

## Research Article

# The Difficulty of Students in Utilizing Online Learning Resources to Apply Creative Thinking

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Creative thinking skills can create creative ways and harmonize knowledge with time. However, the analysis of the difficulties of mathematics education students has not been widely discussed, especially in the use of online learning resources. This study analyzes 15 fourth-semester mathematics education students' difficulties in using online learning resources to apply creative thinking in solving math problems. Instruments consist of creative thinking skills test and a scale of online learning difficulties. The study results found that all subjects were familiar with online learning resources. However, its utilization was still minimal due to various difficulties, such as unstable signals, high quota costs, confusion about choosing an abundance of information, and uncertainty about the correctness of the information. These difficulties have an impact on the limited knowledge of the subject and the ability to generate ideas. Fluency in creative thinking was low. Subject ideas tend to be limited and routine. Subjects prefer to present an idea and immediately apply it to problem-solving. Flexibility is not visible, and errors in responding to ideas still occur. As a result, when the idea is executed incorrectly, the problem-solving is also wrong.

**Keywords:** difficulty of student, online learning resource, creative thinking

## 1. INTRODUCTION

Various sectors of life are changing as a form of adaptation to the Covid-19 pandemic, including the education sector. It seems clear that educational activities, especially in the learning process, have undergone significant changes. At the beginning of the Covid-19 pandemic, learning that was usually carried out face-to-face could not be carried out related to social distancing and was carried out to minimize the impact of Covid-19. This has resulted in many schools going into shock. The unpreparedness of distance learning, especially in small cities, makes learning activities seem to stop. Faced with this fact, the government then allowed face-to-face learning based on the 4 Ministerial

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Decree, but distance learning must still be done because face-to-face learning can only be done in a limited and strict manner.

Distance learning which is synonymous with utilizing communication within the network is not a bad thing. If you look closely, various benefits can be taken from distance learning. For example, the convenience of studying, the flexibility of time, and a place to learn. In addition, distance learning which is carried out by utilizing the internet network or known as online pursuits [1], can provide an open-source system in learning. Open-source systems can provide opportunities for students to be active and creative in exploring to meet their learning needs. Thus, if done effectively, learners' knowledge can develop broadly and deeply.

One of the advantages of an open-source learning system is the availability of various online learning resources that can be used in the learning process. Online learning resources can be accessed with digital devices such as smartphones, tablets, laptops, and others. These devices can be supported by learning media such as Edmodo, google classroom, and others so that they can connect students around the world [2–4]. Thus, the global exchange of information is possible. Logically, it can help students to expand their knowledge. The process of building knowledge becomes limitless in line with the opening of access to learning resources that can be used. Students can also discuss with anyone without being limited to places. However, the facts show that the use of online learning resources is still not optimal. This fact can be seen from the results achieved by students in online learning which are still low and have several obstacles [5, 6]

Learning by using online learning resources that are free of access can help develop learning activities. There is no limit to the source of informants that has been a limitation in face-to-face learning. Students can find a variety of information needed in the learning process from many sources. Information is even more varied and abundant. That should be able to broaden the horizons of students and increase opportunities for creative thinking. Creative thinking is a thought process to produce new things in the form of ideas or objects, as well as new forms or arrangements that are directed at goals [7]. Creative thinking fulfills subjective criteria and is not limited by the demands of logic [8].

Creative thinking is an important skill in learning. This is because creative thinking can form a more open, stable, and confident personality. In addition, creative thinking can also make learning activities fun [9]. The ability to think creatively need in various fields of learning, including mathematics. People need two modes of thinking in mathematics, one of which is creative thinking with intuition [10]. Kim defines that people who are gifted in mathematics are people who can show superior ability to solve mathematical

problems creatively. Children who are raised with new creative mathematics will be more confident [11]. The best creative ideas generated can qualify for mathematical development. These creative ideas often combine and simplify [10]. In addition, by thinking creatively, mathematics will be able to accelerate with the times.

Creative thinking skills can be measured through the achievement of creative thinking indicators. These indicators include originality, accuracy, fluency, and flexibility. Other indicators are fluency, flexibility, and novelty. Fluency refers to the number of ideas generated as an appropriate response. Flexibility is a real shift in the approach taken when generating the right response. Newness is the originality of the ideas generated. Analysis of student responses regarding fluency refers to the number of ideas raised or questions generated, flexibility refers to the different alternatives generated, and originality refers to the scarcity of responses through responses. Fluency, flexibility, and novelty are the indicators used in this study.

Creative thinking skills is an important role in mathematics can't be achieved optimally by students. That occurs at various levels of education, including in tertiary institutions, especially for student mathematics teacher candidates. Based on several study results, known that students have not maximally developed their creative thinking skills [12]. Many students forget the basic material related to the concept of analysis. The level of student's creative thinking skills is still lacking, only 39.07% of the ideal score [13]. Students tend to be trained to derive formulas, not given space to think broadly which can stimulate their developing creative thinking skills. The achievement of critical thinking skills that have not met expectations is caused by several things, including the lack of opportunities given to display creative thinking through the mathematics learning process. Learners are mostly taught to think in a narrow domain and rely on routine processes [14]. In addition, lack of training, information, prejudice, and time constraints also cause less development of creative thinking skills.

The fact that there is no meeting point between the importance of the ability to think creatively and its achievement targets is an interesting problem to study. That has become more interesting related to online learning that is being promoted during the Covid-19 pandemic. As previously described, online learning, which provides advantages in accessing online learning resources, should be able to develop creative thinking skills which have an impact on improving learning outcomes, but in fact, this is not the case. This problem is a problem that needs to be researched considering that no research examines the causes of difficulties for students in utilizing online learning resources related to the development of creative thinking skills, especially for prospective mathematics teacher students. Students who are prospective mathematics

teachers are considered urgent subjects to study. The reason is mathematics education students are future mathematics teacher candidates who will be at the forefront of the learning process. Therefore, this study was conducted to analyze the difficulties of prospective mathematics teacher students in utilizing online learning resources to apply creative thinking in solving math problems.

## 2. RESEARCH METHOD

The method used in this study is the descriptive qualitative method. The study was conducted on fifteen subjects, namely students of level II (semester IV) mathematics education study program at one of the private universities in Garut Regency, the academic year 2020/2021. Subjects were selected by random with a Grade Point Average (GPA) above 3.00. The research instrument used in the form of a test of creative thinking skills of four items in the description with the topic of a polyhedron. The additional instrument is the online learning difficulty scale. The study was conducted by trying out the instrument on the subject, then analyzing the resulting data. Before used, the instrument is tested for validity first. Validation does by an expert in mathematics education, a lecturer at a university in Bandung. After being validated, the instrument used to test the subject's creative thinking skills in solving math problems associated with difficulties in utilizing online learning resources. The result data obtained from the creative thinking ability and the online learning difficulty scale were then analyzed. The first analysis carried out was to compare the results of the subject's answers with scoring guidelines. This is done to find out the extent of the problem solving process carried out by the subject and the difficulties that occur. The next analysis is based on the indicators of each item, namely fluency, flexibility, and novelty. Each indicator is used to analyze the subject's difficulty in the creative thinking process to solve mathematical problems. The analysis is also associated with the questionnaire results obtained.

## 3. RESULTS AND DISCUSSION

The results of this study consisted of data on the results of the mathematical creative thinking ability test and online learning difficulty scale. The first data analysis to compare the results of the subject's answers with scoring guidelines. This analysis is divided into two parts, comparing the number of subjects with correct or incorrect answers, and comparing the item scores for each subject based on the ideal score on the scoring

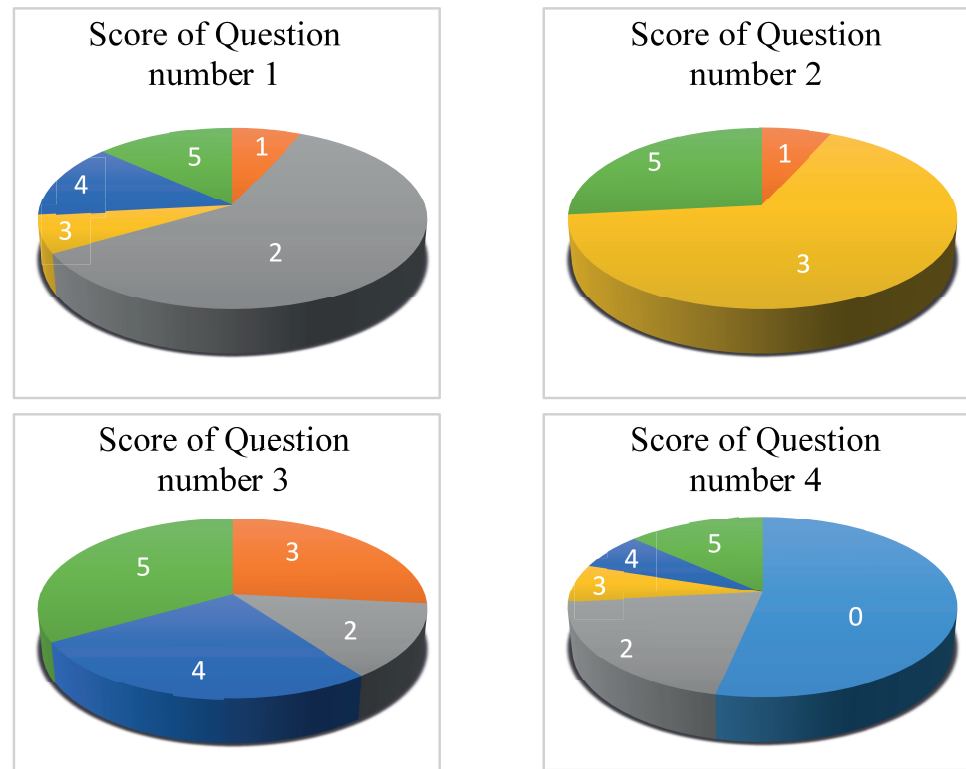
guidelines. The results of the first part of the analysis regarding comparing the number of subjects with correct or incorrect answers are as follows.

TABLE 1: Analysis of the number of students's with correct or incorrect answers based on scoring guidelines

Item Number Question	Number of students's with the right answer	Number of students's with incorrect answers	Descriptive
1	5	10	Subjects generally know and can prove the concept formula of face and space digonal of cube, but has difficulty finding ideas that refer to the relationship between the two.
2	14	1	Subjects generally can find out the relationship between a cuboid and a prism, but it's limited. Providing only one condition, not developed for other cases that are generally accepted.
3	9	6	Subject generally can count the number of edges of a prism and a pyramid, but had difficulty in finding the relationship between the ribs of the prism and the pyramid. Some subjects were able to find the relationship, but only in the example, they did not find a general condition that causes the number of edges of a prism to be equal to the number of edges of a pyramid.
4	4	11	Subjects generally trapped in the concept of volume formulas for cubes and cuboids and focus on routine processes, tend not to be thorough in understanding problems.

Based on Table 1., the lowest results are in questions 1 and 4. In question number 1, the subject tends to get stuck on the previously known concepts of the face and space diagonals of the cube. The concept that the subject believes in is the face diagonal with the formula  $s\sqrt{2}$  and the space diagonal with the formula  $s\sqrt{3}$ . The subject immediately thinks about applying the concept to the problem and immediately solves the problem. Subjects do not think further to find ideas related to the problems and concepts they have. In problem number 4, the subject is very focused on the formula for the volume of the cube and block. The subject chooses to solve the problem routinely even though the calculation numbers are large. As a result, many subjects made mistakes in their calculations and thus made wrong conclusions. Turning to the results of the second part of the analysis regarding comparing the score of each subject's item based on the ideal score in the scoring guidelines. The score for each item is as follows.

Based on Figure 1, it is known that in question number 1 the score is dominated by a score of 2. This shows that the subject's answers are generally wrong. The subject has been able to put forward the concept of face and space diagonals correctly but is



**Figure 1:** The score of subjects with each score for each item of the question.

not careful in applying it to the problem. Subjects cannot think creatively to apply the same concept to different problems. In question number 2, the score is dominated by a score of 3. This means that the subject's answer is correct. However, the subject only checks the answer from one side without trying to find other alternatives that might break his opinion. In question number 3, the score results are quite even at scores of 3,4, and 5. This shows that the subject's answer is correct even though there are still some problems such as the subject is too hasty in simplifying and does not try to develop its findings to apply to various conditions. In question number 4, the score is actually dominated by a score of 0. This shows that generally the subject's answer is wrong. Some subjects seemed inaccurate, such as not reading the size of the sides of the cube listed in the problem, doing wrong calculations, and being difficult to make an analogy without being tied to routine formulas for the volume of cubes and cuboids.

The second data analysis is based on the indicators of each item. Each indicator is used to analyze the subject's difficulty in the creative thinking process to solve mathematical problems. The analysis of the first indicator starts from the fluency indicator in question number 2. Fluency refers to the number of ideas generated as an appropriate response. Just a little of the subjects who can come up with several ideas related to problems and problem solving. The subject tries to analyze the problem

well. Starting from generating some ideas about the concept of drawing cuboids and prisms, describing the properties of prisms and cuboid, and explaining the elements of prisms and blocks. The subject then analyzes the ideas that have been described so that a connection between the beam and the prism appears, then concludes. However, most of the subjects are known can't to come up with various ideas. Subjects tend to feel difficult and do not want to look for other ideas related to problem solving. The subject only puts forward an idea and then immediately draws a conclusion. For example, suggesting the elements of cuboid and prisms or describing the concept that the volume of a triangular prism is half the volume of a block. After an idea emerged, the subject immediately concluded that the block was a prism without trying to analyze other possible concepts.

The second indicator analysis is the flexibility found in questions 1 and 3. Flexibility is a real shift in the approach taken when producing the right response. In question number 1, very few of subjects can come up with ideas then process these ideas until they come up with the right solution. Subject generally still made mistakes. Some subjects can come up with ideas but the development of these ideas looks like guesswork and is not accompanied by sufficient explanation. The subjects also seem to have difficulty applying the concept of face and space diagonals of the cubes that have been previously known to different cases. The subject immediately applies the diagonal formula and states that the statement is wrong without further analyzing the problem presented.

In question number 3, subjects can come up with ideas and process these ideas with the right approach to problem-solving. The subject explains the concept of the number of prism and pyramid edges correctly, then gives an example of a condition in which the number of edges of a prism is equal to the number of edges of a pyramid. The subject also develops ideas to the intended general condition so that the number of prism edges is equal to the number of pyramid edges. Other subjects, generally, can't process the resulting ideas into the right solution, even though in general the ideas generated were related to the problem. Some subjects explained the concept of the number of prism and pyramid edges but were unable to show a relationship between the two. Other subjects even only put forward the idea of the concept of the elements of the prism with a brief explanation. The subject looks confused to process the ideas it generates.

The third indicator analysis is originality in question number 4. Originality refers to the scarcity of responses through responses. The subjects were able to respond to problems in new or irregular ways was very little. The subject can think creatively by using his understanding of the logic of the cuboid height and then relating it to the

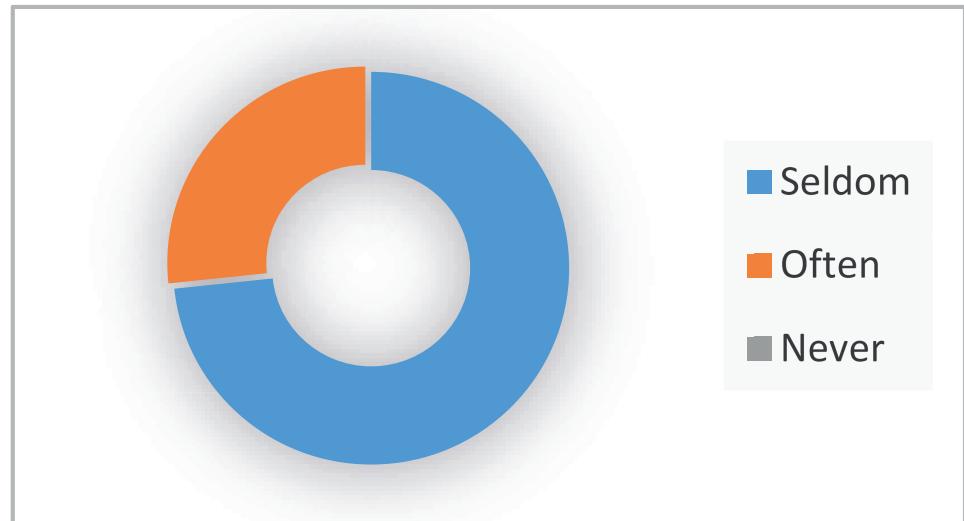
length and width of the cuboid. Meanwhile, most of the subjects seemed unable to solve problems irregularly. Some subjects still use routine processes in solving problems. The formula for the volume of cubes and cuboid is still used and many people make mistakes in their calculations and have difficulty understanding the problem. The subject is in a hurry to understand the problem so that an error occurs in finding information for problem-solving.

Based on the description of the results of data analysis, the achievement of creative thinking skills in terms of scoring guidelines and indicators of creative thinking abilities is still low. Several reasons known to be the cause. The subject feel difficult in bringing up ideas related to the problem. Subject ideas tend to be limited, prefer to put forward an idea that is considered related to the problem, and immediately apply it for problem-solving. It does not appear to be the subject's attempt to consider the various ideas that might relate to solving the problem. Another difficulty is processing ideas into the right solution. Subjects are generally can generate ideas even though they are limited, but the ideas are not always executed well. Subjects also did not appear to develop ideas that lead to problem-solving. Furthermore, subject is also difficult to generating new ideas that are not routine. The ideas generated are generally routine. The use of procedural formulas remains the choice of most subjects.

The difficulties faced by the subject in applying creative thinking, one are caused by a lack of knowledge of the subject related to the problem. Limited insight makes the subject unable to come up with various ideas. Subjects are limited to routine procedural ideas. No effort was seen to explore new ways of solving problems. The opportunity to broaden horizons or explore is very open to online learning activities with access to unlimited learning resources. Online learning resources which are the advantages of online learning have not been widely used by the subject. Based on the results of the questionnaire analysis, it is known that all subjects know about online learning resources. Some of the online learning sources known to the subject include for example google search, genius, brain, teacher's room, digital books, youtube, zoom, co-learn, and learning houses. Learning resources are used by all subjects for learning. However, not all subjects use learning resources in every learning activity. The frequency of use of learning resources by the subject is as follows.

As many as 11 from 15 subject said they seldom use online learning resources. Several things were the reasons, namely the material from the lecturers which was considered sufficient. The explanation from the lecturer was also considered clear and understandable so that the subject considered that there was no need to look for other sources of information or knowledge. Cost and signal strength are another reason. The





**Figure 2:** Intensity of using online learning resources.

cost of pulses which was considered wasteful and the signal that was not always stable made the subjects choose not to take advantage of high-frequency online learning sources.

Another cause of the minimal use of online learning resources is the subject's belief in the correctness of information on online learning resources. It is known that various online learning resources used by the subject are not believed to be true. In generally, subject were known to be unsure that the information obtained from online learning sources was correct. According to the subject, this information must be confirmed in advance to the lecturer, cause too numerous and varied. After that, the knowledge can only be ascertained right or wrong. It is not easy to decide which information is correct and wrong. The abundance of easily accessible information makes them feel confused about what steps to take to solve the problem.

## 4. CONCLUSION

Online learning resources such as google search, youtube, etc. are generally familiar to the subject. However, the intensity of its use still tends to be low because of the various difficulties that are felt. For example, the signal is not always stable, the cost of quotas is quite high, the abundance of information creates confusion and the uncertainty of the correctness of information from online learning sources. The emergence of difficulties in utilizing online learning resources resulted in a lack of information or subject insight. Subject knowledge becomes limited. This resulted in a lack of stimulus to generate lots of ideas. Lack of knowledge also results in difficulties in digesting and developing

ideas. The novelty that is expected to emerge is difficult. Routine processes are always a mainstay in solving problems because new methods are difficult to create. This reason makes the subject's creative thinking ability less developed. Fluency in creative thinking is low. Subject ideas tend to be limited and routine. No novelty appears. Subjects prefer to present an idea and immediately apply it to problem solving. Flexibility is not visible, errors in responding to ideas still occur. Subject did not try to think further about other ideas that may be related to the problem for comparison. As a result, when the idea is executed incorrectly, the problem solving is also wrong.

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