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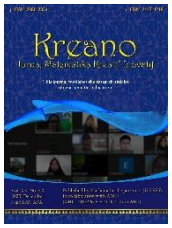

Analysis of Mathematics Error and Anxiety of Junior High School Students in Solving Diagnostic Tests

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Abstract

This study is to analyze mathematics anxiety and error answers of JHS students. It involves 11 female students and 5 male students of the class VIID of JHS in Surabaya and volunteers participate in diagnostic tests during the Covid-19 pandemic. The test consists of 15 multiple choices and 5 essay questions, is conducted online with Google meet and on-cam video conditions and is continued by a structured interview via Google Forms. The test identified that 4 students (25%) achieve score$s \geq 75$ (KKM/Minimum score), and 12 students (75%) are still under KKM. Utilizing Newman's error stages, the average student errors are reading (16.55%), comprehension (17.24%), transformation (22.07%), process skills (21.38%), and encoding (22.76%). The diagnosis results defined some factors that influenced students' mathematics anxiety are uncertain feeling (31.25%), nervous (37.5%), confusion (56.25%), forgetting the formula on both multiple-choice (37.5%) and essay questions (87.5%), relying on teacher assistance (37.5%), parental assistance (75%), peer assistance (87.5%).

Keywords: diagnostic test, mathematics anxiety, Newman errors procedure, Covid-19 pandemic.

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Abstrak

Penelitian ini bertujuan menganalisis kecemasan matematika dan kesalahan jawaban dari siswa SMP. Sebanyak 11 siswa perempuan dan 5 siswa laki-laki dari kelas VIID SMPN di Surabaya secara sukarela berpartisipasi dalam tes diagnostik di masa pandemi Covid-19. Tes terdiri dari 15 soal pilihan ganda dan 5 soal uraian, dilaksanakan secara daring dengan Google meet dan video on-cam, serta dilanjutkan wawancara terstruktur melalui Google forms. Hasil tes adalah 4 siswa (25%) memenuhi skor ≥ 75 (KKM) dan 12 siswa (75%) masih kurang dari KKM. Dengan prosedur kesalahan Newman, rerata komponen kesalahan siswa adalah: membaca (16,55%), pemahaman (17,24%), transformasi (22,07%), keterampilan proses (21,38%), dan pengkodean (22,76%). Hasil diagnosa menegaskan bahwa faktor-faktor yang mempengaruhi kecemasan matematika siswa adalah sikap mudah grogi yang rutin dalam tes (31,25%), nervous (37,5%), bingung (56,25%), lupa rumus pada soal pilihan ganda (37,5 %) maupun soal uraian (87,5%), serta masih perlu bantuan dari guru (37,5%), orangtua (75%), atau teman sebaya (87,5%).

INTRODUCTION

Solving problems or math problems can often cause anxiety for anyone. Mathematics anxiety that occurs in students, parents, and teachers can be an important predictor of individual and environmental mathematics achievement (Szczygieł, 2019). Student mathematics achievement can be used as an indicator of student cognitive development, which can be affected if students experience math anxiety, especially female students (Cézar, 2018; Shishigu, 2018; Van Mier et al., 2019; Wang, 2020). More specifically, arithmetic calculations that are difficult for students to do when solving math problems can be influenced by math anxiety (Cézar, 2018). Students who have low scores after taking a math test have a negative and significant correlation with math anxiety (Shishigu, 2018). Determining the addition operation result of numbers in two different columns can lead to slower performance and more prone to errors resulting in higher levels of anxiety (Mammarella, 2020). Mathematics anxiety experienced by students is usually in the form of spatial anxiety (when solving tasks related to spatial thinking), abstract anxiety (when studying more abstract mathematical material), statistical probability anxiety, statistical calculation anxiety, and numerical calculation anxiety. (Alvarez-Vargas et al., 2020; Hunt et al., 2019). Student mathematical anxiety often arises spontaneously when the teacher gives practice questions, quizzes, or tasks and asks students to find solutions to these problems within a specified and limited time, even without being scheduled beforehand.

Based on the results of the trial study conducted by the researcher, math anxiety also occurred in 5 (five) undergraduate students of Biology Education in 1st (the first) semester from one of the private universities in Surabaya when the researcher gave a math test in the form of 5 essay questions in unscheduled. When interviewed about their feelings regarding the math test, they stated that they were confused, nervous, felt their heart pounding, had some difficulty remembering or determining the relevant formula, were unsure of the answer, and fear of not being able to solve the problem perfectly in a limited time. Another study on seventh-grade junior high school students in Serang showed that anxiety affects the ability to understand mathematical concepts (Diana et al., 2020). Meanwhile, junior high school students in Turkey feel anxious when carrying out problem-solving and information processing when taking math tests (Sevgi & Arslan, 2020).

The appearance of mathematics anxiety experienced by high school students to these university students can be identified, such as from nervousness

when reading questions, suddenly not remembering and having difficulty remembering formulas to incorrectly applying formulas in solving them, because they also experience errors in determining the solution of mathematics problems. Student errors often occur in solving questions in the form of multiple choice and questions in the form of an essay. Sometimes student mistakes in problem-solving occur because they do not understand the problem, choose or apply the incorrect concept. One of the rules used to analyze errors in student answers is the Newman error procedure (NEP) (Clements & Ellerten, 1996; Newman, 1983; PAT Teaching Resources Centre, 2019). NEP has been applied and utilized in countries such as Indonesia, India, Malaysia, Thailand, Australia, and so on (Suyitno, 2015). Specifically, NEP has 5 error components, such as reading, understanding, transformation, process skills, and encoding (Alhassora et al., 2017; Chotimah et al., 2017; Clements & Ellerten, 1996; Praktitipong & Nakamura, 2006).

In the component of reading questions, students often make mistakes due to, such as: not reading the questions carefully and not recognizing terms, words, symbols, or mathematical notation in the questions correctly. In the component of understanding the problem, students often cannot understand the problem by writing down what is given and what is asked in the question. In the component of transformation, students cannot choose the right formula to solve the problem. In the component of process skills, students cannot solve or apply arithmetic operations correctly. In the component of encoding, students cannot explain the problem solving correctly.

Grade VII JHS students, who are still going through a transition period from elementary school to the high school level, often experience math anxiety while studying or solving math tests/questions. In the cognitive development stage from Jean Piaget, a minimum age of 11 years is included in the formal operational phase (Müller et al., 2015; Ojose, 2008). In this phase, students can think abstractly, do not depend on the manipulation of concrete objects and have formal deductive logic of thinking. There are still students whose abilities have not yet reached this phase.

METHODS

This research used a descriptive qualitative approach. The research sample was class VII-D, which was selected from eight grade VII groups of SMP Negeri 3 Surabaya with A accreditation, consisting of 11 female students and 5 male students who were willing and actively voluntarily participating in this study. Grade VII-D was determined purposively based on the recommendation of mathematics teachers who implemented online learning during the LSSR (Large-Scale Social Restrictions) implementation period in Surabaya due to the Covid-19 pandemic, students have heterogeneous abilities, mathematics teachers in grade VII-D were willing to actively participate in data collection, as well as the availability and willingness of students who have computers or laptops to take tests as well as online interviews. Research data was obtained by diagnostic tests and structured interviews. The diagnostic test aims to identify student answer errors and math anxiety felt by grade VII students in dealing with and solving mathematics problems whose material has been studied. Research that used a test in the form of an essay of 5 questions to measure the ability to understand student mathematical concepts on the material that has been studied by grade VII students in Serang confirmed that there

were indicators of mathematics anxiety, such as students who are unable to apply the relationship between concepts and procedures (Diana et al., 2020). Meanwhile, in Turkey, junior high school students feel anxious when carrying out the problem-solving process on the problem-solving ability test which is indicated by students who do not write down formulas and problem-solving steps correctly (Sevgi & Arslan, 2020). Diagnostic tests are one of six types of tests (EduChannelIndonesia, 2021). Diagnostic test questions are arranged based on a grid of questions compiled by researchers and adapting questions from the junior high school national exam collection (2005-2015) with material on numbers, algebra, geometry and measurement, and statistics with cognitive levels C1 to C4 in Bloom's taxonomy. The diagnostic test questions consist of 15 multiple choice questions and 5 essay questions and have been adjusted to the syllabus for the seventh-grade junior high school mathematics subject. The diagnostic test was validated by two mathematics education lecturers with at least a doctorate, the readability test was carried out by two junior high school mathematics teachers and two eighth-grade students from another junior high school. Students' answers were mapped using NEP, and analysis of the dominant factors of student mathematics anxiety in terms of student answers, attitudes towards mathematics, and individual aspects of students.

Diagnostic tests were carried out online during the Covid-19 pandemic season. The implementation of the test consists of three parts, such as preparation, implementation, and closing. In the preparation section, students received information about test instructions with a maximum total test score of 100, the time for solving questions was 50 minutes and students were allowed to prepare books or answer sheets to write answers to these questions. In the implementation section, students were asked to pay close attention to the instructions on each question before solving it, and then each student saw the test impressions from the share screen via google meet and immediately solved multiple choice questions for 15 minutes and was continued by solving on essay questions for 30 minutes, and wrote answers on a book or answer sheet that has been prepared at the preparation section. In the closing section, each student was asked, using a mobile device, to take a photo of the answers to multiple choice and essay questions and upload them on the link provided by the researcher. The student-written answers were then mapped using NEP, while the dominant factors of student mathematics anxiety in terms of the material, attitudes towards mathematics, and student individual aspects were analyzed based on the results of structured interviews.

Factors explored by structured interviews related to the existence of student anxiety or mathematics anxiety start from their feelings when viewing and reading diagnostic test questions, feelings while solving multiple choice questions, feelings while solving essay questions, and mathematics learning habits with or without teachers, parents, and peers helping. Structured interviews were conducted online the day after the students finished taking the diagnostic test. The researcher conducted a structured interview with each student, which lasted about 15–25 minutes online using a recorded google meet. Previous researchers have obtained permission and facilitation from mathematics teachers and related school principals. During a structured interview, each student is slowly conditioned and given a stimulus about the problems in the test questions. This is done to remind students when they

solved test questions. Structured interview activities were divided into four parts. First, students were asked to tell about their feelings when facing a diagnostic test. For example, did students object to the diagnostic test? And how did they feel when they read the questions? Second, students were asked to explain their feelings when solving multiple choice questions, for example, what they felt when they started answering multiple choice questions, which questions were easy or difficult to do and made them fail to focus or feel normal. Third, students were asked to describe their feelings when solving essay questions, for example, how they felt when they began to answer essay questions, did they feel nervous when changing story questions into mathematical forms. Fourth, students were asked to tell how they routinely studied mathematics with or without their teachers, parents, or peers helping.

Analysis of test data carefully assesses and identifies each student's answers (Miles & Huberman, 1994). The answers to multiple choice questions were given a score, while the answers to essay questions were given a score and then identified the types of errors in student answers using NEP, such as the stages of reading, understanding, transformation, process skills, and encoding. Furthermore, the interview data were analyzed to obtain the factors that influenced the emergence of student anxiety related to the implementation of the diagnostic test that they had been carried out.

For multiple choice questions, using the answer key and scoring guidelines, each correct answer is given a score of 2 if it is correct and no score is given if it is wrong or does not answer. For essay questions, number 1, 2, and 3, each step of the answer is considered and given a maximum score of 10, while question number 4 is given a maximum score of 15, and question number 5 is given a maximum score of 25. Answers to essay questions were assessed by considering the completion steps according to the answer key, so that if there were steps that are not appropriate, then students did not get a score according to writing the correct steps. Each score obtained by students is compiled in a score tabulation. Furthermore, in answers to essay questions, student answers were analyzed in more detail to identify the types of errors using NEP indicators, which included reading, understanding, transformation, process skills, and encoding. From the NEP indicators, it is identified anxiety factors that can arise from students, such as forgetting formulas or writing incorrect formulas, doing wrong calculations or applying incorrect number operations. Furthermore, data from the written answer recapitulation were confirmed and clarified during the interview process about the feelings of each student when carrying out tests and solving problems. The qualitative interview data were analyzed to strengthen the indicators of anxiety that appeared in each student's written answers and to obtain the factors that influence the anxiety.

RESULTS AND DISCUSSION

Result

After being given a total score for all test answers from each student, it was found that there were four students (a male student and 3 female students) obtained a minimum score of 75, meanwhile, twelve students (4 male students and 8 female students) obtained score less than 75. A score of 75 is the minimum completeness criteria score (MCC) used by the school. The recapitulation of diagnostic test scores is presented in Table 1 below. The maximum score for multiple choice questions is 30 and the maximum score for essay questions is 70.

Table 1. Stages and Indicators of Newman Error Analysis

Stage	Indicator
Reading and Decoding	The student is unable to read problems, unable to read questions, unable to recognize terms, words, symbols, or mathematical notation correctly
Comprehension	The student does not understand the reading and does not write down what is given and asked
Transformation	The student is incorrect in choosing the appropriate mathematical formula/operator/procedure to solve the problem
Process Skills	The student is not skilled at identifying the appropriate operation or series of operations or does not know the steps needed to carry out the selected operation perfectly (unable to do arithmetic operations or calculation steps correctly)
Encoding	The student does not consistently write and justify the final result correctly and does not write the conclusion as the final answer to the question

*Adaptation of:*Alhassora et al., 2017; Chotimah et al., 2017; Clements & Ellerten, 1996; Praktitipong & Nakamura, 2006.

For the answers to essay questions, an analysis was carried out using NEP and the types of student errors are presented Tabel 2.

Table 2. Student diagnostic test score

No	Name Code	M/F	MC Score	Essay Score	Total Score
1	PM	M	4	13	17
2	SF	F	14	20	34
3	RS	M	22	16	38
4	FU	F	20	37	57
5	NM	F	24	37	61
6	ML	F	24	37	61
7	DY	F	26	37	63
8	DP	F	28	37	65
9	SA	M	20	48	68
10	BR	M	16	54	70
11	AS	F	22	52	74
12	ND	F	22	52	74
13	SH	F	20	55	75
14	PA	F	22	55	77
15	DP	M	22	62	84
16	AR	F	30	54	84

Table 3. Student errors percentage from answers to essay questions

No. Question	Type of error	%
1	Reading	18,75
	Understanding	18,75
	Transformation	18,75
	Process Skills	18,75
	Encoding	25
2	Reading	12,5
	Understanding	12,5
	Transformation	18,75
	Process Skills	18,75
	Encoding	18,75
3	Reading	62,5
	Understanding	68,75
	Transformation	87,5
	Process Skills	87,5
	Encoding	87,5
4	Reading	12,5
	Understanding	12,5
	Transformation	12,5
	Process Skills	12,5
	Encoding	12,5
5	Reading	43,5
	Understanding	43,5
	Transformation	56,25
	Process Skills	50
	Encoding	56,25

Question number 1 is: On the math ability test, the total score is determined by the rules: a score of 4 for correct answers, a score of -2 for incorrect answers, and a score of -1 for any unanswered question. Of the 50 questions given, Amir answered only 48 questions and obtained a score of 100. How many questions did Amir answer correctly? In question number 1, 3 students are making simultaneous errors on four components. In reading errors, conceptually the three students could not recognize the terms or words in the questions correctly. For misunderstanding, the three students did not write down what was known and asked. While the transformation errors were identified because the three students did not write valid mathematical formulas or procedures, and the third process skills errors

did not write down the solution steps in an orderly and complete manner. However, in encoding errors, there was one student other than the three students above who was detected making an error because the four students did not justify the result or write the conclusion in their written answers.

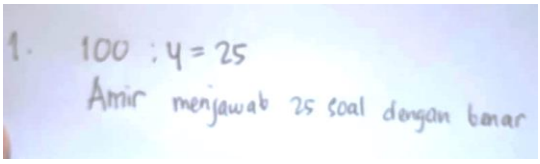

Figure 1. Examples of student errors in the answers to question number 1.

In Figure 1, the student only wrote the final answer that was not correct, so he experienced five stages of errors starting from reading errors, understanding, transformation, process skills, and encoding.

Question number 2 is: From saving her pocket money, Ani saved Rp. 800.000,- at a bank that provided services and savings prizes of 16% per year. At the time of taking it, Ani's savings became Rp 992.000,-. How long does Ani save her money? In question number 2, 2 students made simultaneous errors on two components. In reading errors, conceptually the two students could not recognize the terms or words in the questions correctly. Whereas in the misunderstanding, both students did not write down what was given and asked. However, in the transformation, process skills, and encoding errors, there was one student other than the two students who were detected making errors because the three students did not write valid mathematical formulas or procedures, and did not write down the solution steps in an orderly and complete manner and did not justify the results or write the conclusion on the written answer.

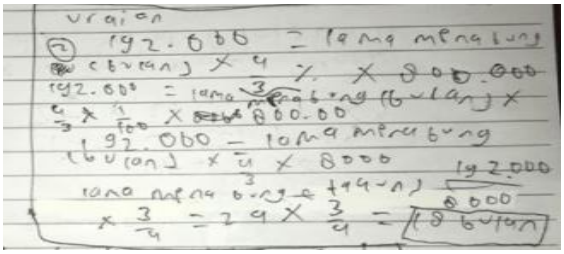

Figure 2. Examples of student errors in the answers to question number 2.

In Figure 2, the student did not make mistakes according to NEP indicators starting from the stages of reading, understanding, transformation, and process skills, but experienced encoding errors by not justifying the results by writing conclusions.

Question number 3 is: The sum of two different numbers is 6 and its difference is 4. Determine the square of the sum of the two numbers, special attention to question number 3, because 10 students made reading errors, conceptually the ten students could not recognize the terms or words in the questions correctly. For misunderstanding, there was one student other than the ten students who were identified as making an error because the eleven students did not write down what was given and asked. However, in the transformation, process skills, and encoding errors, there were three students other than the eleven students above who were detected as making errors because the fourteen students did not write valid mathematical formulas or procedures, did not write down the solution steps in an orderly and complete manner, and did not justify the results or write a conclusion on the written answer.

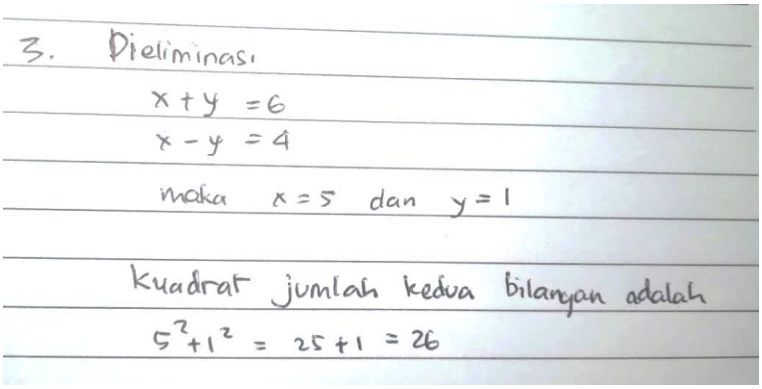

Figure 3. Examples of student errors in the answers to question number 3.

In Figure 3, the student experienced transformation error by not writing down the solution with elimination, substitution or a combination of a linear equation system of two variables and incorrectly determining the sum of the quadratic formulas. Students also experienced process skill errors, students did not write down the calculation steps and were wrong in the calculations for the results. Students experienced encoding errors and incorrectly wrote the final answer to the question.

Question number 4 is: Determine the real number x that satisfies the equation $3\left(2x+\frac{1}{3}\right) = 4(3x-\frac{1}{2})$. In question number 4, 2 students made simultaneous errors on five components. In reading errors, conceptually the two students could not recognize the terms or words in the questions correctly. For misunderstanding, both students did not write down what was given and asked. In the transformation error, both students did not write valid mathematical formulas or procedures. For process skill errors, the two students did not write down the solution steps in an orderly and complete manner. Furthermore, in encoding errors, the two students did not justify the result or write the conclusion in their written answers.

Figure 4. Examples of student errors in the answers to question number 4.

In Figure 4, the student only wrote the final answer that was not correct, so he experienced errors in reading, understanding, transformation, process skills, and encoding.

Question number 5 is given as follows: The framework (skeleton) of a beam is made of copper wire which is malleable and without being cut. Its length is $x\ cm$, width $(x+2)cm$, and height $(x+4)cm$. If the copper wire used is no more than 60 cm in length, then determine (a) Inequality in the variable x. (b) The value of x. In question number 5, 7 students made simultaneous errors in the first two components. In reading errors, conceptually the seven students could not recognize the terms or words in the questions correctly. While in the misunderstanding, the seven students did not write down what was given and what was asked. However, in the transformation errors and encoding errors, there were two students other than the seven students above who were identified as making mistakes because the nine students did not write valid mathematical formulas or procedures and

Table 4. Factors Affecting the Emergence of Student Mathematics Anxiety

		Student Initial Behavior			Forget Formula		Still Need Help		
No	Code	Usual	Nervous	Confused	Multiple choice	Essay	Teachers	Parents	Peers
1	PM	-	V	V	V	V	-	V	V
2	SF	-	-	V	V	V	V	-	V
3	RS	-	V	-	-	V	V	V	V
4	FU	-	-	V	V	V	-	V	V
5	NM	-	V	V	V	V	V	V	V
6	ML	-	-	V	-	V	-	V	V
7	DY	-	-	V	-	V	-	V	V
8	DP	V	-	V	-	V	-	-	V
9	SA	V	-	-	-	V	-	V	V
10	BR	-	-	V	-	V	-	V	V
11	AS	-	V	-	V	-	-	V	V
12	ND	-	V	-	V	-	V	V	V
13	SH	V	-	-	-	V	V	V	V
14	PA	V	-	-	-	V	V	V	V
15	DP	V	-	V	-	V	-	-	-
16	AR	-	V	-	-	V	-	-	-

did not justify the results or write the conclusions in their written answers. However, in the process skill error, 8 students were categorized as making mistakes because they did not write down the solution steps in an orderly and complete manner.

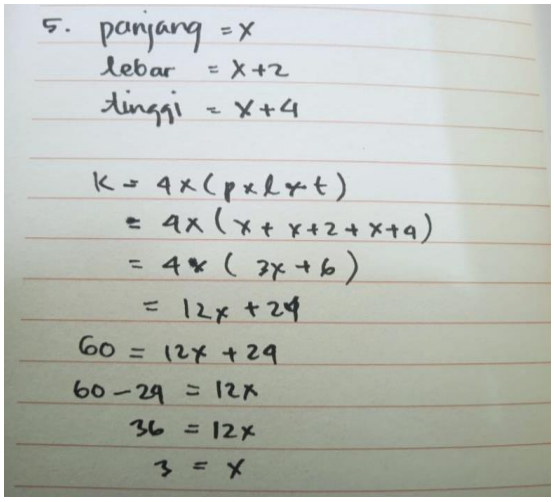

Figure 5. Examples of student errors in the answers to question number 5.

In Figure 5, students did not make mistakes in reading and processing skills, but experienced errors in understanding, namely not knowing what was being asked. Furthermore, it made a transformation error by writing an equation with the "=" sign which should be inequality with the "<" sign. Undoing errors were also made by not writing the conclusion of the final answer to the question.

The results of error analysis according to NEP in each answer to the essay question of the diagnostic test also showed an anxious attitude which was seen from students who forgot the formula so that they did not write the formula correctly, had difficulty doing calculations with arithmetic operations so that they wrote the result incorrectly. From the error, then structured interviews were conducted based on each student's answer and analyzed to determine the factors that affect the emergence of student anxiety which can be presented in the following Table 4.

The results analysis of structured interviews explores the factors that affect student anxiety in three parts, such as student initial behaviour, forgetting the formula on the question, and still needing help. The first part includes the usual attitude, nervous attitude, and confused attitude felt by students when solving diagnostic tests. The second part covers the condition of forgetting the formula in multiple choice questions and forgetting

the formula in essay questions. The third part covers the independence of students who still need teacher help, still need parent's help, and still need peer help.

Factors in the first part, there are 5 (31.25%) students who show a usual attitude, there are 6 (37.5%) students who show an easily nervous attitude, and there are 9 (56.25%) students who show an easily confused attitude. Factors in the second part, there are 6 (37.5%) students who forget the formula on multiple choice questions and 14 (87.5%) students who forget the formula on essay questions. Factors in the third part, there are 6 (37.5%) students who still need teacher help, there are 12 (75%) students who still need parental help, and there are 14 (87.5%) students who still need peer help in learning and solving mathematics problems.

Discussion

Based on the results of the study, it was identified that there were still many students who were wrong in recognizing the terms in the questions which were reading errors. This fact supports the results of Suyitno (2015) who stated that students can read but misunderstand the meaning of the questions. Meanwhile, according to Yuwono, et al. (2021) students who made mistakes in the reading stage tend to be unable to interpret the meaning of words from sentences in the questions given.

More specifically, understanding errors have been identified in elementary school students in Thailand, namely, students cannot understand the phrases in the problem and cannot proceed with solving the problem, also cannot understand the meaning of the question and cannot determine whether it is an affirmative sentence or a question (Praktitipong & Nakamura, 2006). Whereas in this study, at the level of high school students, a similar error occurred because the students did not write down what was given and what was asked. This is very possible in classroom learning; students are not accustomed to solving problems gradually and regularly.

Students showed their potential in determining the right formula to solve the problem, however, students still found problems in applying and operating the formula correctly, and this was a transformation error (Alhassora et al., 2017). Alhassoura et al. also showed that process skill errors occur when eighth-grade students in Malaysia misapplied the procedure for converting the information provided into the formula, students could not identify the correct coordinates to be substituted and implemented into the midpoint formula. Students did not know the mathematical model following the question request, did not correctly determine the formula used, and did not write down the formula used, and this is a transformation error. Errors in doing calculations, and not writing down the final solution process in an orderly manner, is an error in the student's process skills. The results of this study confirmed that students were also incomplete in writing valid solution steps.

In encoding skills, students were still less careful and less trained, so they did not write down the results or conclusions. This supports the results of research from Chotimah et al., (2017) that students were incomplete in writing down the results and concluding the calculations that have been done.

Five types of errors identified based on NEP indicators which were then analyzed and cross-checked with interviews showed that there was a relationship between student errors and answers to the diagnostic test description questions. Students who experienced transformation errors, where students did not correctly

write down the mathematical model or formula used to determine the solution to the problem, were so nervous and confused and forgot the formula that should be used. Process skill errors made by students, where students were not precise or could not perform arithmetic calculations, then they must experience confusion with how to calculate it. Forgetfulness and confusion were some indicators of student anxiety that can be extracted from structured interviews. It also showed that there was a relationship between test answers, errors, and student anxiety.

Factors that affect student anxiety can be identified starting from the initial attitude that routinely appears in tests such as showing a usual attitude (31.25%), being easily nervous (37.5%), easily confused (56.25%), forgetting the formula on multiple choice questions (37.5%) and essay questions (87.5%), and still depend on teacher help (37.5%), need parents help (75%), or need peer help in learning mathematics (87,5%). The form and variety of questions can also cause anxiety, as well as the redaction of the questions and the length of the questions, as well as forgetting the formula to answer the questions. The existence of help from class teachers and private tutors also affects student nervousness. Parents who are happy and routinely accompany students to study at home also play a role in the emergence of student anxiety. More than 85% of students tend to feel more comfortable learning mathematics together with their peers. This is following research (Batchelor et al., 2017; Casad et al., 2015; Demirtaş & Uygun, 2020; Huang et al., 2021; Wang, 2020) that parental involvement in terms of positive cognitive and behavioural engagement such as helping children do tasks related to student mental health such as anxiety, students feel comfortable with their mothers when sharing their ideas and feelings, and spending time. The teacher role can prevent math anxiety, which is one of the most important barriers to math achievement and develop strategies to reduce the anxiety level of students with high math anxiety levels, the selection of new friends or old friends can also affect mathematics anxiety in grade VII and grade VIII students in Turkey (Kesici, 2019).

Implication of Research

These findings underscore the importance of fostering gradual, structured problem-solving habits and improving students' ability to interpret and apply mathematical formulas effectively. Moreover, the study reveals the profound impact of anxiety on student performance, influenced by factors such as question complexity, parental involvement, teacher support, and peer collaboration. To mitigate these challenges, educators must implement strategies to reduce math anxiety, enhance classroom practices, and encourage supportive environments both at home and in peer groups. This comprehensive approach can improve students' confidence, cognitive engagement, and overall mathematical proficiency.

Limitation

Some of the limitations in this study that can be followed up for future research are: the items and variations of diagnostic test questions are only based on the syllabus of the seventh-grade junior high school in mathematics subject, it is only assumed and the teacher information that the material has been studied by students, no trials have been carried out first on diagnostic tests and validators validate according to their competence, there is no difference in student gender, there is no appli-

cation of peer-based scaffolding and student conditioning, then diagnostic tests and interviews conducted online due to the implementation of LSSR during the Covid-19 pandemic period. The limitations of this study point to several areas for improvement in future research. The reliance on a syllabus-based diagnostic test without prior validation through trials may affect the accuracy and relevance of the test items, potentially limiting the insights gained. Additionally, the lack of differentiation by student gender, as well as the absence of peer-based scaffolding and structured student conditioning, restricts the understanding of how these factors influence mathematical errors and anxiety. The exclusive use of online diagnostic tests and interviews due to Covid-19 restrictions may also have introduced biases or reduced the depth of responses compared to in-person interactions. Addressing these limitations can enhance the robustness and applicability of future studies.

CONCLUSION

Diagnostic tests that were carried out unscheduled and with a variety of questions could provide a significant mathematical shock to class VII junior high school students who were still in the transition phase from primary education to secondary education with a more formal deductive cognitive level. There were 2 students (12.5%) who got scores less than 50 for multiple choice questions and only 3 students (18.75%) who got scores less than 50 for essay questions. With a minimum MCC of 75, there were still 12 students (75%) who got scores less than the KKM. Especially for essay question number 3, which involves algebraic forms with the square number calculation, there were still at least 10 students (63%) who still made significant errors. Based on the analysis of student errors according to NEP in solving mathematical problems in the form of essays, at least 3 students (22.07%) still experienced simultaneous errors in several components such as reading and understanding errors, as well as simultaneous errors in all components. These results confirmed that seventh-grade junior high school students still need more regular and planned guidance to understand more abstract-deductive mathematics concepts. While the factors that affect student mathematics anxiety could be identified that more than 50% of students were still easily confused. The results of this study also confirmed that 87.5% of students were still not familiar with the essay question form. In solving mathematics problems, all students have started to be independent and confident, although 87.5% still felt comfortable when with peers in learning mathematics.

This research is still in the early stages and will still be developed using variations of math problems that adapt to students' cognitive abilities. In addition, it is necessary to pay attention to the purpose and specifications of the question. The gender of students can also be divided into masculine and feminine groups so that the mapping of student abilities by the teacher can provide references in designing the right treatment and selection of learning. In addition, the application of peer-based scaffolding and student conditioning also needs to be investigated further to increase self-confidence and independence to further minimize the occurrence of student mathematics anxiety.

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