

## Identification Scientific Creativity of Junior High School Students

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### Abstract

The purpose of this study is to identify scientific creativity junior high school students seen from the students' answers originality. The instrument used in this study adapted from the scientific creativity test by Hu & Adey (2002) to junior high school students of class VIII. Originality scores developed from frequency tabulation of all answers obtained, Frequency and percentage of each answer was calculated. The results showed that the students' answers varied and few original category. It was concluded that the student is still not much to give answers to the originality, scientific creativity test.

Keywords; creativity, scientific

### 1. Introduction

Koballa and Chiappetta (2010) stated that the IPA, in effect: 1) as a way of thinking (way of thinking), 2) as a means of investigation (a way of Investigating) about this universe, 3) is a set of knowledge (a body of knowledge). This way of thinking is characterized by the thought process that goes on in the minds of those engaged in the field. How the investigation provides an illustration of the approaches used in compiling knowledge. A collection of knowledge are the results of the discovery of creative activities scientists for centuries collected and compiled systematically into a body of knowledge that are grouped according to the areas of study, such as physics, biology, chemistry can be: facts, concepts, principles, laws, theory and models.

Education serves to develop the entire potential of learners "become a man of faith and devoted to God Almighty, noble, healthy, knowledgeable, skilled, creative, independent, and become citizens of a democratic and responsible" (Republic Act number 20 of 2003 on the System National Education). The 21st century is in need skills, that creativity and innovation, critical thinking and problem solving, communication, and collaboration. Man who would be successful in the 21st century are the ones who are creative and have a diversity of ideas in a creative dimension. Research conducted by Reznikof et al., In Dyer (2011), which is 25 to 40 percent of what is done in an innovative source of genetic. This means that about two-thirds of the skills they acquired through learning innovation. Only about a third of what is done in an innovative and creative source of genetic, while about two-thirds of the skills acquired through innovation and creative learning (Dyer *et al.*, 2011 in Nur, 2014).

In science teaching, creative thinking that can be trained is scientific creativity. Scientific Creativity is the ability to discover and solve new problems, and the ability to formulate hypotheses usually involves some additional knowledge of our initial (Pekmez et al., 2009). If students are involved with the work of the investigation, then they will become more creative in determining the variables, methods and equipment, and so forth (Aktamis et al., 2008). Scientific creativity as an intellectual trait or ability to generate produce a certain product are genuine and have more social or individual, designed with a specific purpose in mind. Student creativity assessment scheme includes four criteria of creative thinking, fluency, flexibility, originality and elaboration.



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Torrence (Hu and Adey, 2010) looked at thinking fluency, flexibility and originality as central features of creativity:

- 1) Fluency means the number of ideas generated original.
- 2) Flexibility is the ability to 'change tack' or 'change the task,' is not bound by an approach that has been set after the approach can no longer be used efficiently.
- 3) Originality interpreted statistically: a rare answer, which only happens occasionally in a given population, is seen as the original.

Characteristics of scientific creativity can be summarized as follows: remain sensitive to every problem, the ability to generate new ideas which are technologically acceptable, the ability to want to know, to understand the world around it, the ability to solve problems, search for solutions, designing experiments, imagination, identifies the difficulties, formulate predictions or hypotheses, and so on (Aktamis et al., 2008). Measurement of scientific creativity of this research focuses on creative thinking and scientific processes. In this research, scientific creativity of students can be assessed by using a holistic approach; ask questions related to the use of the skills of their scientific process. Components of the creativity of the investigation work can be measured by checking the students' skills in asking questions and determining the appropriate variables, planning the experiment and try different methods. Researchers believe that the test items in this test has included two components, namely the scientific creativity and science process. Based on the above it can be concluded creative thinking skills are the skills to think someone just about anything in creation. discover, imagine, suspect, design, propose alternatives, create and produce something.

## 2. Research Method

Data obtained using the scientific creativity test scientific creativity in the form of matter. Instruments scientific creativity is an adaptation of "A scientific creativity test for secondary school students" (Hu and Adey, 2010). Scientific creativity test scoring procedure is the sum of the scores fluency, flexibility score, and a score of originality. Fluency scores obtained subject to instantly calculate the entire answer subject to any task given by the subjects, regardless of the quality of the answer. Scores for each task flexibility is obtained by calculating the amount of local content or approach used in the reply. Originality scores developed from frequency tabulation of all answers obtained frequency and percentage of each answer was calculated. If the probability of an answer is less than 5%, a score this answer was given 2 points; If the probability is of 5% to 10%, this answer was given a score of 1 point; If the probability of a response greater than 10%, this answer was given a score of 0 points.

## 3. Results and Discussion

Scientific creativity test was measured using the test Scientific Creativity Structure Model (SSCM) that has been adapted to the material I've ever taught, namely heat. Categories are determined in accordance with the response from originality to test the students' answers given and the score given in accordance with the categories that have been presented.



Question 1

Table 1. Rationality Evaluation Answers Question 1

Please write down as many uses of science you get to a piece of iron!			
Respon	N	%	Score
Cookware i household	9	33,33	0
Tools of heat	1	3,70	2
Building tools	11	40,74	0
Tripod	18	66,67	0
The basic ingredients burner	5	18,52	0
Chair	3	11,11	0
iron table	3	11,11	0
Fence	13	48,52	0
Making the bike frame	2	7,41	1
Tron Rule!	5	18,52	0
Tron	1	3,70	2

Question 1 aims to measure students' skills in generating new ideas accepted Technology. Based on Table 1 it can be seen that the number of students who are thinking of using iron as a fence, three feet and building tools majority. Answer students who received a score of 2 is ironing. Allegedly students think they can use iron as a component of the board. Judging from the responses of students is still a lot of answers in response to a non-scientific, because the use of iron many students answered related to building materials.

Question 2

Table 2. Originality evaluation Answer Question 2

If you can use a spacecraft to travel in space and fly towards the planet, scientific questions if you want to thoroughly? Please write as much as possible what you can do			
Answering	n	%	Score
What is there in space?	3	11,11	0
Are there aliens there?	8	29,63	0
Is there sunlight on a planet?	2	7,41	1
Is there life on other planets?	7	25,93	0
Is there a place to stay in space?	2	7,41	1
Is the moon does have its own light?	1	3,70	2
Is in a very hot planet Mercury?	1	3,70	2
Whether we can touch the stars / moon?	1	3,70	2
Do planets have oxygen?	2	7,41	1
Do all the planets have gravity?	1	3,70	2
Does every star has a different name?	1	3,70	2
Is the temperature in space is very hot?	3	11,11	0
What is the shape of the star?	3	11,11	0
How is the weather there?	2	7,41	1
How can we get a network?	1	3,70	2

If you can use a spacecraft to travel in space and fly towards the planet, scientific questions if you want to thoroughly? Please write as much as possible what you can do

Answering	n	%	Score
What shape of natural and artificial satellites?	2	7,41	1
Why Pluto could be missing?	1	3,70	2
Why only Earth only inhabited planet why not the other?	2	7,41	1
Why Saturn has a ring and the ring why do not fall into the planet Saturnus?	1	3,70	2
Why does Jupiter have a red dot?	1	3,70	2
Why is the planet Neptune that rotates not around in orbits alone?	1	3,70	2
Any color planets are there?	2	7,41	1

Question 2 is aimed melatihkan to find the problem mid curiosity, as well as ask questions. Based on Table 2, it can be seen that many different questions after the students are taught scientific creativity. The majority of questions students asking if there are any other creature on the planet and whether life exists on other planets. On this question, the average student ask different questions with other students.

Question 3

Table 3 Originality evaluation Answer Question 3

Please reflect and wrote as much as possible improvement you can do to make a refrigerator be more attractive , more useful and more beautiful !			
Answering	n	%	Score
Made without wires	1	3,7	2
Design a refrigerator with an ornament	26	96,3	0

Question 3 is to measure the ability to generate new ideas accepted technology for product improvement. Based on Table 3 the majority of students answering to provide a refrigerator with an ornament. Responses were categorized original and unusual is to design a refrigerator without wires. Allegedly it is associated with the development of increasingly advanced technology, so the possibility can be designed refrigerators without using wires to get electricity.

Question 4

Table 4 Originality evaluation Answer Question 4

Answering			
If there were no sun, describe what the world will look like?			
	N	%	Score
Earth will be dark	22	81,8	0
Vcry cold weather	8	29,63	0
The world will freeze	4	14,81	0
Creatures of the world will die	5	18,52	0
School holidays because there was no morning	2	7,41	1



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If there were no sun, describe what the world will look like?			
Answering	N	%	Score
Noli fe	5	18,52	0
No morning	3	11,11	0
No heat	3	11,11	0
No daylight	3	11,11	0
Can not photosynthesis	2	7,41	1
Can not eat	2	7,41	1
Can not dry the clothes	1	3,70	2
Plants will die	3	11,11	0

Question 4 is a question to gauge students' creative imagination. Based on Table 4 it can be seen that a variety of responses given by the students, the majority of which are given by the students is the world going to be dark, no life, living things would be cold and dead. Original and unique responses of the students are human beings can not eat and the plants can not photosynthesize.

### Question 5

Table 5 Originality evaluation Answer Question 5

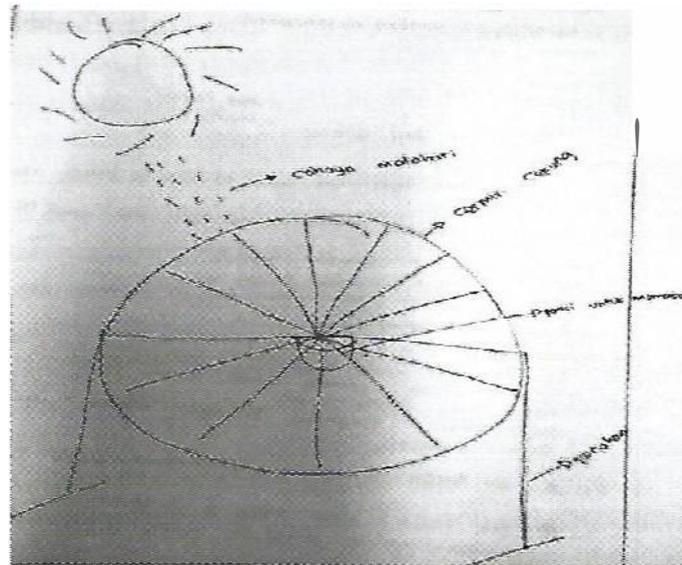
No aluminum foil and a thick cloth. How can you test which material is better to keep the ice to prevent rapid melting? Please write down as many ways you find and instruments, principles, and a simple procedure you use!

Answering	N	%	Score
The time when the ice melts ice wrapped in aluminum foil and thick fabrics	27	100	0
No response	1	8,1	

This question measures the ability of creative experiment, simply measure steps - steps determinant variables in the experiment and science process skills. The response given the majority of students on this question is the same, ie comparing the time the ice melts as ice wrapped in aluminum foil and a thick cloth. Based on the students' answers to students still can not do the experiment creatively, but there are various possibilities to test it. Such as determining the variables used, such as wrapping extensive ice, the ice mass, time, ambient temperature, distance to the source of energy, etc.

### Question 6

Question 6 is used for product design by using imagination and knowledge that already exist for designing a product. the solar cooker. Here's an example of the answers given by the students.



Pielure 1 Examples of the results of the students' work to question 6

The majority of students answer questions like Figure 1, this is because students remember the example given teacher while learning about the application of heat energy transfer in everyday life.

Based on the scores given to the originality of students' answers show that the students are yet creative. This is due in particular learning in school science teaching is not melatihkan scientific creativity. Yet according to Dyer et al. (2011) suggest that the ability of creative thinking is the result of learning, not a genetic boon. Two-thirds of the skills acquired through innovation and creative learning. Based on the opinion of Dyer et al. (2011) showed that for melatihkan creative thinking skills should be taught during the learning process.

#### 4. Conclusion

Students answer the creativity test is based on the experiences of everyday life and their environmental conditions. The low score of originality shows that students have not been trained scientific creativity in learning in school.

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