



DEVELOPMENT OF ASSESSMENT INSTRUMENTS ON CREATIVE THINKING SKILL IN ENVIRONMENTAL POLLUTION MATERIALS

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Abstract

This study aims to produce instruments that are valid, reliable, and describe the skill to think creatively in environmental pollution material. The trial design of the study used Pre Experimental design with One Shot Case Study model. The subject of this study are 27 students of 7th Grade at SMPN 1 Sidoarjo. The research instrument on this study used students' sheet, questionare sheet, and test. This study used validity and reliablity teachniques. The reseach data were analyzed by descriptive quantitative and qualititative. The result of the research through theoretical validation showed that all questions were accepted and fit in. The results of the validity test of the assessment instrument showed that 6 items with sufficient validity and 6 items with high validity. Meanwhile, the reliability test value obtained at 0.796 in the high category. Based on the results, the category of fluency aspect is quite good with a percentage of 55.2%, the flexibility aspect percentage of 29.3% is not good category and an average overall aspect of 38.8% is in the poor category. This research can be used as an evaluation tool that can design learning to improve creative thinking skills.

Keywords: Instruments, Creative thinking, Environmental pollution.

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INTRODUCTION

The 21st century, where the learning process is transformed into enabling students to master knowledge and various skills to compete in the global economy (Suratno et al., 2019). Based on the quote from Piirto (2011) Creativity for 21st century skills, that the importance of creativity in the 21st century requires various parties including educational institutions to develop it. In accordance with the mission of the 2013 curriculum that is to prepare the Indonesian population to have knowledge of life as individuals and citizens who are faithful, productive, creative, innovative, effective and able to participate in the life of society, nation, state and world civilization (Permendiknas No. 69 of 2013).

The 2013 curriculum is a curriculum that focuses on interactive, inspirational, fun, challenging learning, motivates students to play an active role, provides sufficient space for initiative, creativity, and independence according to talents physical and psychological development as stated in the standard process (Richardo, 2016). HOTS can be applied to the preparation of creative thinking problems, according to (Fanani, 2018) Higher order thinking skills (HOTS) is a bloom taxonomy which consists of Analyze (C4), evaluate (C5) and create (C6) which can be used in the preparation of questions. King et al in Fanani (2018) classify HOTS as critical thinking and logical thinking, reflective thinking, metacognitive thinking, and creative thinking.

Creative thinking skills are the skills to come up with ideas in solving problems in various ways and are different from those that have been there before, but can be modified using the old method with the principle of innovation (Rosa & Fatwa, 2018). Munandar in Azhari & Somakim (2014) the skill to think creatively has four aspects, namely fluency, flexibility, originality and elaboration or detail in developing ideas.

According to Martin (2015), based on the results of GCI (Global Creativity Index) research in 2015, Indonesia is in 115 out of 139 countries in the world. Regarding this, the level of creativity in Indonesia is still low. Reinforced by Fanani (2018) states that the results of the 2015 PISA survey, Indonesia managed to move up six ranks but was still below the average Organization for Economic Cooperation and Development (OECD). The average science score in OECD countries is 493 while Indonesia is 403. One of the reasons is that students in Indonesia are not competent in solving contextual problems, working on reasoning, and providing creative reasons for solving them.

Based on an interview with one of the science teachers at SMPN 1 Sidoarjo that creative thinking skills have been trained in students in the form of essay questions that demand creative answers, but the assessment instrument is not equipped with an assessment rubric that is in accordance with the creative thinking component. So it can be concluded that the assessment made by the teacher has not been directed towards educational goals properly and needed to be developed to measure students' creative thinking skills. In accordance with the opinion (Hamdi et al., 2018) that teachers are expected to develop test items related to higher order thinking that are not easy however, teachers need to familiarize themselves with high-level test items, items used by TIMSS and PISA. The instrument for assessing the skill to think creatively includes a question and an assessment rubric. The question in the form of a description refers to the aspects of creative thinking which include fluency, flexibility, originality, and elaboration. The scoring criteria refer to the modified Fitriarosah (2016) rubric.

This environmental pollution material has close problems in everyday life (Novayani et al., 2015). Environmental pollution material makes students challenged to be able to think creatively in making problem solving solutions (Sari et al., 2017). In Susiningrum's research (2018), creative thinking results were obtained with sufficient categories, but similar research needs to be carried out related to learning that can improve creative thinking skills.

Based on the description above, the researcher developed an instrument for assessing the skill to think creatively on environmental pollution material. This study aims to produce instruments that are valid, reliable and describe the skill to think creatively on environmental pollution material.

METHOD

Research Design

This study uses the type of research and development Research and Development (R & D). The trial design in the study used the Pre Experimental design (nondesign) with the model One Shot Case Study. In this study, one group was given treatment then made observations (Sugiyono, 2016).

Research Objectives

Subject of this study are 27 students of 7th Grade at SMPN 1 Sidoarjo.

Data Accumulation Technique

Research instruments used for data collection were study sheets, validation sheets and test sheets to measure students' creative thinking skills.

The data collection techniques in this study include validity and reliability. The research data were analyzed descriptively, quantitative and qualitative. Qualitative descriptive analysis to correct deficiencies of the questions that have been developed. Meanwhile, quantitative descriptive analysis by calculating the theoretical validation from the aspects of construction, material and language uses a Likert scale (Riduwan, 2015). The technique used to determine empirical validity is correlation, product moment while for reliability using Cronbach's Alpha (Arikunto, 2018).

According to Sugiyono (2016) it is said to be valid if their value calculated is greater than r table. Question items are said to be reliable if the value is > 0.60 (Ghozali, 2016) or with sufficient, high and very high criteria (Sundayana, 2016).

Determining the level of creative thinking of students is done by calculating the score of all the questions worked on and converting the score into a percentage and categorizing the skill to think creatively (Riduwan in Efendi & Ehda, 2017).

Table 1. Interpretation of Students' Creative Thinking Levels

Percentage of Creative Thinking Indicators Achievement	Category Levels
81 - 100	Very Good
61 - 80	Good
41- 60	Enough
21- 40	Less
0- 20	Very Poor

RESULTS AND DISCUSSION

In order to obtain the results of the skill to think creatively, an answer was scored for each item. The scoring criteria used in this study refer to indicators of creative thinking skills according to Fitriarosah (2016) which have been modified as follows:

Table 2. Indicators of Creative Thinking Skill

Aspects measured	Indicator
Fluency	Student can provide many relevant answers.
Flexibility	Students can provide answers to various ways to solve problems.
Elaboration	Students can provide a broad meaning of a scientific idea of problem solving by using detailed steps.
Originality	Students can provide different combinations to express answers.

Before the instrument is used, validation is required. The research results were seen based on the results of theoretical validation, validity test, reliability test and creative thinking skills.

Theoretical Validation

The results of theoretical validation on an instrument for assessing creative thinking skills on environmental pollution material are presented in Figure 1.

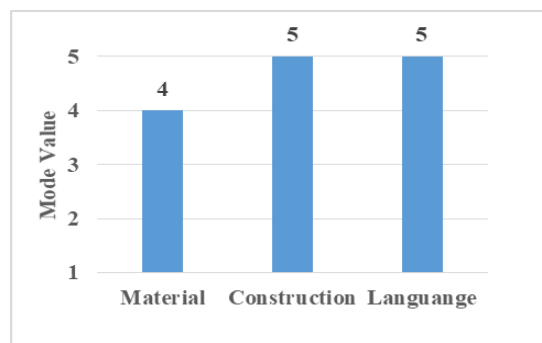


Figure 1. The Validation Results of the Creative Thinking Skill Assessment Instrument in Environmental Pollution Material

Based on Figure 1, the validation results show that the mode value in the material criteria aspect is 4, the mode value in the construction criterion aspect is 5 and the mode value in the language criterion aspect is 5. So the results of the theoretical validation of the instrument for assessing the skill to think creatively on environmental pollution material are 5 very good categories (Riduwan, 2015). Based on these criteria the questions are accepted and fit for use.

Validity Test

The questions used in this test were tested for validity. The validity test was carried out to measure the validity of each item with the help of SPSS Product Moment Pearson sign 0.05.

Table 3. Results of the Validity Test of the Creative Thinking Skill Test

No	r count	r table	Interpretation
1	0.517	0.367	Enough
2	0.487		Enough
3	0.536		Enough
4	0.720		High
5	0.656		High
6	0.635		High
7	0.475		Enough
8	0.467		Enough
9	0.745		High
10	0.434		Enough
11	0.640		High
12	0.640		High

Based on the results of the validity test for the skill to think creatively in table 4 above, there are 6 questions showing sufficient validity and 6 other questions showing high validity (Arikunto, 2018). In accordance with Sugiyono's theory (2016), all 12 items of creative thinking skill are declared valid because the value of $r_{xy} > r$ table.

Reliability Test

Test The reliability test was carried out with calculations assisted by SPSS Cronbach alfa , the test reliability coefficient value was 0.796 in the high category (Sundayana, 2016). In accordance with Fitriarosah's research (2016) the reliability obtained was 0.720. According to Ghozali (2016) the item is said to be reliable if the value is > 0.60 or with sufficient, high and very high criteria (Sundayana, 2016).

Creative Thinking Skill

The appropriate question items are then used to describe creative thinking skills. The results of students' creative thinking skills are presented in table 4.

Table 4. Interpretation of Creative Thinking Skill Based on Aspects

Aspect	Percentage	Interpretation
<i>Fuency</i>	55.2%	Enough
<i>Flexibility</i>	29.3%	Less
<i>Elaboration</i>	32.1%	Less
<i>Originality</i>	38.6%	Less

Based on the test results, it showed that the students' average score was 39 out of 27 students. The maximum score obtained is 73 and the minimum score is 21. In table 5, the students' achievement for the test of creative thinking skills from every aspect of the interpretation is quite good and not good. Aspects of fluency (fluency) as much as 55.2% of students managed to answer with a maximum score so that it was interpreted quite well. In this aspect, students are mostly able to answer the causes and consequences of environmental pollution with many answers. This is in accordance with Nurdayanti et al., (2020) that students who reach the aspect fluency already understand environmental changes that occur due to several factors that support changes in the environmental structure.

Meanwhile, the aspects of flexibility, elaboration, and originality were in the poor category. On the aspect, flexibility the lowest percentage was obtained of 29.3% who managed to answer with the maximum score. This is because there is less variation in student answers in solving environmental pollution problems in various ways. In accordance with Effendi & Ehda's research (2017) that students who have not

reached the aspect flexibility , the answers tend to be the same from the example described by the teacher so that the answers do not vary.

If the percentage of creative thinking skill is viewed from the overall value, the following results are obtained.

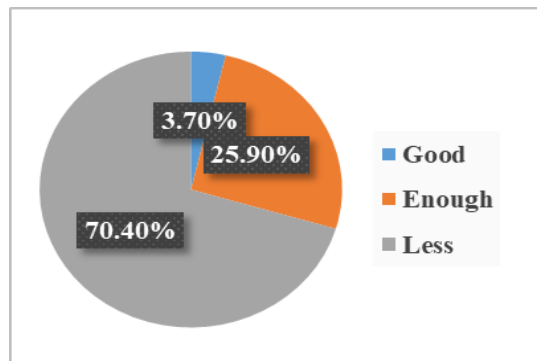


Figure 2. Results of Creative Thinking Skill

Based on the diagram, there is 1 student in the good category with the value obtained by 73, 7 students are categorized as good enough with the acquisition of scores above 40 and 19 students are in the poor category with scores above 20.

Environmental pollution material is very closely related to student life and is relevant to developing skills creative thinking. According to Sari et al., (2017) students will be challenged to think creatively and be able to make solutions in overcoming environmental problems. Based on this research, it is found that the overall creative thinking skill of students has an average of 38.8% is in the less category good. In this material, students still have difficulty developing their creative thinking skills. This is because the assessment instrument is not equipped with a rubric appropriate to the creative thinking aspect so that students' answers vary but not according to the creative thinking aspect. In accordance with Kusnadi et al., (2014) the skill to think creatively does not appear by itself and the role of the teacher is needed in developing students' thinking skills. So it is necessary to combine ideal components such as learning strategies, learning resources and evaluation instruments (Hydayani, 2020).

CONCLUSION AND SUGGESTION

Conclusion

Based on the research results of the development of an assessment instrument for the skill to think creatively on environmental pollution material through theoretical validation, all questions are accepted and suitable for used. The results of the validity test of the assessment

instrument showed that 6 questions had sufficient validity and 6 had high validity. While the reliability test value was obtained at 0.796 in the high category. Based on the research, the skill to think creatively, the highest percentage result is the aspect of fluency 55.2%, while the lowest percentage result is the aspect of flexibility 29.3%. Overall, the results of the fluency aspect test in the category were quite good, aspects of flexibility, elaboration, originality in the poor category and the overall skill of students to think creatively had an average of 38.8% in the poor category.

Suggestion

Instrument for assessing the skill to think creatively developed can help students realize and improve indicators that have not been achieved. This research can also be used as a learning evaluation tool so that teachers can design lessons that can improve students' creative thinking skills. Further researchers, research related to learning is needed that can improve creative thinking skills.

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