Analysis of Creative Thinking Skills among Grade 11 Students at SMAN 14 Gowa

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Abstract - *This study analyzes the creative thinking abilities of Grade 11 students at SMAN 14 Gowa on the topic of dynamic fluids. The researchers employed a quantitative descriptive design using a survey method. The study involved 82 students selected through purposive sampling. The researchers collected data using five validated open-ended questions, each representing an indicator of creative thinking skills: fluency, flexibility, originality, and elaboration. The results indicated that, overall, students' creative thinking skills was categorized as fairly creative, with an average interval score of 14.7. Among the indicators, fluency showed the highest achievement (62.20%), classified as high, followed by flexibility (59%), elaboration (56%), and originality (52%), all of which fell into the moderate category. These findings suggest that students demonstrate strength in generating multiple ideas; however, further instructional support is needed to enhance their skills to produce original ideas and to develop and explain ideas systematically.*

Keywords*: Descriptive Test Instruments; Creative Thinking Skills; Dynamic Fluids*

INTRODUCTION

In the era of 21st century learning reform, the goal of education is not only focused on good learning outcomes, but rather prioritizes various student skills (Saefina, et al. 2025). In the 21st century, it is required to master various skills. The skills in question are communication skills, collaborate, critical thinking, and think creatively (Mu'minah, 2021). These four skills really need to be developed through the learning process (Hartiani, et al. 2022).

According to Nur (2016) to develop skills and potential within themselves, students have different abilities depending on their respective levels of creativity. One of the goals of education is that students are able to think creatively both in terms of solving or solving problems and also the skills to communicate or convey their thoughts (Jumriana, Luthfin, & Mutmainna, 2022). According to Trianggono (2017), creative thinking is a habit of a mind that is trained by paying attention to intuition, revealing new possibilities, opening up amazing perspectives, then generating unexpected ideas.

Creative thinking is the skill to generate new ideas that are original, flexible, and elaborate (Maryam, 2021). This ability includes four main aspects, these four aspects are important indicators to assess the extent to which students are able to develop their creativity in solving problems, especially in physics learning which often requires in-depth analytical and problem-solving skills (Djupanda, 2015). In addition, research by Hermawati (2021) shows that creative-based learning can improve students' high-level thinking skills.

Several previous studies support the importance of developing creative thinking skills. Research by Jumriana, Lutfin, and Mutmainna (2022) found that creative thinking skills are correlated with physics problem-solving skills. However, this study focused more on the relationship between variables, not on a specific description of students' creative thinking skills. In addition, Herlina and Qurbaniah (2017) in their

research found that students' creative thinking skills were still in the sufficient category, indicating the need for more attention in developing this skill. However, an in-depth analysis of students' creative thinking skills, especially in the context of physics learning at the high school level, still needs to be done (Wafa, et al. 2025).

Creative thinking skills are important for students to have. This is because creative thinking is a basic skill that must be developed in schools (Ozdas & Veli, 2017). This is supported by the results of research from Sambada (2012) which states that the higher the creativity, the higher the ability to solve problems in physics learning. In accordance with the objectives of the Ministry of National Education (2008), namely exploring creativity aims to produce graduates who have abilities according to graduate competency standards, it is necessary to develop learning for each competency systematically, integrated, and thoroughly (Irfana, 2019).

Based on the results of observations conducted by researchers at SMAN 14 Gowa, it is known that physics teachers have implemented student-centered learning and used learning models designed to encourage student creativity. However, teachers do not yet have concrete information regarding the extent to which students' creative thinking abilities have developed, because the evaluations conducted so far have still focused on the cognitive aspects of learning outcomes. In other words, students' creative thinking abilities have never been measured directly, so teachers have not been able to know the real picture. This is the basis for the need to conduct research to analyze students' creative thinking abilities in physics subjects. Based on the background that has been described, this study aims to analyze the creative thinking abilities of class XI students of SMAN 14 Gowa in physics subjects.

RESEARCH METHODS

The type of research used in this study is quantitative descriptive with a survey method. The population of this study was all students of class XI SMAN 14 Gowa totaling 115 people. The sample was taken using the technique *purposive sampling* and obtained 82 students from three classes.

The data collection technique used a descriptive test that had been compiled based on four indicators of creative thinking according to Guilford, namely fluency, flexibility, originality, and elaboration. The research instrument used in this study was a creative thinking skills test instrument consisting of 5 questions, the instrument was validated theoretically and empirically. Content validity used the Gregory approach with very high validation results. Reliability was tested using *Alpha Cronbach* and obtained a value of 0.62, which indicates that the instrument is reliable. The data were analyzed descriptively by calculating the average and percentage of achievement for each creative thinking indicator.

To group the level of creative thinking skills test results based on each indicator, five assessment categories are used which are arranged based on the percentage of the value. The categorization is as follows:

Table 1. Categorization of Creative Thinking Skills Test Scores Based on Each Indicator

Percentage (%)	Category
80 – 100	Very high
60 – 80	High
40 – 60	Currently
20 – 40	Low
0 – 20	Very low

(Hasanah & Haerudin, 2021)

To group the level of creative thinking skills of students as a whole, a classification is used based on the total score interval.

Table 2. Categorization of Student Creative Thinking Skills Test Results Scores

Interval Scores	Category
21 – 25	Very Creative
16 – 20	Creative
11 – 15	Quite Creative
6 – 10	Lack of Creative
0 – 5	Not Creative

(Ali, 2012)

RESULT AND DISCUSSION

Result

Overview of Creative Thinking Skills Scores of Class XI Students

Based on the data in Table 4.2, the average score of creative thinking skills of participants in the category is in the interval of 11-15, which is included in the fairly creative category.

Table 3. Frequency Distribution of Students' Creative Thinking Abilities

Interval score	Category	fi	xi	fi.xi	(%)
21 – 25	Very Creative	4	4,88	92	4.88
16 – 20	Creative	30	36,59	540	36.59
11 – 15	Quite Creative	39	47,56	507	47.56
6 – 10	Lack of Creative	8	9,76	64	9.76
0 – 5	Not Creative	1	1,22	2.5	1.22
Total		82		1205.5	100
Average					14.7

This interval is obtained from the average numerical score of 14.7. The description of the percentage of the creative thinking skills test results is shown in the following pie chart.

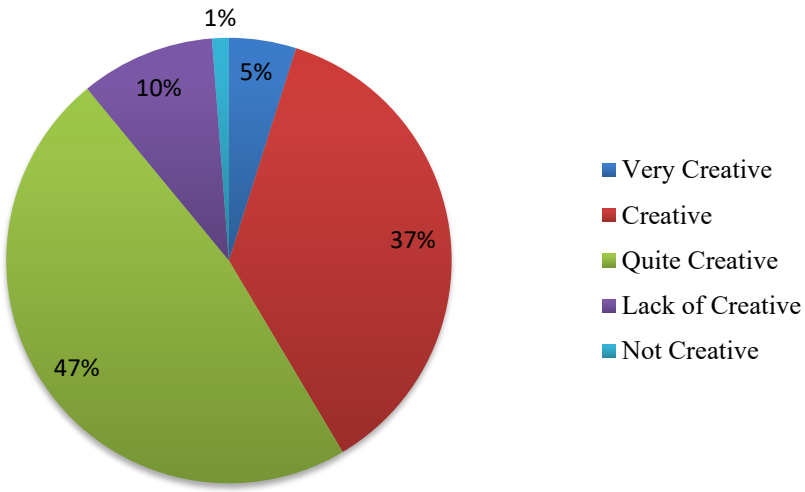

Figure 1. Pie Chart of Percentage Scores of Students' Creative Thinking Skills Test Results

Figure 1 shows the percentage distribution of the level of creative thinking skills of class XI students of SMAN 14 Gowa based on category. As many as 47% of students are in the fairly creative category, 37% are in the creative category, 10% are in the less creative category, 5% are in the very creative category, and 1% are in the non-creative category.

Overview of Students' Creative Thinking Skills Scores Based on Creative Thinking Skills Indicators

The results of the descriptive analysis of the creative thinking skills scores of class XI students at SMAN 14 Gowa for each indicator of creative thinking skills can be seen in Table 5.

Table 5. Statistics of Students' Creative Thinking Abilities Based on Each Indicator

Statistic	Indicators of Creative Thinking Skills			
	Fluency	Flexibility	Originality	Elaboration
Sample	82	82	82	82
Maximum ideal score	10	5	5	5
Minimum ideal score	0	0	0	0
Average score	6.22	2.96	2.61	2.8
Percentage	62.2%	59 %	52 %	56 %
Standar Deviation	1.78	0.87	0.86	1.29

The statistical data presented in table 5, shows that the average score achieved by students on the fluency indicator is 6.22 with a percentage of 62.20% while the average score achieved by students on the flexibility indicator is 2.96 with a percentage of 59%. The average score achieved by students on the originality indicator is 2.61 with a percentage of 52% and the average score achieved by students on the elaboration indicator is 2.8 with a percentage of 56%. An overview of the percentage of data from the results of students' creative thinking skills tests on each indicator is presented in the form of a bar chart below.

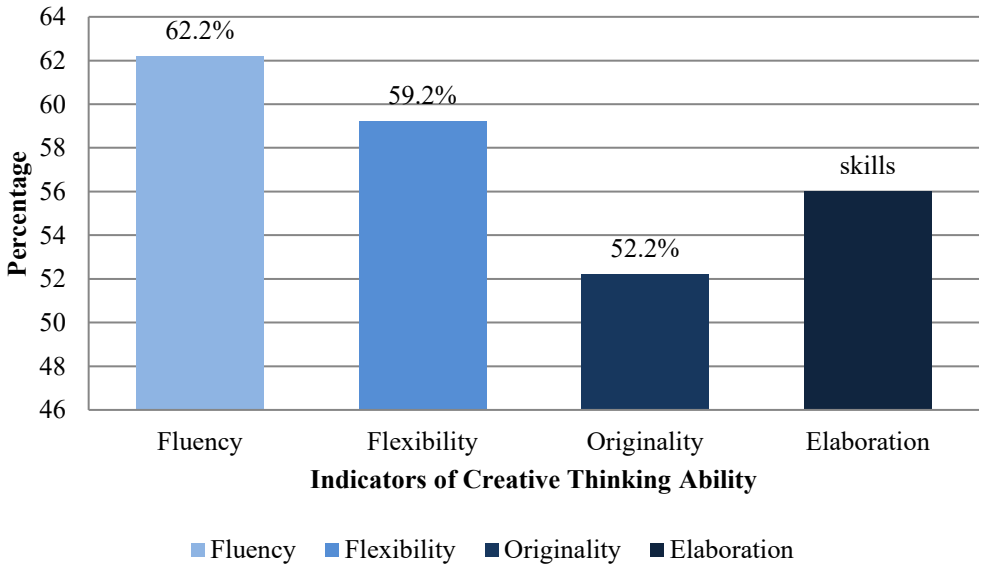

Figure 2. Percentage Bar Chart of Students' Creative Thinking Skills Test Results Scores for Each Indicator

Figure 2 shows the percentage of student achievement in each indicator of creative thinking skills. The fluency indicator obtained the highest percentage of 62.2%, followed by the flexibility indicator of 59.2%. Furthermore, the elaboration indicator had a percentage of 56%, and the originality indicator showed the lowest percentage of 52.2%. These data show a comparison of student achievement in the four indicators of creative thinking skills

Discussion

Based on the results of research on 82 class XI students of SMAN 14 Gowa, it was found that the average score of creative thinking skills based on the score interval was 14.7, which is included in the fairly creative category. This finding provides a real picture that although physics teachers at SMAN 14 Gowa have implemented student-centered learning and tried to foster creativity as found in the results of initial

observations, most students are still at a level that is not yet optimal in creative thinking. This can be caused by the absence of an evaluation that specifically measures creative thinking skills, so that teachers do not have concrete data as a basis for designing reinforcement in these aspects. This condition is in line with the findings of Jumriana, L., Lutfin, and Mutmainna (2022), which stated that students are generally in the fairly creative category because the learning process has not been fully focused on developing creativity as a whole. In addition, according to Qomariyah (2021), one of the factors that inhibits the growth of creativity is the mismatch between the learning approach and the evaluation tools used.

The fluency indicator achieved the highest achievement compared to other indicators with an average score of 6.22 out of an ideal score of 10 with a percentage of 62.20% which is included in the high category. According to Guilford (1950), fluency is the skills to produce many ideas in response to a stimulus. This high score indicates that students are quite capable of providing various answers in solving problems. This is also supported by the results of observations showing that teachers have used open questions in learning, although strengthening the quality of ideas has not been emphasized too much. In the theory of creative thinking by Torrance (1974), fluency is an initial aspect that is easier to achieve than originality and elaboration. This finding is consistent with Hamdi's research (2023), which states that fluency develops faster when students are given space to express themselves and are not too tied to one correct answer. Himmah et al. (2021) also emphasized that students will be able to express more ideas if given the freedom to think. This finding is also supported by Wahyuni's (2021) research, which reported that of the four indicators of creative thinking, fluency scored the highest because students found it easier to generate many ideas than to develop or modify those ideas. Similar research by Lestari & Sari (2020) also showed that students tended to be more dominant in the fluency aspect because they were accustomed to mentioning many answers during discussions, although not all ideas were necessarily of high quality. Thus, the results of this study are in line with previous findings which stated that the fluency indicator tends to be the most prominent aspect of creative thinking among students.

The flexibility indicator has an average score of 2.96 out of an ideal score of 5 with a percentage of 59% which is included in the moderate category. According to Munandar (2012), flexibility reflects the skills of students to express ideas from various perspectives or use different approaches to solving problems. At SMAN 14 Gowa, although teachers have tried to use learning models that encourage exploration, such as group discussions and open problem solving, students still tend to solve problems using the most common method. This shows that flexibility of thinking has not fully developed. These results are supported by research by Fitriarosah (2016) which found that students find it more difficult to show flexibility if they are used to using a single approach to learning. Rahma (2023) also stated that an inflexible learning approach indirectly forms a rigid mindset in students. Therefore, although the learning used has encouraged exploration, flexible thinking skills have not been specifically assessed, so they have not become the main focus of the evaluation.

The originality indicator obtained an average score of 4.81 with a percentage of 48.10%, which is included in the moderate category. Originality according to Guilford

(1950) is the skills to produce ideas that are uncommon, unique, and different from others. This score shows that most students still tend to give general or conventional answers, not being able to present ideas that are truly different from most. This can be caused by learning habits that emphasize one correct answer and the lack of space for free exploration of ideas in learning. Torrance (1974) stated that originality is a higher creative thinking skills because it requires students to get out of their usual mindset. Research by Himmah et al. (2021) also states that the originality indicator is often the biggest challenge for students because they tend to be afraid of being wrong or hesitate to convey uncommon ideas. This finding is also reinforced by research by Suryani & Lestari (2020) who also reported something similar, that students have difficulty in expressing unique ideas, because they are less accustomed to learning approaches that encourage free thinking. Thus, the low originality score indicates the need for a more focused evaluation and reinforcement strategy to build students' courage to think uniquely and innovatively.

The elaboration indicator obtained an average score of 2.80 from an ideal score of 5 with a percentage of 56% which is included in the moderate category. Elaboration according to Guilford (1967) is the skills to expand, develop, and explain an idea in detail and logically. In the field, students are able to convey basic ideas, but are not used to explaining them coherently and systematically. This can be seen when students only answer briefly without explaining the reasons or underlying physics concepts. Herlina & Qurbaniah (2017) stated that low elaboration skills is often caused by students' habit of answering directly without a logically structured thought process. Irfana (2019) added that students who are not trained to explain their thought processes tend to give short answers with minimal elaboration. Although teachers have accustomed students to discussing and making group presentations, there has been no assessment that specifically evaluates the extent to which students are able to construct arguments or explain ideas logically and structured. As a result, students' elaboration abilities have not developed optimally because they are not used to being asked to describe their thought processes in detail. In contrast, the project-based learning approach as developed by Haryanti & Samitro (2019) has been proven to be able to increase elaboration because it requires students to compile structured and complete solution steps.

CONCLUSION

Based on the research results, the creative thinking skills of grade XI students at SMAN 14 Gowa are in the moderately creative category. The fluency indicator is in the high category, while flexibility, originality, and elaboration are in the moderate category. Empirically, these results indicate that physics learning on fluid dynamics material still needs to be improved to encourage the development of more varied, original, and detailed ideas. Practically, teachers need to apply innovative learning models that stimulate creativity, schools are expected to provide supporting facilities and a conducive learning atmosphere, and students are encouraged to more actively explore ideas during the learning process. Further research is expected to involve a wider sample and implement learning interventions that specifically target the improvement of creative thinking skills in each indicator.

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