Creative thinking skills profile of junior high school students in science learning

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Abstract. The era of the industrial revolution 4.0 in the 21st century demands people to develop skills in all sectors of life, including education and learning. One of the elements that supports learning is student creativity. In Science learning, creativity becomes an imperative aspect of learning Science in schools. This study aims to analyze the level of creativity of 7th-grade students at SMP Negeri 8 Surakarta. The type of this research is descriptive research. The subjects of this research consisted of 263 students who were obtained from 8 classes. The instrument used in this study was a instrument test of the creative thinking skills consisting of eight questions. There are four aspects of creative thinking skill namely fluency, flexibility, originality, and elaboration. The results of the percentage analysis of each aspect showed that the fluency was 47% and it was categorized as the moderate category. Meanwhile, the other three aspects were categorized as the low category in which the flexibility was 26.94%, the originality was 21.24%, and the elaboration was 29.77%.

1. Introduction

Technology and science have been developing very rapidly, so that all parties can access information from various sources easily and quickly. Due to this case, students need to manage and choose the information that they get. The 21st century is a period in which the technological advances increase rapidly [1]. To deal with the demands of the 21st century, there are four skills prioritized in learning known as 4C including communication and collaboration, critical thinking and problem solving, as well as creativity and innovation [2]. The 21st century characteristics skills are to solve increasingly complex life problems that need effective and efficient solutions [3]. The creative thinking skill is the one of them. In addition, based on the results of the Global Creativity Index, Indonesia’s ranking is below the creative and innovative index [4]. This is in line with several researches which show that students’ creative thinking skills are still bad [5-7]. Whereas, the creativity is the key component of all competencies. If each individual has the creativity or skill to develop their creativity, the individual can make something new which is better than before [8].

Creative thinking skill can be expanded using an a creative and active learning so that students can solve a problem from various points of view [9]. One way to quantify students’ creative thinking skills is using instruments test that contain assessments of some creative thinking skills aspects from Torrance and Guildford. There are 4 aspects of the creative thinking skill: 1) fluency is a skill to create many ideas, 2) flexibility is a skill to propose several approaches or ways to solve problems, 3) originality is a skill to create authentic and novel ideas as a result of their own thinking, and 4) elaboration is a skill...
to describe and explain idea in detail. So, for this research uses an essay test with four aspects of creative thinking skills [10-12].

The one of important skill for students in Indonesia is creative thinking, because to fix the quality of education in Indonesia [13]. This skill is needed in studying Science in Junior High School. Based on the Law No.20/2003 on the National Education System, Article 3 the purpose of ‘National Education is to develop the potential of students based on legal framework, to strengthen their faith and piety to God the Almighty, their knowledge, health, moral character, creativity, and independence so that they can become democratic and responsible citizens [14]. One of the goals of National Education is improving creative thinking skill which is the ability of individuals to find new ideas, new possibilities, and new discoveries that use their minds based on the originality in their work [15]. Science learning involves understanding content, how to teaching, and the use of information technology strategy [16-18]. This research aims to decide and describe the result of creative thinking skills profil in Science learning in Junior High School in Surakarta.

2. Methods
This research method used descriptive research that aims to decide and describe the result of creative thinking skills profil in 7th grade students of SMP Negeri 8 Surakarta in Science learning. The measurement of students' creative thinking skills used instruments in which each indicator was developed based on 4 aspects adapted from Torrance and Guildford [10-12], there are 4 aspects of creative thinking skills namely fluency, flexibility, originality, and Elaboration. This instrument test was in the form of an essay test of the creative thinking skills in Science learning consisting of 8 questions, with 2 questions for each aspect. The Total subjects of this research were 263 in 7th grade students of SMP Negeri 8 Surakarta in the 2018/2019 Academic Year who were selected sample using a purposive sampling technique. The result data were gained from the analysis of sample students' answers by coding each student's answer and evaluating each student's answer based on the assessment rubric which has given a score 1, 2, 3, or 4 according to the criteria. The scores obtained by students in each aspect are then converted into percentage. The classification category of the percentage results analysis adapted from Riduwan [19]. The classification category of the percentage can be seen in Table 1.

### Table 1. Category of Creative Thinking Skill

| No. | Percentage | Category     |
|-----|------------|--------------|
| 1   | 81 – 100 % | Very Creative|
| 2   | 61 – 80 %  | Creative     |
| 3   | 41 – 60 %  | Moderate     |
| 4   | 21 – 40 %  | Low          |
| 5   | 0 – 20 %   | Very Low     |

The results of the analysis of students creative thinking skills are analyzed descriptively and displayed graphically.

3. Results and Discussion
The results of this research about students creative thinking skills tests can be shown in Figure 1. This figure shows the highest results in the aspect of fluency that reaches 47.17% categorized as the moderate category. Whereas, the other three aspects are categorized into the low category in which the flexibility is 29.94%, originality is 21.24%, and the Elaboration is 29.77%.
Aspect of fluency skill is the highest percentage result of 47.17% which are categorized as the moderate category. Fluency means smoothness that is characterized by answering questions smoothly and variously [20]. This shows that students are able to mention many answers to the questions that have been given. Almost half of the sample can answer questions in this aspect. The way that can be used by the teacher to develop fluency is by frequently asking questions to students, so students are accustomed to trigger many questions [21].

The percentage result of flexibility aspect is 26.94%. Flexibility is the ability of a person to produce ideas consisting of various categories or the skill to see various objects or problems from various points of view [20]. The percentage obtained is categorized as low where the majority of students are not be able to produce new ideas yet that emerge from other perspectives related to the problems given by the teacher. Students only focus on convergent thinking processes because they are logical thinking and limited to verbal excuse and logical thinking, so, the students are accustomed to convergent thinking, and if there are problems given, they will have difficulty in solving problems creatively [22]. To correcting students' creative thinking skills in the aspect of flexibility, teachers can train students to use open-ended or divergent questions [23]. Open-ended questions can give students the opportunity to answer more than one correct thing so that students are encouraged to think flexibly [24]. A combination of 2 thinking skills including divergent and convergent thinking skills can help students to elaborate creative thinking skills.

The percentage result of originality aspect is the lowest from the other three aspects, which is only 21.24%. Originality is the ability of students to give unusual answers that are different from others where answers are rarely given by most people and the answers are original from each student's thought [20]. The answer contains ideas or ideas that are unique and different from those in books and other people's opinions [25]. This relates to aspects of fluency and flexibility where fluency and flexibility of students' thoughts affect students' originality thoughts, so if fluency and flexibility are maximally developed in learning activities, students' originality abilities will definitely emerge [24].

The last aspect is Elaboration which gets a percentage result of 29.77%. This aspect is the second largest percentage result below the fluency aspect. However the results are still classified in the low category. The aspect of Elaboration is the ability of students to detail and find various approaches to solve problems [20]. There are various efforts to develop the ability to think creatively such as the teacher must foster the curiosity of students, provide challenges to students, foster a belief that problems can be solved, and teach the ability that problems will definitely be solved [26]. Effective training to
enhance students' creative thoughts focuses on strategies related to problem definitions, conceptual combinations, implementation plans, and ideas construction [27].

In general, the average percentage result of students' creative thinking skills shows a low category. This is because students are not accustomed to face questions yet that require them to think creatively. The results of the PISA study from 2009 to 2015 for Indonesia which still shows low result in the case of students' high-level thinking skills [28-30]. This is because students are not trained to work on higher order thinking according to the demands of 21st century skills. Learning must also change learning that is accustomed to use lower-order thinking skills (LOTS) into learning that emphasizes higher-order thinking skills (HOTS) as well as training students' literacy skills [31]. Basically, every student has the potential to be creative [32]. Creative students are able to produce many ideas and they are able to solve many problems [33]. Therefore, creative thinking skills in Junior High School students need to be trained to hone their higher-order thinking skills (HOTS) according to the demands of 21st century skills.

4. Conclusion

Total results of the profile of students' creative thinking skills showed that the highest result was the aspect of fluency that reached 47.17%, which could be categorized as the moderate category, while the results of other three aspects were categorized as low category, where the flexibility was 29.94%, the originality was 21.24%, and the Elaboration was 29.77%. Therefore, various efforts are needed to improve students' creative thinking skills in every aspect, especially in the aspects of flexibility, originality, and elaboration.

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