A Preliminary Study of Students Initial Creative Thinking Skills in Surakarta High School

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Abstract. Often founded more emphasis on memorizing the educational word that makes high level thinking ability of the students seldom trained. The 2013 Curriculum implemented higher-order thinking that encourage students to think critically, logically, reflective and creative. This study aims to describe the questionnaire of preliminary study and creative thinking skills of high school students in Surakarta. This research’s type is descriptive qualitative. Sampling techniques used a Purposive Sampling based on the location of the school and the category of schools. Test instruments of students’ creative thinking are provided towards four school in Surakarta. Data obtained from questionnaire of preliminary study and creative thinking skills instrument of student’s creative thinking skills. The validity and reliability of the test instrument analyzed quantitatively using the Quest. Internal consistency value is 0.90, it means that the instrument has high reliability. The results of the preliminary study shows that the majority of learning methods used by teacher was discussion (31.9%), lecture (42.2%), and laboratory activities (7.1%). While, the results of the creative thinking skills is shows that the students had very less category (11.2%), had less category (73.9%), and had medium category (14.9%).

Keywords: Creative Thinking Skills, Quest, High School

1. Introduction

Along with the further development of era and technology, the education sector has been challenged to improve the quality of education or the produced outputs. In that order, the learning on the curriculum of high school is focusing on the capability of higher-order thinking in which one of the elements is the creative thinking, thus, the learning participants will be able to think fast, responsive, and capable of solving the faced problem. According to [1], higher-order thinking is a transfer of knowledge through learning process in which the learning participants are not only memorizing the learning material but also capable of being responsible for the acquired knowledge through the application in daily life. Thinking ability is the ability of someone in delivering new things, ideas, or expressing his mind as a response towards a certain thing, object, or problem [2].

Education is the efforts to improve the quality of human, develop potential, proficiency, and characteristics of young generation towards the direction expected by the community. One of the
functions of education is to facilitate the learning participants for developing their potential towards positive direction. Through availability of education, the learning participants are expected to be able to solve problems in the environment of community and capable of thinking logically.

In the learning process of 2013’s curriculum, students are no longer become the learning object but instead seen as the learning subject. The learning in 2013’s curriculum implements high-order thinking which motivates the students to think critically, logically, reflectively, and creatively[3]. High-order thinking has crucial role in improving the mindset of students in which the students are no longer focusing on one particular point in solving the existing problems but have wider divergent-thought. In this context, school has a responsibility to facilitate the students to improve creative-thinking ability. Creative thinking is the ability to discover various alternative answers towards a problem which emphasized on quantity, appropriateness, and diversity of answers based on the existing information or data [4].

Inviting students to think creatively is initiated from active and interactive studying process in the class. This condition can be seen from the teaching method used by teachers in the class. Creative thinking ability of students required motivation and support to be manifested, thinking creatively will be inhibited without any support. The learning method used by teachers will have important role in improving the creative thinking ability of students. According to[5], learning method is the approach implemented by teachers in interacting with the students/learning participants to accomplish the learning purposes. Improving the creative thinking ability could become the provision of knowledge for the students in the future in facing life problems.

Creative thinking of students needs to be discovered as the basis of the following research in developing the learning model or media which able to facilitate the improvement of students’ creative thinking. This research is aimed to describe the questionnaire of preliminary study and test instrument of creative thinking of students in State High Schools of Surakarta.

2. Materials and Methods

2.1. Materials

2.1.1. Learning Method

Learning process is the communication process which involved three primary components, namely the component of messenger (teacher), the component of message receiver (student, and the component of message itself as the learning material. The failure in communicating during the learning process occurs when the messages delivered by teachers are unable to receive optimally by students, therefore, the materials can not be properly understood by the students. In order to prevent that problem, thus, teachers should be able to determine the method which will be implemented in the learning process. Method is the way/approach used to realize the learning plans that have been formulated for the learning purposes can be accomplished in optimal manner. The success of a learning is highly depending on teachers in determining the learning method which will be applied because the learning strategy could only be implemented through the application of learning method [6].

According to[7], method is the effort to implement formulated plans through actual activities for the determined purposes to be achieved in optimal manner. On the other words, method is used to realize the determined strategies. For example, in order to implement expository strategy, lecturing and question-answer method or the discussion material by using the existing learning source can be used.

Teaching method is the approaches used to present the learning materials towards learning students to achieve the determined learning purposes. Some methods used in implementing learning strategies are including lecturing, demonstration, discussion, simulation, laboratory, field experience, brainstorming, debate, symposium, and others [8].
2.1.2. Creative Thinking Ability of Students

According to [9] and [10], creative thinking is the renewal ability through various techniques of new and beneficial idea creations, describing, repairing, analyzing, and evaluating ideas to improve the creative effort. First level of creativity is indicated by curiosity, will to respond, dare to take risk, sensitive towards problem, toleration towards ambiguity and self-confidence. These elements have made creativity as very complex ability which contained with thinking ability, skills, intellectual level, and affective attitude in human [11].

The aspects included in creative thinking are cognitive skill, affective skill, and meta-cognitive skill. Cognitive skill is associated with the ability of identifying problem and opportunity, formulating decent and unique question, and identifying relevant data. In addition, cognitive skill also associated with the production of ideas (fluency), production of unique/typical ideas (flexibility), or the creation of new ideas or products (originality) [12]. According to [13], creative thinking components include originality. Sharp insight, and generative process. While the steps used in creative thinking are including asking question, transforming information to a new and open minded perspective, finding correlation between different things, observing each other, producing something new as well as considering the intuition.

Law No.20/2003 states that one of the purposes of education is developing the creative thinking ability. However, the actual condition is there are still some schools that used convergent-type of questions. This condition proves that creative thinking of students has not become the orientation in learning. Long-term negative impact which will occur is the weakening of creative thinking ability of students, one of the factors that cause this weakening is less-innovative learning process. Pleasuring process of learning will be able to stimulate the creative thinking of students. [14] states that psychological condition of students during the learning process will generate impact on the acquired research results. Creative thinking ability of students provides positive impact associated with the embodiment of students’ learning initiative.

2.2. Method

2.2.1. Research Design

The type of this research is qualitative descriptive. Sample is collected through Purposive Sampling technique which based on the location of schools and categorized as state high school. Test instruments of students' creative thinking are provided towards four school in Surakarta, namely State High School 4 of Surakarta, State High School 5 of Surakarta, State High School 6 of Surakarta, and State High School 8 of Surakarta. The population of this research is the entire high school students of State High School of Surakarta in 2018/2019 school year with 3 students of each high school as the sample. The data collecting is conducted from July to August 2018. The data acquired from the questionnaire of preliminary study and test instrument of students' creative thinking. Validity and reliability of test instrument are analyzed quantitatively through Quest. The acquired data are analyzed descriptively.

2.2.2. Research Instrument

After the author performs revision on the instrument, test instrument is tested then data acquired data are analyzed quantitatively through Quest to discover the clarity regarding the quality of formulated test. Quantitative test is conducted to discover validity and reliability in empirical manner. The preliminary questionnaire is the effort of collecting the data about learning method used by teachers which supported by direct interviews towards biology teachers.

2.2.3. Data Analysis

The data used in this research are the data regarding the initial capability of creative thinking of students of State High School of Surakarta in 2018/2019 school year. The aspects of creative thinking ability are measured through fluency, flexibility, originality, elaboration. The fluency of thinking is seen from the ability of students in identifying disruption. Flexibility of thinking is seen from the
ability of students in answering the essay test with varied answers. Elaboration is seen from the ability
of students in developing or enriching the ideas of answers for a certain question, therefore, the
answers are more extensive [15] The criteria of score of creative thinking ability of students are as
follows [16].

| Score Range | Information   |
|-------------|---------------|
| Score 0-19  | Very Poor     |
| Score 20-39 | Poor          |
| Score 40-59 | Moderate      |
| Score 60-79 | Good          |
| Score 80-100| Very Good     |

### 3. Results and Discussion

#### 3.1. Result

#### 3.1.1. Percentage of learning method

Table 2. The percentage of learning method used by biology teachers in Surakarta City

| Learning Method | Percentage |
|-----------------|------------|
| Discussion      | 31.9 %     |
| Lecturing       | 42.2 %     |
| Practice        | 7.1 %      |

#### 3.1.2. Validity of Instrument

The validity of test instrument of creative thinking ability of students is obtained after pre-test was
performed and analyzed through Quest in reference to Subali Bambang (2002) in which the results are
described as follows.

Table 3. Validity of Test Instrument of Creative Thinking student

| Item Name | INFIT MNSQ | INFIT t | Information |
|-----------|------------|---------|-------------|
| 1 item 1  | 1.00       | 0.99    | Accepted    |
| 2 item 2  | 0.98       | 0.94    | Accepted    |
| 3 item 3  | 0.86       | 0.81    | Accepted    |
| 4 item 4  | 0.91       | 0.83    | Accepted    |
| 5 item 5  | 0.97       | 0.98    | Accepted    |
| 6 item 6  | 1.06       | 1.16    | Accepted    |
| 7 item 7  | 1.09       | 1.04    | Accepted    |
| 8 item 8  | 1.01       | 1.28    | Accepted    |
| 9 item 9  | 0.99       | 1.02    | Accepted    |
| 10 item 10| 0.98       | 0.94    | Accepted    |

#### 3.1.3. Reliability of Instrument

The reliability of test instrument of creative thinking ability of students is obtained after pre-test was
performed and analyzed through Quest in reference to [11] in which the results are described as follows:

Tabel 4. Summary of item estimates

|                  |       |
|------------------|-------|
| Mean             | .04   |
| SD               | .85   |
| SD (adjusted)    | .81   |
| Reliability of estimate | .90   |
3.1.4. Initial creative thinking ability of students

According to the analysis results, the results are obtained as follows:

| Score Range | Information | Frequency | Percentage of Students |
|-------------|-------------|-----------|------------------------|
| 0-19        | Very Poor   | 40        | 11.2 %                 |
| 20-39       | Poor        | 263       | 73.9 %                 |
| 40-59       | Moderate    | 53        | 14.9 %                 |
| 60-79       | Good        | 0         | 0                      |
| 80-100      | Very Good   | 0         | 0                      |

3.2. Discussion

Preliminary study is conducted to discover the initial creative thinking ability of students in State High Schools of Surakarta. In order to acquire valid and reliable data, thus, test instrument which has gone through validity and reliability test is required. The steps to obtain valid instrument are designing the instrument clues which contain the variable that will be studied, designing the indicators as the standard criteria and designing the item number of question. After the instrument is completely arranged, then, it being consulted to the experts and evaluated whether the items of question that have been formulated are able to represent the condition which will be measured. Revision is performed by the author followed by field test. The acquired data then being analyzed through QUEST to discover the validity and reliability of a implemented test instrument. If the criteria of item reception margin is used through the application of INFIT MNSQ; then, items number 1-10 are accepted (Table 2), or fit in accordance with the model which ranged between 0.77 to 1.33. If the criteria of INFIT t with ± 2.0 margin is used, thus, items number 1-10 are accepted as well (Table 2).

In the quantitative analysis of items through the application of QUEST program, at the end of the analysis, 0.90 of internal consistency value is presented, this value is the reliability value, it means that the reliability value for the instrument is high. A higher reliability value of sample will ensure that pre-test sample is fit with the items that being tested. On the contrary, a lower reliability value of sample will ensure that the pre-test sample is not providing the expected information[11].

In order to discover various learning methods used by teachers in State High Schools of Surakarta, the author uses questionnaires which distributed towards the students and also performs direct interview towards biology teachers. The analysis results indicate that the learning methods used by teachers in Surakarta are including discussion method (31.9%); lecturing method (42.2%), and practices (7.1%).

The aspects of creative thinking which measured include fluency, flexibility, originality, and elaboration. The fluency of thinking is seen from the ability of students in identifying disruption. Flexibility of thinking is seen from the ability of students in answering the essay test with varied answers. Elaboration is seen from the ability of students in developing or enriching the ideas of answers for a certain question, therefore, the answers are more extensive Guilford, 1959 in Munandar. According to the results of preliminary study in State High Schools of Surakarta, the creative thinking ability of students is discovered as follows: 11.2% students are included in “very poor” category; 73.9% of students are included in “poor” category; and “14.9% of students are included in “moderate” category. The acquired results indicate that the creative thinking ability of students is categorized as “poor” category. Creative thinking ability can be improved by implementing interactive learning method which forcing the students to be active. This result is supported by the research of[17] in which the learning method used in the learning process has significant impact towards the increasing level of creative thinking of students. In addition, the research of [18] has proven that creative thinking ability through Problem Solving method will generate higher results compared to the class creative thinking ability through lecturing method. According to the research results of [19] experience, motivation, and
ability to understand the problem as well as thinking skill have positive impact towards problem solving ability while the variable which highly influencing is the variable of thinking skill.

From the four schools determined as sample, each of them has different creative thinking ability.

| Table 6. Recapitulation of Initial Ability of Creative Thinking |
|---------------------------------------------------------------|
| School                         | Category   | Percentage of Student Grade (%) |
|--------------------------------|------------|---------------------------------|
| State High School 4 of Surakarta | Very Poor | 14.7%                           |
|                                 | Poor       | 67.4%                           |
|                                 | Moderate   | 17.9%                           |
| State High School 5 of Surakarta | Very Poor | 8.4%                            |
|                                 | Poor       | 81.1%                           |
|                                 | Moderate   | 10.5%                           |
| State High School 6 of Surakarta | Very Poor | 17.9%                           |
|                                 | Poor       | 71.6%                           |
|                                 | Moderate   | 10.5%                           |
| State High School 8 of Surakarta | Very Poor | 8.4%                            |
|                                 | Poor       | 53.7%                           |
|                                 | Moderate   | 12.6%                           |

State High School 4 of Surakarta has creative thinking ability in “very poor” category with 14.7% of percentage, “poor” category with 67.4% of percentage, “moderate” category with 17.9% of percentage. State High School 5 of Surakarta has creative thinking ability in “very poor” category with 8.4% of percentage, “poor” category with 81.1% of percentage, “moderate” category with 10.5% of percentage. State High School 6 of Surakarta has creative thinking ability in “very poor” category about 17.9%, 71.6% in “poor” category, 10.6% in “moderate” category. State High School 8 of Surakarta has creative thinking ability in “very poor” category with 8.4% of respondent, 53.7% in “poor” category, 12.6% in “moderate” category. According to the explanation above, it is known that State High School 6 of Surakarta has the largest respondent from the category of “very poor” which amounted to 17.9%, while for the “poor” category, 81.1% are in State High School 5 of Surakarta. About 17.9% of “moderate” category is acquired by State High School 4 of Surakarta. Creative thinking ability that being measured has been directed towards learning material

### 4. Conclusion

According to the results of this research, it has been discovered that the most learning method used by biology teachers is lecturing method with 42.2% of percentage, while the creative thinking ability of Surakarta’s students is included in poor category which amounted to 73.9%. The improvement of creative thinking ability of students can be done through the application of interactive media or interactive learning method

### 5. References

[1] Brookhart M S 2010 *How to Asses Higher-Order Thinking Skills In Your Classroom* Paper Presented at the annual meeting of ASCD Los Angeles

[2] Dewi P K 2017 Pengembangan Perangkat Pembelajaran dengan Pendekatan Saintifik Berorientasi Masalah *Open-Ended* untuk Meningkatkan Kemampuan Berpikir Kreatif Siswa pada Materi Bangun Datar Segiempat Kelas VII SMP *Skripsi* FMIPA UNY

[3] Asari A R 2014 *Perspektif Global Tentang Kurikulum 2013 Secara Umum dan Pembelajaran Matematika Secara Khusus* Seminar Internasional UM Ponorogo 8 Maret 2014: K-13

[4] Nurmitasari 2017 Tingkat Berpikir Kreatif Siswa MTs pada Bangun Datar Ditinjau dari Jenis Kelamin (*Jurnal Edumath* Vol 3) No 2 Hlm 118-128
[5] Afandi M dkk 2013 Model dan Metode Pembelajaran di Sekolah Unissula Press
[6] Sanjaya W 2006 Strategi Pembelajaran Berorientasi Standar Proses Pendidikan Jakarta: Prenadamedia group
[7] Ruhimat T 2012 Kurikulum dan Pembelajaran Jakarta: Rajawali Pers
[8] Mukrimah S S 2014 53 Metode Belajar dan Pembelajaran Bandung: UPI
[9] Piirto J 2011 Creativity For 21st Century Skills: How to Embed Creativity Into The Curriculum Netherland: Sense Publishers
[10] Trilling B & Fadel C 2009 21st Century Skills: Learning For Life in Our Times San Fransisco: Jossey-Bass A Wiley Imprint
[11] Subali B 2016 Pengembangan Tes Beserta Penyelidikan Validitas dan Reliabilitas Secara Empiris Yogyakarta: UNY Press
[12] Sariningsih R H I 2017 Mengembangkan Kemampuan Penalaran Statistik dan Berpikir Kreatif Matematis Mahasiswa Melalui Pendekatan Open-Ended (Jurnal Riset Pendidikan Matematika vol 4) 2 hal: 239-246
[13] Sumarno U 2010 Berpikir dan Disposisi Matematik: apa mengapa dan bagaimana Dikembangkan Pada Peserta Didik Bandung: FMIPA UPI
[14] Kargar F R at all 2013 The Effect of Teaching critical and creative thingking Skills on the locus of control and psychological well-being in adolescents (Prosedia Social and Behavioral Science 82) 1 51-56
[15] Munandar U 2014 Pengembangan Kreativitas Anak Berbakat Jakarta: Rineka Cipta
[16] Arikunto S 2012 Dasar-Dasar Evaluasi Pendidikan Jakarta: Bumi Aksara
[17] Kusuma S P 2014 Pengaruh Metode Pembelajaran dan Berpikir Kreatif Terhadap Hasil Belajar Sejarah Siswa SMA (Jurnal PENDIDIKAN SEJARAH 3) 2 Desember 2014
[18] Kurniadi A R 2017 Pengaruh Metode Problem Solving Terhadap Kemampuan Berpikir Kreatif Matematis Siswa Pada Materi Luas Bangun Datar Skripsi Fakultas Ilmu Tarbiyah dan Keguruan UIN Syarif Hidayatullah
[19] Handayani Z K 2017 Analisis Faktor-Faktor yang Mempengaruhi Kemampuan Pemecahan Masalah Soal Cerita Matematika SEMNASTIKAUNIMED ISBN: 978-602-17980-9-6