



DEVOTING TO ENHANCE THE CRITICAL THINKING SKILL AND THE CREATIVITY OF STUDENTS IN SEVENTH GRADE THROUGH PBL MODEL WITH JAS APPROACHMENT

S. Fatimah

SMP Negeri 2 Kudus, Central Java, Indonesia

DOI: 10.15294/jpii.v4i2.4184

Accepted: 4 September 2015. Approved: 30 September 2015. Published: October 2015

ABSTRACT

This research aims to improve the critical thinking skill and the creativity of students in VIIC class in SMP 2 Kudus in academic year 2013/2014 by implementing problem-based learning (PBL) with Jelajah Alam Sekitar (JAS) approach. The learning design used is the classroom action research which conducted in 2 cycles. The first cycle applies PBL with JAS approach which the students conduct direct exploration to the environment and in the second cycle students conduct direct and indirect exploration. The results show that the PBL model with JAS approach is able to improve the students' critical thinking skills amounted to 74.35% and enhance students' creativity amounted to 66.96%. It can be concluded that the PBL model with JAS approach is effective to improve the critical thinking skill and the creativity of students.

© 2015 Science Education Study Program FMIPA UNNES Semarang

Keywords: critical thinking, creativity, PBL model with JAS approach

INTRODUCTION

A paradigm shift in the education requires a change in the learning process. Teachers should plan for student-centered learning to foster the spirit of learning, motivation, creativity, initiative, inspiring, innovative and students' independent. Science learning in the interaction of living creatures with the environment material, ask the students to think critically and creatively. The development of the thinking skills can be achieved with a model and learning approach which has a principle to explore the environment and get the environmental issues as the stimulus is the PBL model with JAS approach.

PBL is an active learning models that use issues as stimulus (Barrow, 2000), thus effectively increasing the ability to solve problems (Harlim and Belski, 2010) and to improve the creative thinking skills of students (Awang and Ramly,

2008). The application of PBL in the learning process improves high-level thinking skills (Sastrawati, et al., 2011), and critical thinking (Fachrurazi, 2011). Learning to solve problems which is associated with life, the students are more motivated to learn and improve the ability to think critically and creatively (Sukandar, 2013).

JAS approach gives explorative activities, real experience to the students, thus having diverse thinking concept from all of the students and their learning outcomes more efficiently (Mulyani, et al., 2008). This approach can also increase the activity of the teachers and the students, process skills, and students' mastery learning (Yuniastuti, 2013; Ismartoyo and Indriasih, 2013).

Thinking skills and creativity are competencies that must be trained to the students, because this capability is indispensable in life. Teachers need to help students develop critical thinking skills through strategies and methods that actively support the students (Liliasari, 2001). In the reality the learning process is less encouraging on the

*Correspondence Address:

Siti Fatimah

E-mail: Email: fatim_smp2kudus@yahoo.com

achievement of critical thinking skills (Shipton, 2011). The results of the initial observation data showed that the critical thinking skills and the creativity in VIIC class is very low. In the learning process to 80% of students do not dare to ask a question and provide arguments to address a problem. On the science learning with the experiment method, 60% of students are not able to analyse the data from the experiment, 30% are able to make the analysis but did not link between the variables and only 10% of the students who can analyse the data properly. The lack of the Critical thinking skills and the creativity of the students are also shown from the results of the students' daily tests with problem-based open description. At the daily test I, the average score is 68.4 with a 34% degree of completeness. In the daily test II, the average score is 66.6 and the students who pass the study amounted to 27.5%. The low results of the learning achievement, indicating the ability of those students to analyse, explain, interpret and provide ideas to solve the problem is still low. The students are not given the problems that challenge them to conduct independent study with variety of learning resources. The students are frequently memorize the concepts without knowing the process of finding the concept so the ability to think critically, creatively, creativity and student engagement in the learning process is still low.

PBL model study with JAS approach to the living creatures' interaction with the environment materials is expected to improve the critical thinking skills and the creativity of the students. Therefore, this study aims to apply the model PBL to improve the critical thinking skills and the creativity of VIIC students in the academic year 2013/2014 in the matter of the living things with the environmental interaction.

METHOD

The research design used here is *penelitian tindakan kelas* (PTK) consists of four activities: planning, action, observation and reflection. The research was conducted on 23 April to 7 June 2014 in SMP 2 Kudus year 2013/2014. The study involved 30 students in VIIC class consisting of 20 female students and 10 male students. This research was conducted by 2 cycles. The first cycle of learning material held the interactions between the components in the ecosystem using the PBL model with JAS approach, where students explore directly into the environment. In the second cycle, we do the learning materials about pollution and environmental impact. In this cycle, the

students explore the environmental issues caused by pollution through the media / internet, and do the exploration into the environment directly. In cycle I and II students were asked to provide solutions to issues that are given at the time of learning.

The collected data include the value of students' critical thinking skills which the scores are obtained after cycle I. The student creativity data are obtained from the assessment of the product. Supporting data is the students' activity data which taken from the students' activity observation sheet, the level of adherence to the implementation of PBL approach JAS is obtained by observation, the students' response data were taken to the students' questionnaire responses sheet, the teacher responses data were taken by the teacher interviews guide sheet, the manner assessment data results taken by self-assessment sheet and behaviour observation sheets and the performance assessment are taken from the performance assessment sheets. These data were analyzed using quantitative and qualitative methods. The success indicators of this research is the students' critical thinking skills in science learning using PBL model with JAS approach with the criteria of the students who reach the category of critical and very critical at least 75%, the creativity of the students who reach the category of creative and very creative at least as much as 75% , the usage of learning with PBL models with JAS approach is in a good category, and the value attitude and the improvement of students' performance by at least in good criterion.

RESULTS AND DISCUSSION

The PBL model with JAS approach is adapted with PBL syntax referenced from Nur (2011) are combined with the JAS approach. The learning activity starts with orienting the students towards the issue. The problem stems from the students environment such as the problems faced by the seller of ornamental fish, the plague of caterpillars and environmental pollution. In the cycle I the students explore the environment directly and in the cycle II the students do the environment simulation directly and through the media. The students are grouping in small groups to explore for identifying the problems, discuss to find solutions of the problems and to design an experiment to analyze and evaluate the proposed solution. The students communicate the results of the discussion in the classical way to evaluate the proposed solutions. The experimental design results, reports and debriefing in presentations as

a means of reflection activities, evaluation and competition between the groups. Furthermore, the study concludes with the teacher's reinforcement and award for the best group. The teachers only act as the class facilitator, the students conduct an independent study.

The implementation of PBL models with JAS approach gained through observations. The percentage rate of adherence to the JAS cycle I and II, including in the excellent category, reaching 84% and cycle II reached 98%. This shows the success indicators of the research performance is achieved. In addition to PBM implementation observation, the students were given the student responses questionnaire about the learning PBL model with JAS approach. As a result, the students gave positive responses to the learning process. The students feel more active and enjoyable. The students are also challenged to learn problems solving with scientific methods, finding new ideas and solutions, discuss and exchange ideas in the group.

In this study, PBL with JAS approach is applied as an effort to improve students' critical thinking skills and creativity. The students' critical thinking skills data in this study was obtained from the scores of tests conducted at the end of the cycle I and the cycle II. The critical thinking skills score of VIIC students in the cycle I and the cycle II obtained is presented in Table 1.

In the first cycle the students' average score

activity as much as 51.78. The average score is in the low critical category. Therefore, the cycle of improvement held on shortcomings experienced during cycle I. In the cycle II the average score increased by 22:57 compared to the cycle I, and including in the critical category. It means that the indicators of success in the research have been achieved, and can be generalized that the application of the PBL model with JAS approach to learning the material of living creatures with the environmental interaction in class VIIC SMP 2 Kudus year 2013/2014 can improve students' critical thinking skills.

Recapitulation results of analysis of the critical thinking skills level of students in grade SMP 2 VIIC Kudus year 2013/2014 in the cycle I and the cycle II are shown in the Figure 1.

Based on Figure 1. it shown that the level of critical thinking skills of VII C students in the cycle II tends to be higher than the cycle I. In the cycle I, the students who reach the critical and very critical criteria as much as 60%. The achievement of the critical thinking skills score in the cycle I has not meet the success indicators research, but it has increased if we compared it with the pre-cycle condition. In the pre-cycle, all of the students have no critical thinking skills criteria. Low critical thinking skills that is caused by several factors, including the teacher does not develop higher order thinking skills of students such as the ability to analyze, synthesis and evaluation.

Table 1. Recapitulation of Students Score of Critical Thinking Skills Tests

| Data | Critical Thinking Skills Scores | |
|---------------|---------------------------------|----------|
| | Cycle I | Cycle II |
| Highest Score | 82.22 | 94.44 |
| Lowest Score | 33.33 | 41.67 |
| Average | 51.78 | 74.35 |

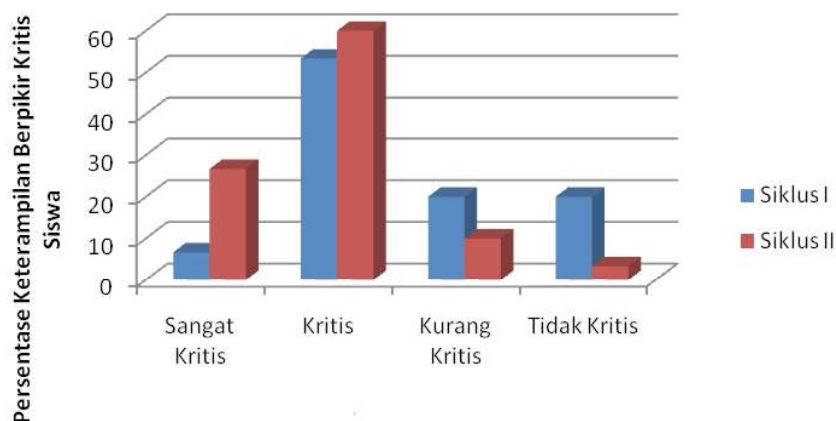


Figure 1. The Percentage of Students' Critical Thinking Skills

Teachers are often developing the low-level thinking skills such as knowing and understanding science concepts. A similar sentiment was expressed by Pithers and Soden (2000) that the two factors that cause critical thinking does not develop during education is the curriculum generally designed with a range of material that is broad, so teachers are more focused on the completion of the materials and teachers' understanding of the learning model that can improve critical thinking skills less.

The application of PBL with JAS approach in the cycle I can improve students' critical thinking skills as students are given unstructured problems. The use of such problems in the PBL may invite students to develop higher-order thinking habits such as analysing, evaluating and making predictions (and Chia Chin, 2005: 44).

The PBL learning model with JAS approach is student-centered learning (Savery, 2006; Barrow, 2000). The use of this model during the cycle I make students become more active and engaged in the observation, experiment, discussion, analyse the experimental results, summarize and communicate the group's work. This is supported by the data from students' observational learning activities obtained during the cycle I. The student learning activities increased during the cycle I. At the beginning of the cycle I is only 30% of students actively engaged in the learning process, but the number of students who are active and involved in learning are increase. At the end of the cycle I, the students who are actively engaged in learning as much as 93.33%. The activeness in learning process lead to the more independent students in constructing knowledge. Independent learning encourages students to apply new knowledge, evaluate the allegations put forward, and adjust the strategy to achieve the goal of learning (Hmelo silver, 2004), so it can developed the critical thinking skills.

The improvement of students' critical thinking skills as well due to the collaboration activity during the learning process. The results of this study corroborate the research conducted by Masek and Yamin (2012) that PBL effectively improve students' critical thinking skills. Students can develop the ability to think through some of the processes that take place during the learning process such as discussion, brainstorming, debate, interaction and reflection during the process of collaboration.

At the cycle II we held an improvement over the weaknesses found in the cycle I so to increase the students' critical thinking skills in the cycle II of 23:33% and students were striking at

least get the score of the critical criteria as much as 83.33%. This shows the success indicators of the research are achieved. At the cycle II mean score of the students' critical thinking skills still categorized as good, namely 74.35. At the cycle II, there is an improvement in the critical thinking skills for 22:57 compared to the achievements of the cycle I. The students who achieve the very critical and critical categories as much as 86.67%, which is 26.67% higher than the score of the cycle I. Achieving the critical thinking skills in the cycle II has met the success indicator of research. This may imply that the PBL model with JAS approach can improve students' critical thinking skills.

The application of PBL with JAS approach in the cycle II could further enhance the students' critical thinking skills because the students are more active and independent in the learning process. This is facilitated by students worksheet that is easily understood by students and facilitated by the internet media for learning process. The students can access the Internet to find ideas and search for learning resources. The learning activeness during the cycle II is shown from the observation of learning activities, that 100% of students actively involved in the learning process. The activeness in the learning process lead to the more independent students in constructing their knowledge. The independent learning process encourages the students to apply new knowledges, evaluate the allegations, and adjust the strategy to achieve the goal of learning process (Hmelo, 2004), so they can develop their critical thinking skills. This has the same idea with the cognitive learning theory and social constructivism, one person will be more effective in the learning process, if the cognitive actively undergo in the reconstruction, both when it clashes with a phenomenon or social conditions.

The improvement of the students' critical thinking skills are also due to the improvement of students' collaboration. In the cycle II the students' collaboration attitudes percentage up to 85.42%. This achievement is 7.9% greater than cycle I. The students' learning collaboration improvement will enhance the students' thinking activities such as discussion, debate, ask questions, express opinions, to give the idea of problem solving, analyse the data from the experiment, interaction and reflection. The thinking activities undertaken during the collaboration is one of the factors causing the PBL model with JAS approach effectively improve the students' critical thinking skills. The study also strengthens a research conducted by Sastrawati, et al., (2011: 12) states that PBL can improve students' critical thinking

and communication.

The improvement of the critical thinking skills are higher in the cycle II because the students are given the completeness and ease of access the information needed for the learning process. This can increase the students' curiosity. Curiosity is the main cause of the Thinking skills development. This is according to the research conducted by Walker. et al., (2011) that the completeness of the information technology which is supported by the ability of teachers to make a good learning process will improve the effectiveness of the learning process and developing the students' thinking skills.

PBL learning with JAS approach can improve the critical thinking skills as the learning process takes place in heterogeneous small groups. Learning process in small groups will lead to exchange of ideas, provide opportunities for students to engage in discussions, are responsible for their own learning process that will make students become critical thinkers. Learning in groups is expected for developing more in the critical thinking skills if only the strategy is appropriate to place students with different abilities in one group. Thus, it will create interdependence between the members of the group to achieve a common goal. Based on the observations during the cycle II of the learning takes place, the students are divided into diverging small groups may encourage the development of the students' critical thinking skills.

The students' creativity data in this study was obtained from the value of the products carried on every activities of face to face class in the cycle I and II. The creativity average value of VIIC students in the cycle I and the cycle II obtained are presented in Table 2.

The analysis results showed the average creativity of VIIC students in the cycle II tends to be higher than the cycle I. The analysis results summary of the students' creativity level in grade SMP 2 VIIC Kudus year 2013/2014 in the cycle I and the cycle II shown in Figure 2.

Based on Figure 2, it indicated that the students creativity level of VII C class on the cycle II tends to be higher than the cycle I. In the cycle I, the students who achieve the creative criteria and very creative as much as 90%, and there are still 10% of students are less creative. In the cycle I, the average score of the students' creativity in a good category of 78. The students' creativity level who achieve a minimum of creative categories 90%. This shows that the learning by PBL model with JAS approach has been able to enhance students' creativity.

The increased of students' creativity during the learning cycle I caused the students to work collaboratively designing an inquiry or a product to solve a problem. This kind of activities can trigger the emergence of ideas and increase the creativity of the students. It makes them to be more flexible and higher originality. Mackinnon (2005) suggests that creative people have a good

Table 2. The Recapitulation Results of Students' Creativity Assessment

| Data | Creativity Score | |
|---------------|------------------|----------|
| | Cycle I | Cycle II |
| Highest Score | 94 | 93.5 |
| Lowest Score | 61 | 64 |
| Average | 78 | 81.23 |

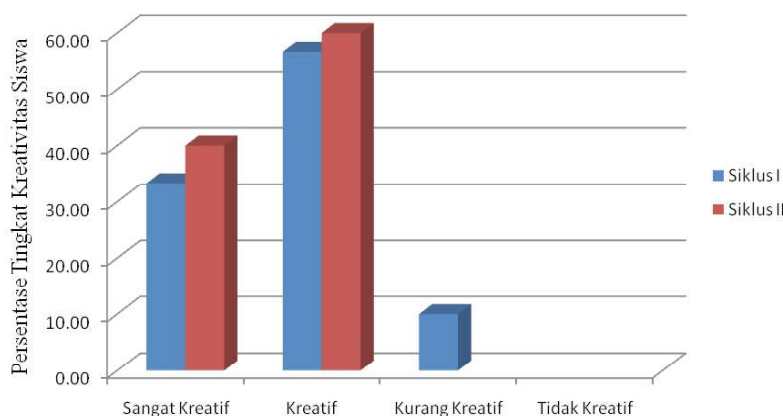


Figure 2. Students Creativity level percentage

level of cognition that is flexible enough, the curiosity is high and they can communicate easily.

PBL learning model with JAS approach can enhance the creativity because it begins with the exploration of the surrounding environment to identify problems and to find alternative solutions. Creativity requires the materials for making knowledge, concept or product that is different from the previous (Torrance, 1995). The exploration activity is a very encouraging a person creative activity development, because by exploring, the students can obtain the materials to find new ideas or generate new products.

The creativity of the students will also increase if the students learn in small groups (Foster and Penick, 2006). PBL model learning with JAS approach in the small groups experimental class makes the students' creativity can be increased. In the students' small groups, the students actively seek the learning resources, provide ideas, discuss, and learn from colleagues and integrating various knowledges.

Students' creativity can arise when it is supported by a responsive environment (Torrance, 2005). PBL model with JAS approach provide learning situations that support the development of the creativity, by giving problems in their learning process. According to research by Tan et al. (2009) issue provides an opportunity for innovation by acting as a creative thinker catalyst. Problems can raise the students' curiosity, conduct investigations, and thought to finding a solution. According to Reid and Petoctz (2004) through the students' creativity can be developed by problem-solving activities. In this study, the teachers are actively facilitate and guide the students in their search for finding the knowledge needed to solve the problem, so it makes the students' level of creativity becomes better. This is consistent with the

research results from Gomez (2007) that the training and mentoring for the teachers can enhance the creativity of the students. Thus, learning with PBL model with JAS approach which is executed excellently to enhance students' creativity.

In the cycle II of all students, including in the creative category and highly creative. The mean score of the students' creativity including in the excellent category which is equal to 81.23. The student's creativity level who who at least achieve 100% creative category. This shows that the learning using PBL model with JAS approach has been able to enhance students' creativity.

The increased creativity are higher in the cycle II due to the students' collaboration level are increases, so in designing a more flexible and original investigation. Mackinnon (2005) suggests that creative people have a flexible cognition, high curiosity and can communicate easily. The students' works in the form of the creation of rubbish displayed and presented to the class. Some groups that make video creation process of his work such as making a pencil case from the former pack clothing fragrances, a flashlight from the underarm deodorant and a bag of coffee wrapper. At the presentation, the students must provide an explanation of how to make the product, how to operate and use it. Other groups were given an opportunity to assess the product and give feedback for the effectiveness of the product. This activity will trigger the improvement of the creative ability to produce new products.

PBL learning model with JAS approach can enhance the creativity because it begins with the exploration of the surrounding environment to identify the problems and find alternative solutions. Creativity requires the materials for making knowledge, concept or product that is different from the previous products (Torrance, 1995). The

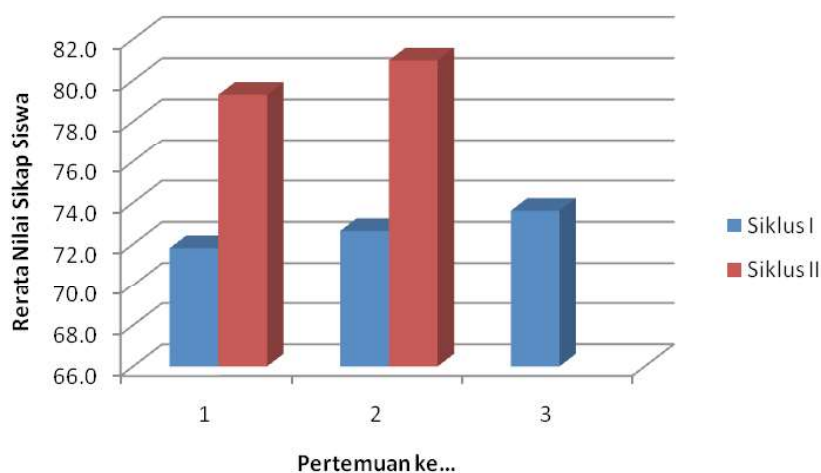


Figure 3. The Student's Average of Scientific Attitude

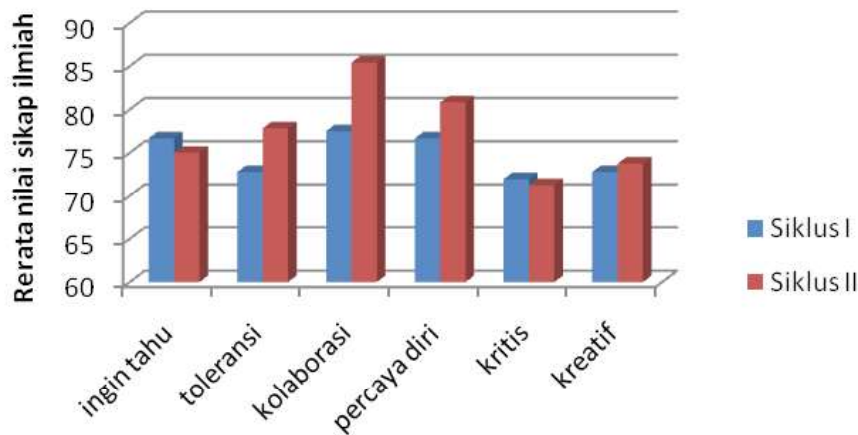


Figure 4. The Average Aspects of The Scientific Attitude Students

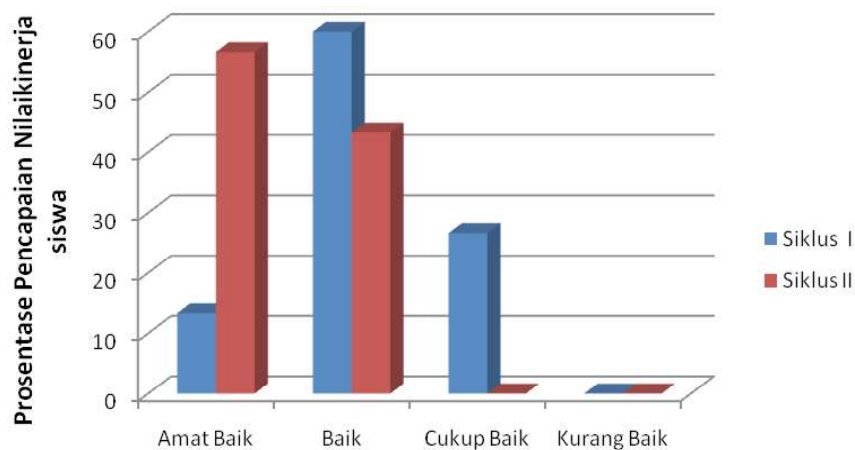


Figure 5. The Recapitulation of Students' Performance Levels

exploration activity is a very encouraging development of a person creative activity, because the students can obtain the materials to find new ideas or generate new products. Exploration makes students feel learning is fun. This pleasure will help them gain new ideas.

The assessment of scientific attitude in the study was obtained using observation scientific attitude assessment sheets in the learning process. The assessment is done by peers. The average of the scientific attitude results of class VII C in the cycle I and the cycle II shown in Figure 3. The students' scientific attitude during the cycle I to the cycle II tends to increase.

The scientific attitude assessed including curiosity, tolerance, collaboration, self-confidence, critical and creative. The mean assessment of the scientific attitude shown in the Figure 4. The most prominent scientific attitude in the cycle I is curiosity and the lowest is critical stance.

In the cycle II the most prominent attitude are collaboration and confident. The average of

the scientific attitude is higher than the cycle I, among others, tolerance, collaboration, confident and creative. Scientific attitude in the cycle I and the cycle II as a whole in both categories that have a score range of 62.5 - 81.5. This shows that the success indicators of this research have been reached.

The assessment of the students' performance in the study was obtained using the observation performance assessment sheet when the students conduct the experiments in the cycle I and the cycle II. The analysis showed the average score of students' performance in the cycle II VIIC class tend to be higher than the average score of cycle I. The improvement of the students' performance on the cycle II of 12.92 compared to the cycle I. The score results are then grouped into four levels. The analysis result of the students' performance level in grade 2 SMP VIIC Kudus year 2013/2014 in the cycle I and the cycle II shown in Figure 5.

Figure 4.6. indicated that the students performance level of class VII C on the cycle II tends to be higher than the cycle I. In the first cycle, the students who have a very good value and a good performance as much as 73.33%, and 26.67% other students have enough performance value. The achievement of the performance value has not met the success indicators of research. Therefore, in the cycle II undertaken several improvements by providing student worksheets that has been facilitated, and the exploration activities conducted directly into the environment around students and indirectly through the Internet. In the cycle II the entire students value better at the student performance and all students achieve at least good performance value. Students who achieve very good performance criteria as much as 56.67% and 43.33% as good criteria. This shows that the PBL model with JAS approach can enhance the critical skills and creativity of the students.

CONCLUSION

From the research results and discussion concluded that: (1) learning using PBL model with JAS approach can improve the students' critical thinking skills class VIIC Kudus SMP 2 year 2013/2014 amounted to 74.35% (2) learning using the PBL model with JAS approach can boost the students' creativity of VIIC SMP 2 lessons Kudus 2013/2014 amounted to 66.96%. The implications of this research, which are recommended (1) in implementing PBL learning with JAS approach for junior high school students, in student worksheet needs to be given questions that engage students in learning activities, (2) if the learning objective is skills oriented, improve thinking skills and creativity of the students, it is possible to apply PBL model with JAS approach.

REFERENCES

- Awang, H., & I. Ramly. (2008). Creative thinking approach through problem based learning: pedagogy and practise in the engineering classroom. *International Journal of Social Sciences*. 3(1), 18-2.
- Barrows, H. S. (2000). *Problem-based learning applied to medical education*. Springfield IL: Southern Illinois University Press.
- Chin, C., & L. Chia. (2005). Problem-based learning: using ill-structured problems in biology project work. *Science Education*. 90(1), 44-67.
- Fachrurazi. (2011). Penerapan pembelajaran berbasis masalah untuk meningkatkan kemampuan berpikir kritis dan komunikasi matematis siswa sekolah dasar. *Jurnal Penelitian Pendidikan Edisi Khusus* (1), 76-88.
- Foster, G.W., & J.E. Penick. (2006). Creativity in cooperative group setting. *Journal of Research in Science Teaching* 22 (1): 89-98.
- Gomez. J.G. (2007). What do we know about creativity. *The Journal of Effective Teaching*, 7(1), 31-43.
- Harlim. J., & I. Belski. (2010). Young engineers and good problem solving: The impact of learning problem solving explicitly. *Proceedings of the 2010 AaeE Conference*. Sydney, Australia.
- Hmelo-Silver. C.E. (2004). Problem-based learning: what and how do students learn. *Educational Psychology Review*, 16(3): 235-266.
- Ismartoyo., & A. Indriasih. (2013). Penerapan pendekatan jelajah alam sekitar pada perkembangan tumbuhan di sekolah dasar. *Humanika*, 17(1): 254-266.
- Liliasari. 2001. *Model pembelajaran ipa untuk meningkatkan keterampilan berpikir tingkat tinggi calon guru sebagai kecenderungan baru pada era globalisasi*. Retrieved from <http://jurnal.upi.edu/jpmipa/view/2098>.
- MacKinnon, D. W. (2005). *IPAR's contributions to the conceptualization and study of creativity. perspectives in creativity*. Taylor, I. A. & Getzels, J. W. (Eds.). Chicago, IL: Aldine Publishing Company.
- Masek, A., & S. Yamin. (2012). The impact of instructional methods on critical thinking: a comparison of problem-based learning and conventional approach in engineering education. Research Article. *International Scholarly Research Notices*. 2012, 1-6.
- Mulyani, S., A. Marianti, N.E. Kartijono, T. Widi-anti, S. Saptono, K.K. Pukan., & S.H. Bintari. (2008). *Jelajah Alam Sekitar (JAS) pendekatan pembelajaran biologi*. Semarang: Jurusan Biologi FPMIPA UNNES.
- Nur, M. (2011). *Pembelajaran berdasarkan masalah*. Surabaya: PSMS Unesa.
- Reid, A., & P. Petocz. (2004). Learning domains and the process of creativity. *The Australian Educational Researcher*. 31(2), 45-62.
- Pithers, R., & R. Soden. (2000). Critical thinking in education: A review, *Educational Research*, 42(3), 237-249.
- Sastrawati. E, M. Rusdi, & Syamsurizal. (2011). Problem based learning, strategi metakognisi dan berpikir tingkat tinggi siswa, *Tekno-Pedagogi*, 1(2), 1-14.
- Savery, J.R. (2006). Overview of problem-based learning: definition and distinction. *The Interdisciplinary Journal of Problem-based Learning*, 1(1), 9-20.
- Shipton, B. (2011). Expanding Police Educators' Understanding Of Teaching, are They as Learner-Centered as They Think? *Journal Of Learning Design*. 4(2), 1-19.
- Sukandar. (2013). Pengembangan perangkat pembelajaran berbasis masalah materi suhu dan kalor untuk meningkatkan kemampuan berpikir kritis dan kreatif siswa SMA. *Tesis*. Prodi Pendidikan IPA. Program Pascasarjana Unnes.
- Tan, O.S., Teo, C.T. dan Chye, S. (2009). Problem

- and creativity. In Tan, O.S. (Ed), *Problem-Based Learning and Creativity*. Singapore: Cengage Learning Asia Pte Ltd. Page 1-13.
- Torrance, P. E. (1995). *Why Fly? A philosophy of creativity*. USA: Ablex Publishing Co.
- Torrance, P. E. (2005). *Different ways of learning for different kinds of children*. Mental health and achievement. Torrance, E. P. & Strom, R. D. (Eds.). New York, NY: John Wiley and Sons.
- Walker, A., M. Recker, M. Robertshaw, J. Osen, H. Leary, L.Ye., & L. Sellers. (2011). Integrating technology and problem-based learning: a mixed methods study of two teacher professional development designs. *Interdisciplinary Journal of Problem-based Learning*. 5(2), 70-94.
- Yuniastuti. (2013). Upaya meningkatkan ketrampilan proses dan hasil belajar biologi dengan pendekatan pembelajaran jelajah alam sekitar pada siswa kelas vii smp kartika v-1 balikpapan. *Jurnal Socioscientia*. 5(1), 31-38.