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Analysis of Mathematics Textbook Problems for Class X Viewed from Creativity

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ABSTRACT

This study aims to describe the level of creativity of questions in class X high school/vocational high school mathematics textbooks, the subject matter of the trigonometry series, and comparisons based on the creativity indicators of questions. The type of research used is descriptive qualitative. To ensure the credibility of the data, the researcher uses a triangulation method. The subject of this study were Competency Test questions in Mathematics Textbooks K13 curriculum, written by Dicky Susanto, Theja Kurniawan, Savitri K. Sihombing, Eunice Salim, Marianna Magdalena Radjawane, Umy Salmah, Ambarsari Kusuma Wardani, published by the Center for Curriculum and Books (2021). Chapter Series Sequences and Trigonometry Comparisons of 10 questions. In this study, the level of creativity in these questions will be analyzed in stages based on the creativity indicators used in solving them. The results of this study are that the percentage of questions for each level of creativity is: Very Creative 0%, Creative 80%, Quite Creative 20%, Less Creative 0%, Not Creative 0%. From these results, it was found that the Competency Test questions contained in Class X SMA/SMK Mathematics Textbooks were written by Dicky Susanto, Theja Kurniawan, Savitri K. Sihombing, Eunice Salim, Marianna Magdalena Radjawane, Umy Salmah, Ambarsari Kusuma Wardani, published by the Central Curriculum and Bookkeeping (2021) is Creative.

Keywords: [Question Creativity Level; Creative Problem Indicators; Textbook Analysis]

INTRODUCTION

Education is a vital need that is very important and must be fulfilled for human life. Alvin Tofler in (Widodo, 2014) states that the first wave of human civilization began with the agricultural revolution (8000-10000 years ago), the second wave of the industrial revolution in the early 18th century, the third wave of information technology started in 1960, the fourth. wave of early life sciences. The 21st century and the five waves of creativity. (1)A critical area for reflection is the influence of technology on student creativity which is considered one of the essential characteristics of 21st-century learners. In everyday life, creativity becomes a very dominant force. Other people often underestimate humans with educational limitations regarding behaviour and intellect. Education is an activity to develop the talents and potential of each student, which is carried out consciously and planned. Education is also considered the best place to prepare for changes in the nation that will bring prosperity in the future (2).

Pllana, (2019) the book "Teaching and Learning for the Twenty-First Century" that creativity is like critical thinking, and a higher order of thinking skills is included in cognitive competence. (3)three essential skills used to prepare students for future life and career success are creativity, critical thinking skills and problem-solving skills. Suryana (4)state that the implementation of

creativity in learning is expected that students can express new ideas that are different in solving each problem they face so that they are rich with progressive and diverging ideas which will later become competent and compete globally which is constantly changing.

Almira (5) states that learning mathematics is an interaction between teachers and students which involves the development of patterns of thinking and logic that are deliberately created so that mathematics learning programs can grow and develop optimally. In the world of mathematics, education is crucial because mathematics can train students to reason critically, creatively and actively. Creative thinking is related to one's creativity. Torrance (6) suggests four stages of creative thinking: first, detecting problems or difficulties; second, putting forward guesses and hypotheses; third, evaluating and verifying the hypothesis; fourth, communicating results. According to Jones (7), creative thinking combines flexibility, originality, and sensitivity to ideas.

According to Sabri (8), mathematics books are complementary units consisting of a series of learning activities to assist students in achieving the formulated learning objectives. Mathematics textbooks are used to practice independently, and the presentation in textbooks affects students in using this book. This student book contains the efforts students must make to achieve the competencies contained in the 2013 Curriculum (9). The test is a way to measure the success of the learning process. Another opinion was put forward by Cronbach (10), who stated that a *test* could be defined as a systematic procedure for observing one or more characteristics of a person marked by a numerical standard. If the test used is not good, the results obtained are not good, which can harm students. To determine whether the test's quality is good or not, an analysis of the quality of the test must be carried out. If the test is appropriate and suitable, the function of the test will be realized (11). Pujiastuti & Kulup (10) state

that the importance of assessment in learning evaluation requires teachers to have the ability to make assessments. The teacher can make efforts to obtain quality questions by analyzing the items.

Learning Mathematics requires creativity in solving problems; each student's creativity is different. Silver (12) explains three parts of mathematical creativity: fluency (number of different answers), flexibility (number of strategies to solve problems), and originality (how rare are the responses in a collection of all responses or the frequency of responses. According to Guilford (13) includes several indicators, including fluency (ability to generate many ideas, answers, problem-solving, or questions), flexibility (ability to generate varied ideas from the information that has been obtained), originality (producing ideas or ideas that are new and different from before) and elaboration (the ability to develop and add ideas in detail so that they look more interesting).

The test is a way to measure the success of the learning process. Another opinion was put forward by Cronbach (10), who stated that a *test* could be defined as a systematic procedure for observing one or more characteristics of a person marked by a numerical standard. If the test used is not good, the results obtained are not good, which can harm students. To determine whether the test's quality is good or not, an analysis of the quality of the test must be carried out. If the test is appropriate and suitable, the function of the test will be realized (11). Pujiastuti & Kulup (10) state that the importance of assessment in learning evaluation requires teachers to have the ability to make assessments. The teacher can make efforts to obtain quality questions by analyzing the items.

Students have creative potential, which is developed through solving creative problems in learning mathematics. The process of thinking and displaying specific ideas or ideas, these ideas give rise to a new action that is different and interesting. Therefore, item analysis is needed by

teachers in learning mathematics because creative questions can increase students' creativity in solving problems.

The author will present a description of the theory and framework used in analyzing Class X High School/Vocational High School Mathematics textbooks on Trigonometry Series and Comparison material. In the research framework, there are two major parts, the first is related to indicators of creative questions, while the second is the level of creative questions in books. Furthermore, at the end of the section, the number of creative questions from the textbook will be explained so that in subsequent publications, revisions will be made according to the notes made by the researcher.

According to Widodo (2015), the indicators used are creativity, fluency, flexibility, and novelty. Khairil Abdi, Mardhikah, and Nurkhalisa Latuconsina 2022 conducted several previous studies. Analysis of the Content Quality of Grade VIII Middle School Mathematics Textbooks Based on Bloom's Taxonomy. Furthermore, Diyah Ayu Wulandari and Dian Septi Nur Afifah conducted research in 2019. Student Creativity in Solving Mathematical Problems Based on Mathematical Ability Level. Hana Sarida Nursyifa, Dindidn Abdul Muiz Lidinillah, E. Kosasih (2020). HOTS Problem Analysis of Geometry Material in Class IV Elementary Mathematics Textbooks.

Based on previous studies, no one has analyzed creativity in competency test questions in textbooks, so the researchers raised the title "Analysis of Grade X Vocational High School Mathematics Textbooks in terms of Creativity." This study aimed to determine the percentage of creativity in questions from a class X

mathematics textbook based on the three indicators of creativity in questions. In addition, the information presented in this study can be used as an evaluation for educators in making practice questions, Midterm Examinations, and Final Semester Examinations that are appropriate to questions that have a creative character and assess suitable teaching materials used in the learning process to achieve mathematics learning in the 2013 curriculum.

METHODS

This type of research is descriptive qualitative research. According to Sugiyono(14), qualitative data is data expressed in the form of words, sentences, and pictures. which aims to describe the level of creativity of the questions on the competency test in class X SMK mathematics package based on the realm of creative question criteria. The variable in this study was the creativity of the questions in the Mathematics Textbook Chapter of Trigonometry Series Sequences and Comparisons.

Creative Questions are questions that can train critical and creative mathematical thinking skills. The level of creativity in the questions is measured by describing the creativity used in solving the questions. *Creative Questions* are questions that can train critical and creative mathematical thinking skills. The level of creativity in the questions is measured by describing the creativity used in solving the questions. *Creative Questions* are questions that can train critical and creative mathematical thinking skills. The level of creativity in the questions is measured by describing the creativity used in solving the questions.

Table 1. Creative Problem Indicators

Aspect	Indicator
(<i>fluency</i>)	A math problem is said to fulfill fluency if the question allows for more than one correct answer.
(<i>flexibility</i>)	A math problem fulfills flexibility if the question allows for more than one solution to be answered.
(<i>novelty</i>).	A math problem is said to be a novelty if it is possible to answer the question in an unusual (unique) and correct way or by using high school/vocational high school level math concepts, but if simplified, it can be solved using high school/vocational high school level math concepts

The subject of this study were Competency Test questions in Grade X High School/Vocational High School Mathematics Textbooks, which were written by Dicky Susanto, Theja Kurniawan, Savitri K. Sihombing, Eunice Salim, Marianna Magdalena Radjawane, Ummy Salmah, Ambarsari Kusuma Wardani, published by the Center for Curriculum and Bookkeeping (2021) Chapter Sequences, Series and Comparisons of Trigonometry, consisting of 10 items.

The work steps in analyzing are as follows:

1. Identification of Trigonometry Series and Comparison Competency Test Questions in Class X High School/Vocational Mathematics Textbooks.
2. Solve Competency Test questions in the Sequences, Series, and Comparisons of Trigonometry chapters in Class X SMA/SMK Mathematics Textbooks.
3. Describe each creative question used in solving the problem.
4. Classify the level of creative questions for each creativity that appears in solving these questions based on indicators of creative questions.
5. Analyze the categories of question creativity levels.
6. Counting the number of questions for each level of creativity questions.
7. Analyze the percentage of questions for each level of creativity questions.
8. Make conclusions and suggestions.

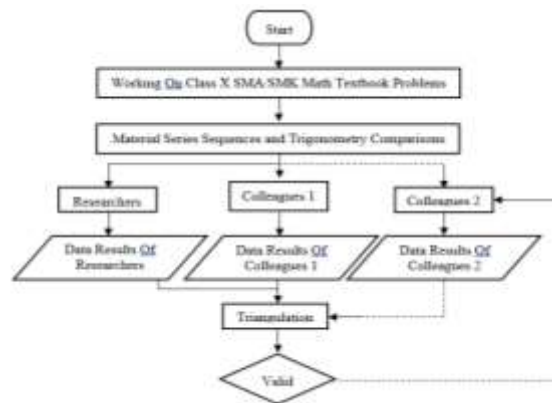


Figure a: data collection steps

RESULT

Class X SMA/VOCATIONAL SCHOOL Mathematics Textbooks used in SMK Negeri 1 Kediri, written by Dicky Susanto, Theja Kurniawan, Savitri K. Sihombing, Eunice Salim, Marianna Magdalena Radjawane, Ummy Salmah, Ambarsari Kusuma Wardani, published by the Central

Curriculum and Bookkeeping (2021). The chapter on Series Sequences and Trigonometry Comparisons contains ten questions. Each item was analyzed using indicators of creative questions, namely fluency, flexibility, and novelty. The results of the analysis of the creativity of the questions are as follows:

Table 1. Characteristics of competency test questions based on creative question indicators

No	Creative Problem Indicator			Information
	fluency	flexibility	novelty	
1.	√	√	√	Meet the indicators of flexibility, fluency and novelty
2.	√			Meet the fluency indicator
3.	√			Meet the fluency indicator
4.	√			Meet the fluency indicator
5.	√			Meet the fluency indicator
6.	√			Meet the fluency indicator
7.	√			Meet the fluency indicator
8.	√			Meet the fluency indicator
9.	√			Meet the fluency indicator
10.	√			Meet the fluency indicator

Table 2 Characteristics of Competency Test Questions Based on Creative Question Indicators

No	Indikator	Very creative	creative	Creative Enough	Less Creative	Not Creative
1.	Flexibility, fluency and novelty	√				
2.	Fluency		√			
3.	Fluency		√			
4.	Fluency		√			
5.	Fluency		√			
6.	Fluency		√			
7.	Fluency		√			
8.	Fluency		√			
9.	Fluency		√			
10.	fluency		√			

Table 3. Researcher Agreement Sheet with Colleagues

No	researcher			Peers		
	fluency	flexibility	novelty	Fluency	flexibility	novelty
1.	√	√	√	√	√	√
2.	√			√		
3.	√			√		
4.	√			√		
5.	√			√		
6.	√			√		
7.	√			√		
8.	√			√		
9.	√			√		
10.	√			√		

The questions in the Competency Test chapters of Series Sequences and Trigonometry Comparisons are on indicators of novelty, fluency and flexibility. The number of questions with fluency and flexibility indicators is 8 questions, questions with novelty indicators are 2 questions.

Table 4. Percentage of Questions for Each Level of Creative Questions

Creative Problem Level	Percentage
Very creative	10%
Kreatif	90%
Creative Enough	0%
Less Creative	0%
not Creative	0%

The data above shows that there are many questions at the Very creative question level, which is 10%. Meanwhile, the

Creative Enough level is only 90%. Furthermore, there are no questions at the three creative levels for the highly creative, less creative, and non-creative levels. The creative percentage of 90% is found in Class X SMA/SMK Mathematics Textbooks written by Dicky Susanto, Theja Kurniawan, Savitri K. Sihombing, Eunice Salim, Marianna Magdalena Radjawane, Ummy Salmah, Ambarsari Kusuma Wardani, published by the Center for Curriculum and Books (2021).

DISCUSSION

A. Sequence Competency Test

Determine the first 10 terms of the following series:

(a) $4 + 2 + 1 + \dots$

(b) $4 + 1 + (-2) + \dots$



Figure 1. Solving question number 1a



Figure 2. Solving question number 1b

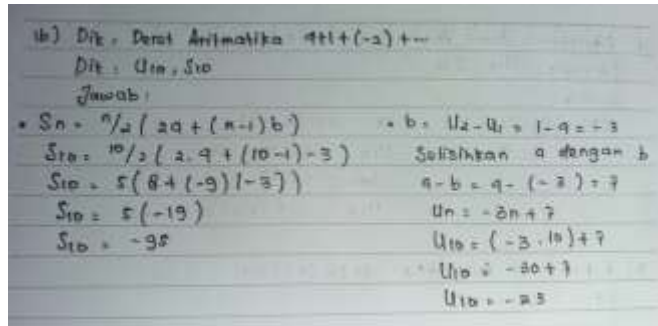


Figure 3. Solving question number 1b

Question number 1 contains 2 indicators of fluency, flexibility, namely applying more than one way of solving or being able to give several correct answers. Based on the pictures of solving the questions in pictures 1, 2, and 3 in questions 1a and 1b, they have been able to answer questions by giving more than one correct answer. So question number 1 is a creative question.

Question number 1, with indicators of fluency, flexibility, that is, questions can be solved in many ways or in more than one way with the correct answer. Based on Figure 4 and Figure 5 solve problem number 1. The problem can be solved in more than one way and the answer is correct. So question number 1 is a creative question.

B. Uji Kompetensi Perbandingan Trigonometri

1. if $\cos x = \frac{20}{29}$. What are the values for $\sin x$ dan $\tan x$?

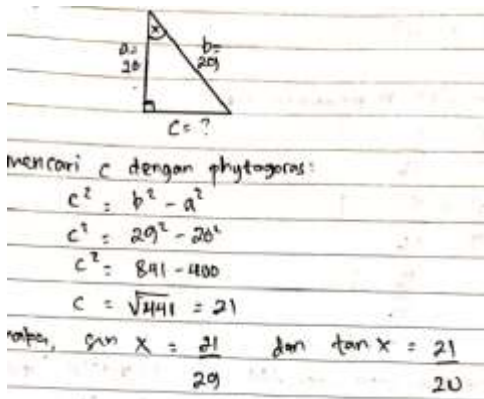


Figure 4. Solving question number 1

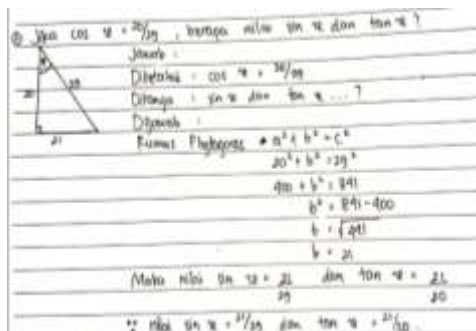


Figure 5. Solving question number 1

CONCLUSION

Based on the results of the analysis and discussion, the questions in the Class X Vocational Mathematics Textbook were written by Dicky Susanto, Theja Kurniawan, Savitri K. Sihombing, Eunice Salim, Marianna Magdalena Radjawane, Ummy Salmah, Ambarsari Kusuma Wardani, published by the Center for Curriculum and Bookkeeping (2021). Chapter Series Sequences and Trigonometry Comparisons. It is at the Very Creative level with a percentage of 10%, while the percentage of questions at the Quite Creative level is 90%.

Declaration by Authors

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