Jurnal Akademika Kimia, 11(1): 1-5, February 2022
ISSN (online) 2477-5185 | ISSN (print) 2302-6030
http://jurnal.fkip.untad.ac.id/index.php/jak/

OPEN ACCESS

Analysis of Student's Creative Thinking Ability on Colloid Material

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Received 23 March 2021, Revised 09 December 2021, Accepted 4 February 2022
doi: 10.22487/j24775185.2022.v11.i1.pp1-5

Abstract

This study aimed to describe students' creative thinking skills in Colloid material in class XI SMA Negeri 7 Palu. The type of this research was descriptive quantitative. The research sample consisted of 30 students. The data collected were in the form of test results for the ability to think creatively, which were obtained through giving essay questions as many as five items that expert validators had validated. The results of every item were on average 74.4% of fluency, while flexibility, elaboration, and originality, respectively, were 75.83%, 53.76%, 61.66%, and 47.5%. Based on the analysis of the four indicators above, it can be found that the students' creative thinking ability on colloid material in class XI SMA Negeri 7 Palu was in the medium category. Students need to be accustomed to working on questions that can require them to think creatively during learning to develop their ability in creative thinking and connect theory with everyday life.

Keywords: Creative thinking, colloid

Introduction

Education is an essential vehicle to improve the quality of human resources. In efforts to improve the education system to create reliable human resources, the government seeks to improve the quality of learning processes and outcomes at every level of education to obtain human resources that can support the development of national education. In harmony with the development of science, technology, and ethnic diversity, a nation requires creative and superior human resources to be used. At the tertiary level, it requires students to have creative abilities in thinking and behavior (Nurhayati & Rahardi, 2021). Students can increase their essential potential through education, whether physical, intellectual, emotional, mental, social, or ethical potential. So that education is an important thing that must be obtained by every student towards the formation of quality students (Fitriani et al., 2017)

Creative thinking is a process that can provide different ideas or ideas that can then become new knowledge and needed answers. Thinking creatively is like an oar in a boat, namely as an introduction in going through learning problems with students as controllers of the oars leading to which direction the students achieve the goals or desired answers (Abdurrozak & Jayadinata, 2016). Education at this time still does not support the growth and development of student's creative thinking skills. The field of education emphasizes unproductive thinking, rote memorization, and looking for only one correct answer. Students' creativity can be hampered and cause rigidity in the thinking process and less broad in responding to a problem (Rosa & Pujiati, 2016).

Based on some of the opinions above, it can be said that creative thinking is a mental activity related to sensitivity to a problem, considering new information and unusual ideas with an open mind, and being able to make connections in solving a problem (Moma, 2015). In addition, Meika & Sujana (2017) explains that creative thinking skills are abilities related to creativity. Which can be interpreted as ways of thinking to change or develop a problem, see situations or problems from different sides, and be open to various ideas and even ideas that are not common. Each student has other creative talents, so the possibility of solving or answering a problem will also vary. Creativity can be seen as a product of creative thinking. In contrast, creative activity is an activity in learning that is directed to encourage or bring out students' creativity to think creatively (Sekar et al., 2015).

The importance of creative thinking skills is trained to students. Students' creativity continues to develop in finding various creative ideas broadly and

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diversely when faced with multiple problems in the learning process at school and in everyday life. In line with this, Malisa et al. (2018) mentioned that creative thinking trains students to dare express opinions, be firm in deciding something and be wise in concluding. The development of creative thinking needs to be done because creative thinking is one of the desired abilities in work.

Thinking skills that are very important are creative thinking skills. Creative thinking is a process of thinking in determining new relationships between things, finding new solutions, or finding contemporary arts. Therefore, we can find and pick new things to adjust to a problem (Wahida et al., 2015).

Creative thinking skills are essential for students in analyzing various problems, so students can find unique ways to solve the multiple issues they face. Nugrahaeni et al. (2017) argued that creative thinking requires a child to have the ability to solve problems, have a variety of answers, can master a problem concept, convey ideas or ideas on a problem topic.

Students' creative thinking skills are needed, especially in learning chemistry, because some chemistry is contextual (Herdiawan et al., 2019). Students often think that chemistry is a complex subject because it contains many formulas and calculations where students' abilities are generally only limited to the level of memorization and have difficulty when faced with problems related to the implementation of chemistry in everyday life (Ningrum, 2016). In addition, chemistry learning aims to train students in thinking and reasoning in concluding, such as through investigation, exploring, experimenting, and showing similarities, differences, consistent and inconsistent (Nursa'adah & Rosa, 2016). Students are demanded to apply creative thinking skills to solve various chemistry-related difficulties and problems.

A colloid is one of the chemical materials studied in class XI MIPA SMA Negeri 7 Palu. Colloidal materials can be understood and learned by observing events or phenomena in everyday life like in nature (soil, water, and air), industry, medicine, and agriculture (Chandraningtyas et al., 2019). The characteristics of colloidal material that contains theory and its application in everyday life make students required to be able to solve problems contextually and think creatively (Arini, 2017).

The indicators of creative thinking analyzed are the ability to think fluently, flexible, original, and detailed because students who think creatively can develop or find new and original ideas. This ability can see related concepts, intuition, and analytical thinking skills to obtain further information (Hutahaean et al., 2017).

Indicators of creative thinking are often implemented in colloidal materials. Therefore almost every colloidal study conducts experiments on events or phenomena. Running experiments is closely related to creative thinking, consisting of several aspects: 1) observing, students try to give many ideas or answers to phenomena that occur and will practice fluent thinking skills; 2) making hypotheses, students try to think of various ways to solve a problem that will train flexible thinking skills; 3) planning and conducting investigations students always try thinking of new, unique ways that are not usually done by others will train original thinking skills; 4) analyzing data, students always try to enrich or develop existing ideas and will train detailed thinking skills (Purlistyani, 2012). However, many students think that the colloidal material is rote, so it does not encourage students to think creatively (Sulastri & Octarya, 2019).

Based on an interview with one of the XI MIPA teachers at SMA Negeri 7 Palu, it was obtained information that students' creative thinking skills on colloidal material were still low. This problem appears when the teacher gives problem-solving questions, students in class XI are still less enthusiastic about answering and studying colloidal material. At least students who express opinions in answering questions from subject teachers are due to the lack of variety of views due to at least the ideas that appear. The ideas that arise are closely related to students' creative thinking abilities during the learning process.

Based on the explanation of the problems that occurred, it is necessary to analyze to determine the students' creative thinking skills on colloidal material in class IX of SMA Negeri 7 Palu.

Methods

The type of research used is descriptive quantitative research. Quantitative descriptive is research based on data collection using research instruments with the aim of testing hypotheses to describe phenomena or events systematically according to what they are (Sugiyono, 2018).

The design of this study used a method survey. The survey method can be described as scientific research whose data is collected from a sample that has been selected from the entire population (Fathurrohmi, 2019).

The population in this study were all students of class XI MIPA SMA Negeri 7 Palu totaling 162 students enrolled in the 2019/2020 school year. The sample of this research is the students of class XI MIPA 1, totaling 30 students consisting of 13 male students and 17 female students.

The sampling technique was *purposive sampling*. This sampling technique is used to determine the sample based on specific considerations; for example, the class is considered to have the same number of students as other classes, and the ability to study results is almost the same.

The research instrument used was a test of creative thinking skills that contained aspects of fluency, flexibility, elaboration, and novelty. The research instrument consisted of 5 essay questions, each represented by 2 or 1 question. Before being

tested, the research instruments used in this study were validated by expert validators.

The students' creative thinking ability in this study aims to be able to describe the level of students' creative thinking abilities. The level of creative thinking is measured based on creative thinking indicators adapted from Munandar (2009). Where this indicator uses four indicators, namely:

Thinking fluently or fluency causes a person to develop many ideas for answers, problem-solving, or questions.

Flexible thinking or flexibility causes a person to produce varied ideas, answers, or questions.

They are elaborating skills that cause a person to be able to enrich and develop an idea.

Original thinking causes a person to be able to produce new and unique expressions or find unusual combinations of common elements.

Results and Discussion

This study aimed to describe students' creative thinking skills about colloidal material. An identification test of students' creative thinking skills was carried out using essay questions to achieve this goal. Students' creative thinking ability is measured based on indicators adapted by Munandar (2009), namely Fluency, Flexibility, Elaboration, and Novelty. Colloidal subjects measure students' creative thinking ability.

Creative thinking and respondents' average score

Based on data analysis, it is known that all respondents have creativity in different aspects of creative thinking; some are very creative, creative, and immensely creative.

Based on the creative thinking ability test results, the scores obtained from the results of data analysis can be seen in **Table 1**.

Table 1. Categories of achievement of creative thinking aspects

No	Indicators of Creative Thinking Ability	Percentage	Category
1	Fluency	75,83%	High
2	Flexibility	53,76%	Low
3	Elaboration	61,66%	Medium
4	Original	47,5%	Low

Students can think broadly based on the questions given in the fluency indicator. Most of the students' fluent thinking ability in the high category based on **Table 1** the percentage of students' creative thinking ability on the fluency indicator was 75.83%, which was in the high class. On the indicators of fluent thinking, respondents can answer questions correctly and adequately regarding the colloid concept where the difference between the three types of mixtures (solutions, colloids, and suspensions) is viewed from the aspect of particle size, stability, and microscope observations. According to the statement (Wijaya et al., 2016), fluency refers to the student's ability to explain the problem. The results of the problem answer smoothly and correctly, having confidence in the correct answers. In line with research conducted by Chandraningtyas et al. (2019), the ability of students to think creatively fluently is classified as good, indicating that students can answer questions well. Questions for this indicator lead students to have many ideas about a problem and respond with several answers.

In the indicator of flexibility, most respondents have not been able to think flexibly based on daily life. In this case, some students tend to be confused if they are stuck in a problem and do not reach the best solution. In this aspect, most of the students have not answered with a new approach with certain concepts. Students should be able to work effectively and by applicable chemical concepts. Based on **Table 1**, the percentage of students' creative thinking ability on the flexibility indicator is 53.76%, which is in the low category. Respondents did not understand the colloid concept well regarding the questions given where the function of soap or detergent in cleaning dirt, grease, or oil attached to clothes needed to use detergent or soap. The dominant answer from respondents only explained the slippery nature of soap without linking chemical concepts regarding the molecular structure of soap or detergent. In this indicator, respondents do not understand the colloid concept well; respondents have not been able to apply chemical concepts in daily life. Respondents are also not accustomed to creative thinking in generating ideas or ideas flexibly when solving a chemical problem, following research conducted by Chandraningtyas et al. (2019). The ability to think flexibly is included in the excellent category indicating that students do not yet have good skills to interpret the images or objects given.

In the elaboration indicator, respondents have not been fully able to think in elaboration based on The questions given following evidenced by the results of the answers where only 3 respondents have a high level of creative thinking in elaboration aspects. The following is proof of solutions where only 3 respondents have a high level of creative thinking in the elaboration aspect. Among them, 25 respondents have a moderate level of creative thinking, and 2 respondents have a low level of creative thinking. Most of the students' elaboration thinking skills are in the medium category. Based on

Table 1, the percentage of students' creative thinking abilities on the Elaboration indicator is 61.66% in the medium category. For that the elaboration thinking indicator, only a few students can identify activities in points 1-5 on questions involving colloidal properties and give reasons regarding the process. Based on one of the students' answers, the ability to think creatively on the elaboration indicator is in a suitable category. Students can identify and explain activities involving colloidal properties from 5 points. Points 1 and 4 heal stomach ache with norit medicine and water purification. Still, in indicators, only a few people answered according to the criteria for answering the questions given in this case. Most respondents on this elaboration thinking indicator cannot answer because of lack of experience and lack of seeking information. In the learning process, only know the nature of the colloid, but how to use it or its working principle is unknown. According to the statement (Nuriadin & Perbowo, 2013) suggested that the ability to detail to describe a particular object, idea, or situation in detail so that it becomes something more interesting. In line with the research conducted by Chandraningtyas et al. (2019), students' ability to think in elaboration is also included in the medium category, indicating that students can elaborate in solving problems. Questions on this indicator lead students to detailed answers in detail.

On the indicator of novelty, some respondents have not been able to think creatively about the novelty aspect based on real-life experienced. Six respondents can answer the questions correctly. At the same time, the other respondents have not been able to solve the problem based on the questions that have been given. Respondents should be able to answer questions with various ideas or ideas where the answers given are unique and should also be able to explain in detail and precisely to achieve the highest category value. Based on **Table 1**, the percentage of students' creative thinking abilities on the novelty indicator is 47.5%, in the low category. Respondents do not understand the concept of colloid based on the questions presented regarding several mixed facts. Respondents are expected to analyze and give each argument why ice cream does not crystallize, so it remains chewy because it is mixed with gelatin; milk does not clot because there is casein in milk. The ink does not settle because it is mixed with gum. Most of the respondents on the novelty indicator have not been able to provide unique answers where almost all respondents have the same answer (usually used as an example in learning), only a small number of which provide excellent solutions. So that there are still many students who are classified as less creative due to chemistry learning, they do not learn to think creatively in new ways. As a result, students are not accustomed to expressing their respective opinions and can only memorize theories. They have not been able to relate ideas. in daily life. In line with the research results by Chandraningtyas et al. (2019), the ability to think original is low, indicating that students have a low ability to convey ideas in other ways. The questions on this indicator aim to measure students' ability to develop new ideas or things that others have never thought of.

Some of the results of the data analysis of this study indicate that students' creative thinking is different. The percentage of the fluency indicator is 75.83% is in the high category, the Flexibility indicator of 53.76% is in the low type, and 61.66% of elaboration is in the medium category. The Novelty indicator of 47.5% is in a low variety. Following Supriadi's (2015) statement, no person does not have creativity. Class XI SMA Negeri 7 Palu can have moderate creative thinking skills, whereas the average student is in the medium category.

Students' low creative thinking ability is caused by students who do not understand the concept and have not been able to apply it in everyday life. This condition is caused by the learning process that does not teach students to think creatively. So that colloidal material becomes abstract and cannot be achieved by students properly. Therefore, students need to be accustomed to working on questions that require students' creativity when learning chemistry so that students will be motivated and trained in creative thinking.

Conclusions

The results showed that the creative thinking abilities of class XI students of SMA Negeri 7 Palu in the categories of Fluency, Flexibility, Elaboration, and Original each had a percentage of 75.83% (high), 53.76% (low), 61.66% (medium) and 47.5% (low).

Acknowledgment

The author would like to thank the principal and the chemistry teachers of SMA Negeri 7 Palu and all parties who have helped the author complete this research.

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