

Conference Paper

Application of Visual Thinking Technique to Improve Students' Critical Thinking Skills

Halimatussa'diah and Ali Mustadi

Yogyakarta State University, Yogyakarta

Abstract

This research aimed to increase the critical thinking ability of the students by using visual thinking technique. The critical thinking ability of the students was measured by 6 indicators, in which five of these indicators measured the students' cognitive ability through analyzing, describing, interpreting, evaluating, and inferring activity, while the other indicator measured the students' affective ability of self regulation. The research approach used was Classroom Action Research involving 40 students of Class 2C at Yogyakarta State University as the research subjects. The instrument used in this research was written test in the form of free essay, interview, and Guttman's Attitude Scale. The data were analyzed by using qualitative and quantitative techniques. The qualitative technique was used for data description, while the quantitative technique was used for the percentage descriptive analysis. The result of the research showed that the use of visual thinking technique made the students' critical thinking was increase for all indicators, namely the ability of analyzing (75.8% or high), describing (61.7% or low), interpreting (60.0% or low), evaluating (66.7% or moderate), inferring (73.3% or high), and assessing *self-regulation* by themselves (75.7% or high).

Corresponding Author:

Halimatussa'diah

 Halimatussadiyah.2017@student
 .uny.ac.id

ali_mustadi@uny.ac.id

Received: 23 January 2019

Accepted: 26 February 2019

Published: 17 March 2019

**Publishing services provided by
 Knowledge E**

© Halimatussa'diah and Ali Mustadi. This article is distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use and redistribution provided that the original author and source are credited.

Selection and Peer-review under the responsibility of the International Seminar on Language, Education, and Culture Conference Committee.

This research aimed to increase the critical thinking ability of the students by using visual thinking technique. The critical thinking ability of the students was measured by 6 indicators, in which five of these indicators measured the students' cognitive ability through analyzing, describing, interpreting, evaluating, and inferring activity, while the other indicator measured the students' affective ability of self regulation. The research approach used was Classroom Action Research involving 40 students of Class 2C at Yogyakarta State University as the research subjects. The instrument used in this research was written test in the form of free essay, interview, and Guttman's Attitude Scale. The data were analyzed by using qualitative and quantitative techniques. The qualitative technique was used for data description, while the quantitative technique was used for the percentage descriptive analysis. The result of the research showed that the use of visual thinking technique was effective in increasing the critical thinking ability of the students for all indicators, namely the ability of analyzing (75.8% or high), describing (61.7% or low), interpreting (60.0% or low), evaluating (66.7% or moderate), inferring (73.3% or high), and assessing self-regulation by themselves (75.7% or high).

Introduction

The Revolution has launched several terms such as critical thinking skills. Critical thinking still remains a very popular term until now especially in education. Knapp & Glenn


OPEN ACCESS

(1996: 128) who emphasize that critical thinking involves analysis of ideas or opinions, comparison of opposing views, thoughtful decision-making, and other such analytical processes". It is certainly a skill that is needed by everyone, especially for students.

Suprijono in his book (2016: 34) mentions several experts who mention from someone who has critical thinking skills such as Rubinfeld and Scheffer, Duldt-Bathey, and Ennis RH. From various differences by experts, Suprijono concluded that the features of critical thinking include interpretation, analysis, evaluation, inference, explanation, and self regulation. Interpretation, which is understanding and expressing meaning or significance from various experiences, information, data, events, facts, habits or customs, rules, rules. Analysis, which identifies different and distinctive relationships between statements, questions, concepts, descriptions. Evaluation, is estimating the credibility of concrete statements or representations which are reports or descriptions of perceptions, experiences, information, opinions and estimating the strength of inferential relationships or statements between statements, descriptions questions or other forms of representation. Inference, identify and encourage elements that make sense, make assumptions and hypotheses, and conclude from the data. Explanation, being able to express the results of one's explanation, present one's reasoning in the form of a strong strong argument. Self regulation, means consciously observing one's cognitive activities, there is no element in these activities and the results obtained, especially by applying the skills in the process and evaluation for inferential research by reading the questions, confirmation, validity or correcting the punishment or results.

Database show that the ability of students to explore the knowledge of students is still lacking. This is evident from no response or answer from students who made experiments to explore knowledge about science curriculum of elementary school materials. Another problem found among people that the lack of communication between students both in small groups and classically. In the initial conditions, the implementation of Science Education subjects in Teacher Education of Elementary School class C semester II in Yogyakarta State University has not facilitated learning method to improve the critical thinking skills of students and has not supported the ability of students in active communication in the classroom.

The lack of critical thinking ability of students was recognized especially from the conclusion of measuring students' comprehension to lecture material. It was seen that the students tended to only copy the material from particular source which have been provided by researcher. Besides, the ability of students to develop concept of material based on knowledge was still less. The weakness of learning activity in the class was indicated by the non-implementative group discussion activities, causing the class

tended to be passive. Most of the time applied by the lecturer was lecture methods, in which students' involvement was seen only in a few activities such as making inquiries in writing and reading material provided by lecturers.

Dilekli (2017: 17) emphasizes the individual differences of teachers and learners. Various literatures on research that analyze the relationship between critical thinking skills and other variables such as age, type, gender, learning style and teaching. But there were only a few researchers who analyzed the relationship between learning styles and students' critical thinking skills. The results of research conducted by Dilekli was the relationship between students' critical thinking and learning styles. That is one of the reason of researcher to provide encouragement to conduct research on the adjustment of teaching styles with students' critical thinking skills as well as to overcome the problem of students' critical thinking.

An adjustment about teaching style is one way to improve students' critical thinking, one of them is by using Visual Thinking technique. Just as research has been done by Smilan (2017: 7) who utilized visual language as the development of creativity, critical thinking, and concept representation. The results of his research emphasized that the ability to think critically can be improved through the use of visual language, which is Visual Thinking.

Visual Thinking or otherwise known as visual mapping is a process that allows one to see some or all of the ideas that form relationships (Margulies & Valenza, 2008: 8). The ideas are poured on the paper in the pictures form in accordance with the ideas that exist in one's mind. The pouring of the idea is aimed at expressing the idea of a person in the form of various symbols that can be described.

Based on the problem of critical thinking skill which is low of Elementary School Teacher Education students at class C semester II, researcher have solution of using Visual Thinking technique.

2. Method

This research is a classroom action research. (Creswell, 2012, 577) "Action research is designed to help students to learn and practice their learning." (Creswell, 2012, 577). The design of action research used in this research is the Spiral Action Research Model developed by Kemmis and McTaggart through several cycles. Each cycle consists of 3 stages: planning, implementation and observation (act and observe), and reflection (reflect).

The study was conducted from February to June of the second semester of Lesson 2017/2018. The subject of this classroom action research is the second semester C students of the Elementary School Teacher Education at Universitas Negeri Yogyakarta 2017 2017. The number of students is 40 students.

At the planning stage, the researcher prepared the implementation of the lesson by preparing the Course Teaching Unit (SAP) with the RPS (Semester Learning Plan). Researchers arranged lecture materials using visual thinking techniques. The step of visual thinking techniques are draw a symbol that represents the topic, if there are no visual images that appear on the head we can use the words. For example, if you choose a topic about field trips, you can draw a child walking or write "Field Trip". In making it starting at the midpoint on the paper. The second step is from the midpoint of the paper, the next step is to contact the topic freely by making a branch in any direction. Build mindscaping by entering all the elements you can imagine using symbols, images, body shapes and keywords. Draw the activities that have been carried out during field trips. The last step is place each new subtopic that matches what is already in mindscape, connect ideas using lines and arrows that are varied and can be varied.

The next step made application "how to make a visual thinking technique" was to perform the stage of implementation and observation. At that stage the learning is carried out by using visual thinking techniques. In the lecture process students are asked to discuss and communicate the material that has been visualized. Discussion activities were conducted in groups and then were communicated in class. Observation stage is done by collecting data result of student's critical thinking ability and calculating data with descriptive technique percentage. The formula used is:

$$\text{Percentage} = \frac{\text{scores}}{\text{Maximum scores}} \times 100$$

The percentage of the results are interpreted with 5 categories of interpretation according to Setyowati (2011) as follows.

TABLE 1: Conversion of Students' Critical Thinking Skill.

Percentage	Category
81,25 < X ≤ 100	Very high
71,5 < X ≤ 81,25	High
62,5 < X ≤ 71,5	Moderate
43,75 < X ≤ 62,5	Low
0 < X ≤ 43,75	Very Low

The next step is reflection that reflects whether the activities have been done in accordance with the planned based on the results of observation.

The study was conducted in 3 cycles, each cycle consisted of 3 meetings. The last day of each cycle was used to evaluate students' critical thinking skills. Techniques and instruments of data collection used tests and non tests. The test technique was used to measure students' critical thinking ability on the cognitive aspect. Assessment of the ability to think critically on the cognitive aspect is done by asking students to do analysis, description, interpretation, evaluation and inference to a mindscaping about the related lecture material and has been prepared by researchers. Non-test techniques use Guttman's attitude scale to measure indicators on the affective aspects of students' critical thinking skills. The form of assessment is self-assessment. The other non-test techniques are interview and documentation.

3. Findings and Discussion

Based on the exposure of data that can be collected by researchers about students' critical thinking skills, the results of student scores can be classically shown in the following table.

TABLE 2: Data on Research Result in Cycle I, II and III.

Cycle	Critical Thinking Indicator (%)						Critical Thinking Skill (%)	
	Analysis	Description	Interpretation	Evaluation	Inference	Self-regulation	Total Score	Category
Cycle I	56,1	50,0	37,7	54,4	41,2	50,2	48,3	Very low
Cycle II	62,3	57,0	50,0	54,5	51,8	55,8	55,2	Low
Cycle III	75,8	61,7	60,0	66,7	73,3	75,7	68,9	Moderate

Based on the table, it can be seen that the percentage of critical thinking skills of 2C students increased in each cycle both measured from each indicator or as a whole. The increase was influenced by several factors. In this study, the use of visual thinking techniques affected the improvement of students' critical thinking skills. This is related to research conducted by Moeti (2017: 22) who reveals several factors that influence one's critical thinking ability based on his research, namely personal motivation, change and various teaching methods, various assessment methods, program reviews and improving program logistics.

The low score of students' critical thinking ability made the researcher not stop trying to keep improving students' critical thinking ability. Thus, the researchers held the second cycle by making improvements in the learning process, especially in the use of visual thinking techniques. The efforts of the researcher to improve the ability are driven by the statement expressed by Topolovcan & Matijevic (2016: 63-64) that critical

thinking apart from being an integral element and constructivist thinking, is also the most dominant dimension. Furthermore, the research suggests that it is possible to develop critical thinking with constructivist teaching. This is related to the development of critical thinking skills which are emphasized on the aspects of student evaluation and interpretation, which involve not only written sources but also their experiences to justify the theory or concept of the material they have learned during the lecture. Reflection is done at the a step is an activity to ask each student to prepare three references either from books, journals or news and the official web-web. Daily newspapers and popular magazines can also be used as a source of information, questions, new topics, problems, and problems for their interpretation needs (Akçay, Kapıcı & Yager, 2017: 102).

The other factors that can alert a person's critical thinking ability are reading books and journal articles. The Activity proved to be useful during the critical thinking development process. Reading articles before lectures encouraged classroom interaction and can contribute to develop critical thinking. Teacher's initiative to create effective interaction between students or encourage the process of discussion in the classroom is needed in terms of developing students' critical thinking skills. Teacher's initiative to create effective interaction between students or encourage the process of discussion in the classroom is needed in terms of developing students' critical thinking skills. The interaction in the form of asking questions and answering questions between students or between teachers is a description of the discussion that took place in the class. The matter revealed by Cox (2012:159) is related to the results of this study. He said that someone is encourage to think through teacher questioning that's open and invites further discussion. Through asking activities and creating communicative situations in discussion activities can stimulate students' thinking skills.

To develop the ability to think critically, one needs to reflect, imagine, discuss ideas and ask questions. The researcher gave opportunity to the students to make notes as well as to hold small group discussion to communicate their perspective in group first. Small group discussion is closely related to the culture of collaboration in the classroom. Collaboration is one activity that affects the development of one's ability in critical thinking. It has also been described by Stephenson & Sadler (2013: 6) that collaboration is one of the deliberate attempts to develop critical thinking skills and needs to be applied in learning. By conducting such discussions form a variety of views that lead them to make inference. The same is also reinforced by Gholam's theory (2017: 25) that one needs to make coherent and rational decisions. They also need to analyze their own thoughts and others, given the different perspectives of each person.

The determinant factor of the success of a learning process will not be separated from the involvement of educators where in this case is the lecturer. As stated by Mustadi (2010: 3) that the role of lecturer as a class manager greatly determines the level of student participation in teaching and learning process in the class, especially in determining the proper teaching method. Therefore, in this research, the performance achievement of the visual thinking technique that has been applied by the researcher has succeeded in increasing the critical thinking ability of 2C Teacher Education of Elementary School students in Yogyakarta State University.

4. Conclusion and Suggestions

Based on the data collected and the results of data analysis, it can be concluded that the use of visual thinking techniques in the preparation of lecture materials can improve the critical thinking skills of class C students semester II in Yogyakarta State University. There are three steps of visual thinking technique that are drawing symbols representing topics, from the midpoint of the paper, student have to connect the topic freely by making the branch in any direction for using symbols, images, body shapes and keywords. The last step is put each new subtopic that matches and connect the idea of using diverse lines and arrows that can be varied.

The steps are used by researchers to arrange the lecture material. In the lecture activities students are asked to discuss to communicate material that has been visualized by lecturers in classical. By using these techniques students' critical thinking ability increases, both from each indicator and overall to exceed the percentage of indicator attainment that is set at 68.9% and moderate category.

Based on the results of the class action research, it can be suggested things are visual thinking techniques are expected to be used to develop students' critical thinking skills, the technique can be used as a reference to develop a tool and to measure students' critical thinking skills, research on the ability of critical thinking is done on a broader subject and the need for other innovations in the manufacture of material-based visual thinking techniques

References

- [1] Akcay, H., Kapici, H., O., & Yager, R., E. (2017). Using Newspapers and Advertisement as a Focus for Science Teaching and Learning. *Universal Journal of Educational Research*, 5, 99-103. doi: 10.13189/ujer.2017.050112

- [2] Cox, R., H. (2012). *Sport Psychology: Concepts And Applications, Seventh Edition*. New York: McGraw-Hill Companies, Inc.
- [3] Creswell, J. W. (2012). *Education Research, Planning, Conducting and Evaluating Quantitative and Qualitative Research 4th Edition*. New York: Pearson Education Inc.
- [4] Dilekli, Y. (2017). The Relationships Between Critical Thinking Skills and Learning Styles of Gifted Students. *European Journal of Education Studies*, 3, 69-96. doi: 10.5281/zenodo.344919
- [5] Fakunle, L. dkk. (2016). Chinese Postgraduate Students' Perspective on Developing Critical Thinking on an UK Education Masters. *Journal of Curriculum and Teaching*, 5, 27-38. doi:10.543/jct.v5n1p27.
- [6] Gholam, A. (2017). Visual Thinking Routines: A Mixed Methods Approach Applied to Student Teachers at the American in Dubai. *Journal of Inquiry & Action in Education*, 9, 12-27.
- [7] Knapp, I., R., & Glenn, A., D. (1996). *Restructuring Schools with Technology*. USA: A Simon and Schuster Company.
- [8] Margulies, N., & Christine, V. (2008). *Pemikiran Visual: Alat untuk Memetakan Ide*. (Terjemahan Hartati Widiastuti). Jakarta: PT Indeks. (Edisi asli diterbitkan tahun 2005 oleh Company LLC. Valenza Crown House).
- [9] Moeti, B., Mgawi, R., K., & Moalosi, W., T., S. (2017). Critical Thinking among Post-Graduate Diploma in Education Students in Higher Education: Ralitiy of Fuss?. *Journal of Education and Learning*, 6, 13-24. doi: 10.5539/jel.v6n2p13
- [10] Mustadi, A. (2010). Peningkatan Prestasi Belajar Mahasiswa Melalui Metode Task Based Teaching (TBT) Pada Mata Kuliah Bahasa Inggris di PGSD, FIP, UNY. *Jurnal Majalah Ilmiah PGSD*.
- [11] Setyowati, A. (2011). Implementasi Pendekatan Konflik Kognitif dalam Pembelajaran Fisika untuk Menumbuhkan Kemampuan Berpikir Kritis Siswa Kelas VIII. *Jurnal Pendidikan Fisika Indonesia*, 7. doi: <https://doi.org/10.15294/jpfi.v7i2.1078>
- [12] Smilan, C. (2017). Visual Immersion for Cultural Understanding and Multimodal Literacy. *Arts Education Policy Review*, 118, 220-227. doi:<http://dx.doi.org/10.1080/10632913.2017.1287805>
- [13] Stephenson, N., S., & Sadler, N., P. (2013). Developing Critical Thinking Skills Using the Science Writing Heuristic in the Chemistry Laboratory. *Chemistry Education Research and Practice*, 17, 72-79. doi: <http://dx.doi.org/10.1039/c5rp00102a>.

- [14] Topolovcan, T., & Matijevic, M. (2016). Critical Thinking as a Dimension of Constructivist Learning: Some of the Characteristics of Students of Lower Secondary Education in Croatia. *Center for Educational Policy Studies Journal*, 7, 47-66.