered exhausting in a way cognitive. Although there is difference in method disclose experience emotional said, the results coding and data reduction are not show meaningful differences in a way overall between student men and women. Findings This strengthen profile anxiety mathematical in category moderate and affirmative importance implementation strategy more learning adaptive.

CONCLUSION

Analysis results show that profile anxiety mathematical student Class VII in Bitung City in a way dominant is in the category **moderate.** Findings This supported by classical mean value amounting to 61.62 which is statistics be under threshold category high. Condition anxiety at the level currently This Actually can viewed as *optimal arousal* that supports concentration, but If No managed, potential hinder understanding more concepts complex in the future

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