The effect of problem based learning model on critical thinking skill students in primary school

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Abstract. Critical thinking is one of the 21st century skills that needs to be developed. This skill is one of the most important basic modalities for everyone and can affect their future life. This research aim to obtain a description of the effect of problem based learning on critical thinking skill students of grade IV in one of the primary schools in Lima Puluh Kota district, West Sumatera province. The research adopted quantitative research and employed quasi experiment which is non-equivalent control group design. The subjects of this research were 40 students of class A as an experimental class and class B as a control class. The data were collected through instrument tests which is critical thinking skill test on natural science subjects especially natural resource materials. The result of this research showed that critical thinking skill students in experimental class improved significantly. So, it can be concluded that the problem based learning affect to critical thinking skill students. This research is expected to be a reference of teachers in developing innovative natural science learning, let alone explicitly this concept not only emphasizes the cognitive abilities of students, but also implicitly can develop their social skills in natural science perspective.

1. Introduction

Life in the 21st century demands a variety of skills that everyone has to master, so that education is expected to prepare students to master these skills in order to become a successful person in life. These important skills in the 21st century are relevant to the four pillars of education which includes learning to know, learning to do, learning to be and learning to live together. These four principles each contain the 21st century special skills that need to be developed in the learning activities.

There are a number of 21st century skills, as follows: critical thinking and problem solving, communication and collaboration, creativity and innovation, literacy, flexibility and adaptability, initiative and self-direction, social and cross-cultural interaction, productivity and accountability, and leadership and responsibility [1]. Then there are several 21st century skills: (1) learning and innovation skills, including: creativity and innovation, critical thinking and problem solving, communication and collaboration; (2) information, media and technology skills, including: information literacy, media literacy, and ICT (Information, Communications and Technology) literacy; (3) life and career skills, including flexibility and adaptability, initiative and self-direction, social and cross-cultural skills, productivity and accountability, and leadership and responsibility [2].

Seven survival skills that everyone needs to have if he wants to live in the 21st century that includes: 1) critical thinking and problem solving, 2) collaboration across networks and leading by influence, 3) agility and adaptability, 4) initiative and entrepreneurialism, 5) effective oral and written

communication, 6) accessing and analyzing information, and 7) curiosity and imagination [3]. So we can see that there are so many 21st century skills that need to be developed to face the development of the era, one of them is critical thinking skill. Critical thinking means being able to think deeply, and deciding on something after thinking and considering it. Critical thinking skills are reasoned and reflective thinking with an emphasis on making decisions about what to believe or do [4].

Critical thinking skill is one of the basic capital or intellectual capital that is essential for everyone and is a fundamental part of human maturity. Therefore, the development of critical thinking skills becomes very important for students at every level of education [5]. Critical thinking in learning, is very big role in improving process and learning outcomes. In addition, critical thinking also has an important role as a stock of students to face the problems faced in everyday life and also the future. Using higher-order thinking skills in the correct context teaches students how to think deeply, living habits with a smart, balanced can be accounted for [6].

Given the importance of critical thinking skills, the school as a place of formal education should be able to develop students' critical thinking skills. The advances in technology and globalization causing schools to be able to prepare intelligent and critical thinking students in answering challenges [7]. Sharpening these thinking skills to form citizens who master the knowledge, skills, attitudes, and values used as the ability to solve personal problems or social problems and decision-making skills and participate in various community activities to become citizens the good one [8]. To explore students' critical thinking skills requires a precise learning model, which can train students to develop and hone their critical thinking skills. However, in reality school learning is still done conventionally memorized, teachers become centers of learning, emphasizing only cognitive ability, not using learning models, rarely using instructional media, not encouraging students to work together and be active in learning, where things -these can not explore students' critical thinking skills.

As a result students' critical thinking skills are low because they are less explored. Indonesian students are good at working on the rote matter. However, in applying and reasoning is still low. Learning at school, starting with daily tests and school exams, does not hone reasoning. From the result of Indonesia National Assessment Program, which this year is tested for grade V SD students, shows the weakness of students' high thinking ability [9]. From the results of a study conducted by researchers in one of the primary schools in Lima Puluh Kota district, West Sumatera, it is known that learning in grade IV is still conventional, where the teacher does not use the learning model, the learning is still memorized, and the learning is still teacher centered. In other words, learning is limited to the transfer of knowledge, rather than creating meaningful learning that can develop the skills or potentials of students, including critical thinking skills. Therefore, it is necessary to apply a learning model that can give students the opportunity to develop and explore their critical thinking skills optimally, ie problem based learning model. Problem based learning is a learning model that presents a contextual that stimulates students to learn.

Problem based learning is a learning model that requires students to think critically, solve problems, learn independently and demand participant skills in teams. The troubleshooting process is done collaboratively and adapted to life [10]. Problem based learning is the use of the various intelligences needed to confront real-world challenges, the ability to deal with new things and the complexities that exist [11]. The main goal of problem-based learning is not the delivery of a large amount of knowledge to the students, but to the development of critical thinking skills and problem-solving skills and at the same time developing the ability of students to actively build their own ability [5]. One of the research on the influence of problem based learning model is research highlighted the differences in the effect of problem based learning models on critical thinking skills and creative thinking. From this research, he found that the model of problem based learning more influence students' critical thinking skills [12].

Based on the above, researchers interested in conducting research on "The Effect of Problem Based Learning Model on Critical Thinking Skill Students in Primary School". This research is conducted on natural science subject matter of natural resources, because human and environment are two things that can not be separated. How humans use the environment around at this time, will affect human life in the future. Therefore, critical thinking skills are needed to determine human attitudes toward the environment.

The purpose of this study is to determine the improvement of students' critical thinking skills after using the problem based learning model in the process of learning natural science, the material of natural resource. This research is expected to be a reference of teachers in developing innovative natural science learning, let alone explicitly this concept not only emphasizes the cognitive abilities of students, but also implicitly can develop their social skills in natural science perspective.

2. Method

This research adopted quantitative research which is experimental research. In this research there are two research subjects that are experimental group and control group. Experimental groups used the problem based learning model, while the control group used conventional learning. Both experimental and control groups were also given tests which are pre-test and post-test. The research employed quasi-experiment which is non-equivalent control group design. The first class became an experimental class given the treatment using the problem based learning model and second class became a control class using conventional learning. Thus the design of this researchis [14]:
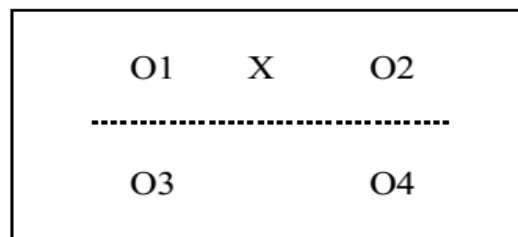

$$O1 \quad X \quad O2$$
$$---------------------------------$$
$$O3 \qquad O4$$

Figure 1. The Research and Design

Description:
O = Pre-test and post-test of critical thinking skill
X = Natural science learning process using problem based learning model
.... = Subject not selected randomly.

This research was located at one of State Primary School in Lima Puluh Kota district, West Sumatera Province. The subjects of this research were 42 students of class A as an experimental class and class B as a control class. The number of IVA class was 21 students and of IVB class were 21 students. The data were collected through instrument tests which are critical thinking skill test consisted pretest and post-test. Pretest is the first test aimed to determine the students' critical thinking skill before obtaining problem based learning model in natural science in experimental class and conventional learning in control class. The posttest is the final test aimed to determine the students' critical thingking skills after they were given problem based learning model in the experimental class and conventional learning in the control class. The test of critical thinking skills used is an essay test aimed to determine the students' ability to express critical thinking skill through the way students complete the test. Moreover, the errors and difficulties experienced by the students can be known so that teacher can improve the learning process. The indicators of critical thinking skill used on the research in this test are: 1) elementary clarification; 2) basic support; 3) inference; 4) advance clarification; and 5) models and tactics [4].

The development of test instruments in this research consisted of validity and reliability. Based on the instrument development that has been done, the overall validity of the results indicates that the question is good. While the validity of the overall contents of the question was good, it was appropriate with the indicator, and according to the contents of the material to be tested.

Furthermore, the data of students' critical thinking skill were analyzed to determine whether the data were distributed normally, homogeneous, and there was an average equality in the data of both samples. Moreover, the data were analyzed the value of the early ability test (pretest) with the final ability test (posttest) through N-Gain analysis. For test and analyze the data, it used SPSS version 20 for windows and Microsoft Excel.

3. Result and Discussion

The research was begun by doing pre-test on experimental class and control class. Pre-test was given to students of experimental class and control class before they were given the learning process aimed at understanding the early critical thinking skills of the students. After the early student ability was identified by pre-test in both classes, treatment was performed with different treatment in experimental class and control class. The experimental class was given the treatment using problem based learning model, and the control class was given learning using conventional approach. After that, both samples were given a final test or post-test aimed to determine the final ability of students in working on the critical thinking skills of students. Here are the descriptive statistics data of pre-test and post-test of students' critical thinking skill:

Tabel 1. Descriptive Statistics Data of Pre-test and Post-test

Score	Experimental Class					Control Class				
	N	Min	Max	Mean	Std. Deviation	N	Min	Max	Mean	Std. Deviation
Pretest	21	33.30	64.50	42.22	9.81	21	31.20	60.40	39.75	9.03
Postest	21	64.50	95.80	73.06	10.02	21	52.00	81.20	60.56	9.03
Ideal Maximum Score = 100										

The result of descriptive statistics data showed that the pre-test average of students' critical thinking skill is 42.22 in experimental class and 31.20 in control class. While the post-test average of students' critical thinking skill is 73.06 in experimental class and 60.56 in control class. Then the data were tested for normality test, homogeneity test, and t test to determine whether there is a difference between the score of pre-test and post-test in experimental class and control class or not.

Based on the results of the analysis of research data obtained that students' critical thinking skill in general increased. Improved critical thinking skill of students who get learning with the problem based learning model better than students getting conventional learning. The problem based learning model can provide great opportunities for students in developing students' critical thinking skill because this model allows students to be more active. Students try to find answers to solve problems through the indicators contained in the critical thinking skill.

4. Conclusion

Based on the research that has been conducted, then obtained the conclusion from the research results that is, there is a difference in critical thinking skill of students who obtained learning with using the problem based learning model and students who get conventional learning. Improved critical thinking skill of students who get learning with the problem based learning model better than students getting conventional learning.

5. Acknowledgments

6. References

[1]   Trilling B and Fadel C 2009 *21st Century Skills, Learning for Life in Our Times* (San Francisco: *Jossey*-Bass)
[2]   Partnership for 21st Century Skills 2015 *P21 Framework Definition Document* p 3-7
[3]   Maftuh B 2010 *Memperkuat Peran IPS dalam Membelajarkan Keterampilan Sosial dan Resolusi Konflik*

[4]   Ennis R H 1996 A Concept of Critical Thinking *Harvard educational review* **32** 81-111
[5]   Kurniasih I 2014 *Sukses Mengimplementasikan Kurikulum 2013* (Jakarta: Kata Pena)
[6]   Lambertus 2009 Pentingnya Melatih Keterampilan Berpikir Kritis dalam Pembelajaran Matematika di SD *Forum Kependidikan* **28** Nomor 2.
[7]   Lotta C L and Miller T N 2011 21st Century Skills Prepare Students for the Future, *Kappa Delta PiRecord* **47** 121-123 DOI: 10.1080/00228958.2011.10516575
[8]   Sapriya 2009 *Pendidikan IPS* (Bandung: Rosda Karya)
[9]   Kemdikbud 2016 Daya Imajinasi Siswa Lemah , *http://nasional.kompas.com/read/2016/12/15/23091361/daya.imajinasi.siswa.lemah*
[10]   Riyanto Y 2010 *Paradigma Baru Pembelajaran: sebagai Referensi bagi Guru/* Pendidik *dalam Implementasi Pembelajaran yang Efektif dan Berkualitas* (Jakarta: Fajar Interpratama Offset)
[11]   Rusman 2010 *Model-Model Pembelajaran Mengembangkan Profesionalisme Guru* (Jakarta: Rajawali PRESS)
[12]   Birgili B 2015 Creative and Critical Thinking Skills in Problem-based Learning Environments *Journal of Gifted Education and Creative* **2** 71-80.
[13]   Sugiyono 2013 *Metode Penelitian Pendidikan* (Bandung: Alfabeta)