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Analysis of Junior High School Students Creative Thinking Skills in Distance Learning

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ABSTRACT

Purpose of this study is to analyze the creative thinking skills of junior high school students in physics in distance learning. This study describes students' creative thinking skills in physics using question instruments related to creative thinking. The method used in this research is descriptive quantitative method. The test is conducted online via google form. The instrument contains eight questions related to the physical matter of substance pressure and its application in everyday life. The subjects of this study were 32 students of VIII Junior High School in Gresik. The results showed that the analysis related to students creative thinking ability in physics obtained an average of 51.5% which was included in the creative enough category. On the fluency indicator it was 37% with the less creative category, 58% on the flexible thinking indicator (Flexibility). with the creative enough category, 64% on the original thinking indicator (Originality) with the creative category, 53% on the detailed thinking indicator (Elaboration) with the creative enough category and 43% on the metaphorical thinking indicator (metaphorical thinking) with the creative enough category. From these results it can be concluded that the creative thinking skills of student's physics in distance learning are still in the sufficient category so that it needs to be improved especially in distance learning at this time, so that alternatives are needed in learning that is suitable for distance learning. Creative thinking skills are one of the important skills to be trained in the 21st century today.

INTRODUCTION

The 21st century is called the century of knowledge, knowledge-based economy century, the century of information technology, globalization, the industrial revolution 4.0, and so on (Wayan, 2019). The life of the 21st century is related to the rapid and abundant development of information and the use of sophisticated technology, this has implications for education that education must be able to create adaptive graduates. (Dwi, 2019).

To be able to produce a creative, innovative and competitive generation, some skills in learning need to be trained in facing the 21st century. The main skills needed in the 21st century are *Critical Thinking Skills*, *Communication Skills*, *Collaboration Skills* and *Creative Thinking Skills* as a necessary competence in the 21st century known as the 4C competence (Partnership for 21st Century Learning, 2015).

The skills that students need to have are creative thinking skills (Dwi, 2019). Creative thinking is a thought process that generates a wide variety of possible ideas and ways (Tridaya, 2012). Creative thinking skills (*Creative Thinking Skills*) are skills related to the skills of using a new approach to solve a problem, innovation and discovery (Zubaidah, 2018). Creative thinking is the skill of discovering new things that did not exist before,

being original, developing new solutions for each problem, and involving the ability to generate new, varied, and unique ideas (Leen et al., 2014).

In 2019 seems to be a difficult year because it is the first year for the emergence of the outbreak *Coronavirus disease* (Covid-19). The epidemic is a world health problem, especially in Indonesia. On January 30, 2020, WHO determined the Covid-19 pandemic as a *Public Health Emergency of International Concern* (PHEIC) or a public health emergency that is troubling the world and the increase in the number of Covid-19 patients is taking place very quickly and spreading throughout the world (Satiyasih, 2020).

During this pandemic, the delivery of education, in formal and informal activities, was shifted to online or online methods radically and massively. So that informants (teachers, lecturers, teachers, educators) as well as target information must be technology literate if they do not want to be left behind. This opinion is in line with (Satiyasih, 2020) which states that in the education sector, teachers and students will be accustomed to interacting with the distance learning system.

Distance learning is a learning system that utilizes media that can allow interaction between teachers and learners (Giri, 2020). Distance learning relies on connectivity between students and teachers online by utilizing their own devices to connect with each other (Pakpahan, 2020). Distance learning is required to seek innovative ideas, ways, tools and substances in order to operate effectively and efficiently (Jalil, 2016).

The situation during a pandemic period requires people to carry out all activities within limitations. To overcome this, all activities are carried out at a distance. Many public places and various activities in them lead to closings, delays, or diversion of events into the realm of online distance (online) including educational institutions. Based on Circular No. 4 of 2020, it states that all face to face activities are converted into online/ online learning. This was done to reduce the transmission of the virus in the community (Perdana, 2020).

Basically physics is a natural science which consists of several aspects, including science as a product, process, scientific attitude and application. Science as a product is a collection of knowledge, science as a process is a way of investigation, while science as a scientific attitude is a mindset and Science as an application is an application of concepts that can manifest in a concrete form in the form of technology (Sunarno, 2018). So that science learning must be able to provide a role in forming the creative character of students as reliable successors in the future.

Based on the results of the study, information was obtained that the creative thinking abilities of physics students of class VIII-D Junior High School Xaverius Lubuklinggau City were still less creative (36.68%) (Arini, 2017). In line with this research, the results showed that students creative thinking skills were quite low with an average percentage of 39.76%. In detail, it can be described for each dimension of creative thinking skills in students *Fluency*, namely of 33.80%, *Originality* of 38.43%, *Elaborate* of 38.89%, and *Flexibility* of 47.92% (Wahyu, 2016)

This study aims to analyze students creative thinking skills in distance learning physics. The function of conducting an analysis related to students creative thinking skills in distance learning is to find out learning innovations that can be used according to the needs of distance learning so that learning that takes place is still able to train students creative thinking needed in the 21st century even in a distance learning situation. far. Analysis is a process that begins with suspecting the truth, then

investigates and describes what is the subject of the problem so that it can be translated into smaller parts after there is an appropriate assessment action to determine objectives (Arini, 2017).

RESEARCH METHOD

General Background

This research was conducted to analyze the creative thinking skills of the eighth grade junior high school students in Gresik in studying the physics of substance pressure material in distance learning. This study used a *pre-experimental design* with *a one-shot case study design* and a descriptive quantitative approach. *Pre-experimental design* is a design that includes only one group or class that is given pre and post-test (Sugiyono, 2014). Descriptive research is research that aims to describe a state or phenomenon as it is without manipulating the object of research (Sukmadinata, 2015).

Sample / Participants / Group

Participants in this study used a sample of 32 junior high school students in grade VIII in Gresik, East Java, Indonesia.

Instrument and Procedures

Instrument is a tool used by researchers to obtain research data. According to (Nurlaila, 2016) the research instrument is a facility used by researchers to collect data. In this study, the instrument used was a creative thinking skill test in the form of several questions or exercises in the form of an essay which was used to measure students creative thinking skills. The data collection procedure used in this study was to distribute instruments for creative thinking. The test used is in the form of an essay test consisting of eight essay questions on *google form* which refer to the creative thinking indicator, namely *Fluency; Flexibility; Elaboration; Originality* and *Metaphorical Thinking*. The essay test was chosen because it has advantages that it can be used to measure students higher abilities (Stankous, 2016). The Following is a flow chart in this study:

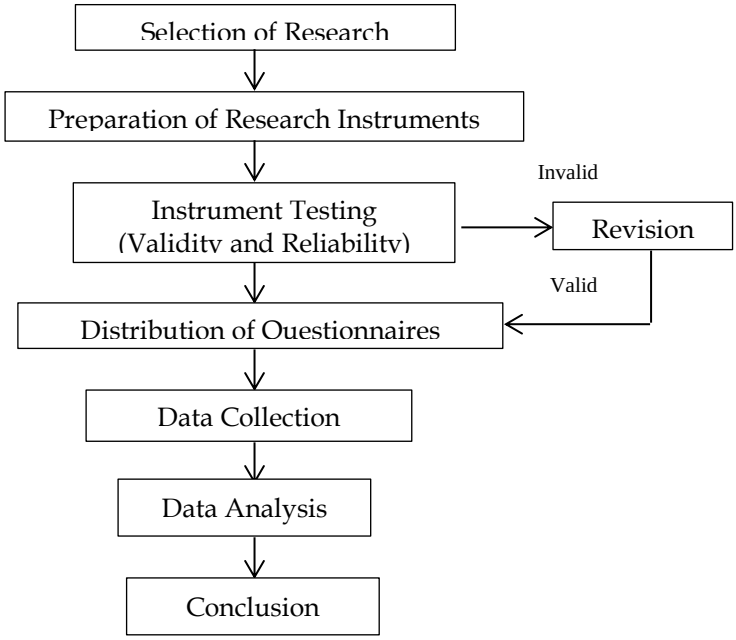

Figure 1. Flowchart of research procedure.

Data Analysis

Instrument Validity

The way to calculate validity is calculated using the following formula:

$$R = \frac{S}{N} \times 100\%$$

Source: (Widoyoko, 2017)

Information:
R = Average score
S = Total score obtained
N = Maximum total score

After knowing the validity value of each expert, then combining the results of expert validity and analyzing all expert validators using the following formula:

$$MR = \frac{\sum R}{N}$$

Source: (Sudijono, 2017)

Information:
MR = Average combined score
$\sum R$ = Total score obtained
N = Number of validators

After calculating the validation value, then the validation results can be categorized as in the following table:

Table 1. Criteria for the validity.

Coefficient	Criteria
75 ≤ VC ≤ 100	Very valid
50 ≤ VC <75	Valid
25 ≤ VC <50	Sufficiently Valid
0 ≤ VC <25	Less Valid

Source: (Riduwan, 2014)

Instrument Reliability

Test used to determine the consistency or consistency of the test. According to (Arini & Asista, 2017), the reliability test serves to determine the consistency of the test whether the test is reliable and remains consistent when used to retry. Reliability testing in this study was carried out using the Cronbach Alfa equation as follows:

$$r_1 = \frac{K}{K-1}\left(1 - \frac{\Sigma Si^2}{\Sigma St^2}\right)$$

(Liliasari, 2013)

Description :
r_1 : Reliability coefficient
k : Number of test items
St^2 : Variance of total test
scores Σsi^2 : Total variance of test items

Conclusion of item reliability refers to the criteria for the reliability coefficient of the test with the standard formula r_{11} 0.70. If $r_{11} \geq 0.70$; then the questions being tested have high reliability. Conversely, if $r_{11} < 0.70$; then the questions tested have low or unreliable reliability (Wijaya, 2019). After calculating the reliability value, the results of the calculation are then categorized in the following table:

Table 2. Criteria for the level of reliability item.

Value Range	Criteria
> 0.800 - 1, 000	High
> 0.600 - 0.800	High enough
> 0.400 - 0.600	Medium
> 0.200 - 0.400	Low
0.000 - 0.200	Very low

(Sugiyono, 2012)

Observation Results Data Creative Thinking Skills

Data analysis technique results observation using a holistic scoring scale by giving a score of 1-4 on each question number, then calculating the percentage value of students creative thinking abilities on each indicator which is calculated using the following formula:

$$NP = \frac{R}{SM} \times 100\%$$

Source: (Purwanto, 2013)

Description :
NP : Percentage value of creative thinking ability
R : Raw score obtained by students
SM : Maximum score of observation

Next is changing the percentage value into categories, from the results of the data in the form of percentages will then be converted into categories. The references in changing presentation into categories can be explained as follows:

Table 3. Conversion percentage of creative thinking skills.

Percentage of	Categories
81% -100%	Very creative
61% -80%	Creative
41% -60%	Creative Enough
21% -40%	Less Creative
0% -20%	Not Creative

Source: (Modification of (Arini, 2017)

RESULTS AND DISCUSSION

Validation Instrument

In this study, the test instrument is validated by three experts. The results of the validation of this research instrument are that validator 1 gets a percentage of 92%, validator 2 gets a percentage of 92% and validator 3 gets a percentage of 77%. From the three validators, it was obtained a combined average score of 87 and was categorized

as very valid. Following are the results of the validation of the research instrument statement:

Table 4. Results of the validity of the test instrument.

Aspects Assessed	Validation Results
Matching items with indicators	Very Valid
Matching items with cognitive domains	Very Valid
Matching items with indicators of creative thinking skills.	Very Valid
Suitability of questions with education level.	Very Valid
Use of sentence formulations in the form of a clear question or command sentence.	Very Valid
Use of tables and figures related to the items.	Very Valid
The use of tables and figures has clear information.	Very Valid
Use of scoring guidelines in accordance with the items.	Very Valid
Formulation of communicative sentences.	Very Valid
The sentence uses good and correct language according to the rules of writing.	Very Valid
Variety of sentences do not lead to multiple interpretations.	Very Valid
Use common language or verbs according to EYD.	Very Valid

The validation of the instrument in this study was carried out by three junior high school science teachers. The results of the validation show that each aspect of the instrument has a very valid level of validity which can be seen in Table 4. A good quality test must meet the test requirements, namely validity, reliability, objectivity, practicality, and economic (Arikunto, 2013). Limitations in this study only use validity and reliability requirements. The test is said to be valid if the test can provide appropriate information and can be used to achieve certain goals (Oktanin, 2015). The validity of the items needs to be sought to find out which questions are not feasible and cause low validity (Utomo, 2018). Rationally, the validity of the questions can be seen in terms of the suitability of the contents of the questions with the material and indicators (Oktanin, 2015).

Instrument Reliability

Reliability test is used to determine the consistency or consistency of the test. According to (Arini, 2017) the reliability test serves to determine the consistency of the test whether the test is reliable and remains consistent when used to retry. The test is said to be reliable if the test produces consistent data whenever the test is carried out (Kusairi, 2013). The test is said to be reliable if the test will always give the same results if the test is given to the same group at different times or occasions (Oktanin, 2015).

Based on the calculation results, the reliability coefficient is 0.76 and it can be said that the instrument used in this study is reliable with a fairly high category. The criteria for the correlation coefficient range from 0.000 - 0.200 are stated to have very low reliability, the coefficient of r ranges from 0.200 to 0.400 is declared to be low reliable, the range 0.400 - 0.600 is stated to be moderate, the range 0.600 - 0.800 is stated to be quite high, and the range 0.800 - 1.000 is declared very high (Sugiyono, 2012). The conclusion of item reliability refers to the reliability coefficient criteria of the test with the standard formula r_{11} 0.70. If $r_{11} \geq 0.70$; then the questions being tested have high reliability. Conversely, if $r_{11} < 0.70$; then the questions tested have low or unreliable reliability (Wijaya, 2019).

Analysis of Creative Thinking Skills

In this study, researchers developed instruments that refer to basic competencies, namely explaining substance pressure and its application in everyday life, including blood pressure, osmosis, and capillarity of the transport tissue in plants. The following are indicators of questions used by researchers in the preparation of instruments.

Table 5. Indicator questions on the instrument.

Sub material	Indicator
Pressure Solid Substance	- Analyze the concept of pressure in living things - Analyze the relationship between force and surface area to the amount of pressure appropriately
Liquid Pressure	- Analyze the application of Archimedes' law in everyday life - Analyze buoyancy - Analyze the application of Pascal's law in everyday life
Pressure	- Gaseous Analyze the application of gaseous pressure in everyday life
Application of the concept of pressure to living things	- Analyze the concept of pressure in living things

The score of the students' creative thinking skills test was obtained by an average of 51.5% with a fairly creative category. The following is a graph of the distribution of students' physics test scores:

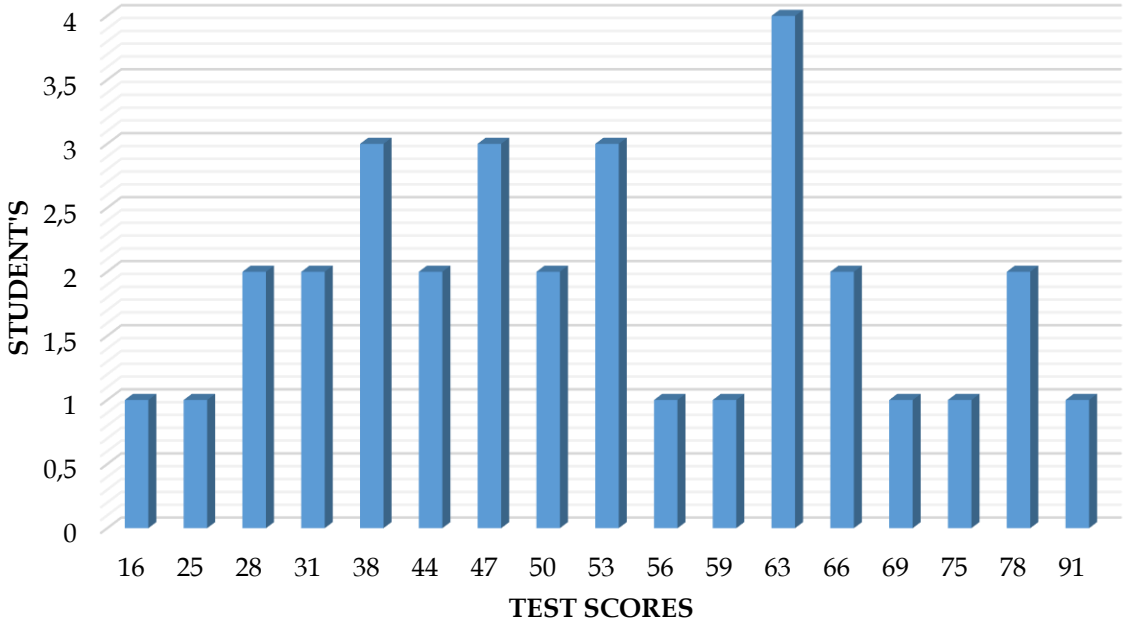

Figure 1. Creative thinking test scores.

The results of the distribution of the student's physics test scores on the average of the highest scores obtained by students are 70, but these scores are not sufficient to meet the minimum criteria for junior high school science subjects. The minimum completeness criteria are set by the teacher board at a school (Permendikbud, 2016). Based on the teacher's interview in the field of science, it would be better if the average student had a minimum achievement of 72 so that students' creative thinking skills in physics were included in the category of needing improvement.

Creative thinking is the ability to provide various possible answers or solutions to problems and is able to spark many ideas or ideas (Yamin, 2013). Indicators of creative thinking used in the instrument namely *Fluency* (fluent thinking); *Flexibility* (flexible thinking); *Originality* (original thinking); *Elaboration* (detailed thinking) and *Metaphorical Thinking* (thinking metaphors). The following is the relationship between indicators of creative thinking skills and the test instrument.

Table 6. The relationship between indicators of creative thinking skills and indicators of questions.

Indicators of Creative Thinking	Indicators of questions
fluency (thinking fluently)	• Analyzing the application of Pascal's law in everyday life • Analyzing the application of Archimedes law in everyday life
Flexibility (flexible thinking)	• Analyzing the application of pressure in gaseous substances in life • Analyzing buoyancy
Originality (original thinking)	• Analyzing the relationship between force and surface area to the amount of pressure
Elaboration (detailed thinking)	• Analyzing the relationship between force and surface area to the amount of pressure
Metaphorical thinking (thinking metaphorically)	• Analyzing the concept of pressure in living things • Explaining the definition of hydrostatic pressure

Data analysis of creative thinking skills was carried out by finding the average presentation of each indicator of creative thinking skills. The following in Figure 1 is the percentage result on each indicator of creative thinking skills.

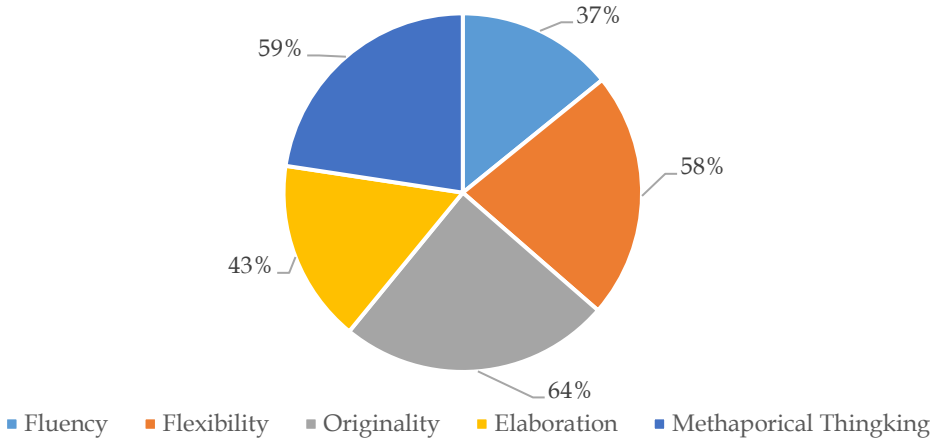

Figure 2. Average percentage of creative thinking skills indicators for each indicator.

After determining the percentage of each indicator of creative thinking skills, then the next step is to determine the category of students' creative thinking skills. The following Table 7 presents the categories of creative thinking skills on each indicator of creative thinking.

Table 7. Category of indicators for creative thinking skills.

Indicators of creative thinking skills	Percentage (%)	Criteria for
fluency (thinking fluently)	37	Less creative
Flexibility (thinking flexibly)	58	Quite creative
Originality (original thinking)	64	Creative
Elaboration (detailed thinking)	43	Quite creative
Metaphorical Thinking (thinking metaphors)	59	Quite creative.

From the research results, the students creative thinking skills in physics were obtained in each indicator, namely, the indicator *fluency* (thinking fluently), which was 37% with the less creative category; on the indicator *flexibility* (flexible thinking), which is 58% with a fairly creative category; on the indicator *originality* (original thinking), which is 64% in the creative category; the indicator *elaboration* (detailed thinking) is 43% with a fairly creative category; on the indicator *metaphorical thinking* (thinking metaphor) which is 59% with the category quite creative. The following is a table of the percentage of creative thinking skills for each number of test questions.

Table 8. Percentage of creative thinking skills criteria for each question.

Creative thinking indicator	Number of test questions	Percentage (%)	Criteria
Fluency	5	37	Less creative
	6	37	Less creative
Flexibility	2	63	Creative
	4	50	Self-creative
Originality	1	65	Creative
Elaboration	7	43	Quite creative
Metaphorical Thinking	3	52	Enough
	8	66	Creative

Based on the results obtained, *fluency* in numbers 5 and 6 got a percentage of 37% and 37% which are included in the less creative criteria, meaning that most students are less able to solve physics description questions on the pressure material. substance.

According to (Rahmazatullaili et al., 2017) states that thinking fluently is an ability to generate many ideas/ ideas. Thinking skills *fluency in* According to Torrance in (Susanto, 2014) is the ability to generate ideas. Seeing the lack of skills of *fluency* students, teachers need to improve students' creative thinking skills on this indicator. Things that teachers can do in improving fluency thinking skills are creating lessons that encourage students to create or think about many ideas. According to (Arini, 2017) to improve students fluent thinking skills, at every meeting the teacher tries to encourage students to come up with many ideas, answers, problem solving or questions so that students fluent thinking skills can develop.

Thinking skills (*Flexibility*) contained in questions number 2 and 4 get a percentage of 63% in the creative category and 50% in the fairly creative category. From these results it can be seen that the students' flexible thinking skills are good enough. Flexible

thinking skills are when students are able to think of more than one idea in solving problems (Prasetiyo, 2014). Dexterity think *(Flexibility),* the ability to produce a number of ideas, answers or questions varied, can see a problem from the viewpoint of different, look for alternatives or directions are different, and can use a variety of approach or way of thinking. Creative people are flexible in their thinking. They can easily abandon old ways of thinking and replace them with new ones. Flexible thinking skills are the ability to present various kinds of problem solving (Rahmazatullaili et al., 2017).

Original thinking skills (*Originality*) contained in question number 1 got a percentage of 65% in the creative category. From these results, it can be seen that the students' original thinking skills are good. Original thinking skills are the ability to have new ideas to solve problems (Susanto, 2014). Original thinking is the ability to express ideas or solve problems in ways that other people do not think (Armandita et al., 2017). This can be formed when students' knowledge is broader, so the more likely it is to generate new ideas or ideas that are not used by the general public (Mustika, 2013).

Skills *Elaboration* in question number 7 get a percentage of 43% with a fairly creative category. From the results it can be seen that the detailed thinking skills still need to be improved by the teacher. The ability to elaborate is a person's ability to describe a simple matter into a broader definition (Prasetiyo, 2014). Detailing skills are skills in developing, adding, developing an idea and expanding an idea (Arini, 2017)

Metaphorical thinking skills (*Metaphorical thinking*) contained in questions 3 and 8 get a percentage of 52% with a fairly creative category and 66% with a creative category. From these results, it can be seen that the students' skills in thinking metaphors are quite good. Metaphorical thinking is the ability to use comparisons or analogies to make new connections. Metaphor is a tool for conceptualizing and understanding something abstract into something creative (Nurhikmayati, 2017). The characteristics of the ability to think creatively according to (Azhari, 2013), among others, the indicators of thinking skills (*Fluency*) have the following characteristics: 1) produces many relevant ideas/ answers, 2) produces learning motivation, 3) has a flow of thoughts that smooth. The indicators of flexible thinking skills (*Flexibility*) have the following characteristics: 1) producing uniform ideas, 2) being able to change ways or approaches, 3) having different thoughts. The indicators of original thinking skills (*Originality*) have the following characteristics: 1) giving unusual answers, 2) giving answers other than others, 3) giving answers that people rarely give. The indicators of detailed thinking skills (*Elaboration*) have the following characteristics: 1) developing, adding, enriching an idea, 2) detailing the details, 3) expanding an idea. Metaphorical thinking *(Metaphorical Thinking)* an activity that refers to an activity to change a material from one meaning to another (Sunito, 2013).

Physics has an important role in various scientific disciplines, therefore it is necessary to integrate creative thinking skills in science subjects (Arini, 2017). To develop creative thinking, students need to be given opportunities for creative learning. Educators should be able to stimulate children to involve themselves in creative activities, by helping to find the necessary infrastructure. In this case what is important is to give freedom to children to express themselves creatively, of course, on condition that they do not harm other people or the environment.

CONCLUSIONS

Based on the research results, it can be concluded that in general students creative thinking skills are categorized as quite creative. The five indicators of creative thinking skills, the indicators *flexibility* and *metaphorical thinking* can be said to be good, but for indicators *fluency; originality; elaboration is* said to be not good enough. The limitation of the sample in this study is that it only uses schools in one city. For further research, it can be developed by using several schools in more than one city in order to know students' creative thinking skills in physics more broadly. With this research, it is hoped that educators can find out the extent of junior high school students creative thinking skills in distance learning. So that the results of this analysis can be used as a consideration for educators to create a creative learning environment. This can be done by using an appropriate learning model or media to stimulate students' creative thinking skills, especially in current distance learning.

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