

Effectiveness of The Practical Handbook Based on Problem Based Learning

Susanti, Diana

Lecturer, Department of Biology Education, STKIP PGRI West Sumatra, Indonesia

Sari, Liza Yulia

Lecturer, Department of Biology Education, STKIP PGRI West Sumatra, Indonesia

Fitriani, Vivi

Lecturer, Department of Biology Education, STKIP PGRI West Sumatra, Indonesia

Riandi

Lecturer, Department of Biology Education, University Education of Indonesia, Indonesia

Supriatno, Bambang

Lecturer, Department of Biology Education, University Education of Indonesia, Indonesia



Abstract - The purpose of this study was to reveal the effectiveness of Practical guided book based on the introduction and laboratory techniques subject for students of biology education STKIP PGRI West Sumatra. This research is the development of 4-D development model which consists of four phases (define, design, develop and dissemination) but this research just done in develop stage in effectiveness. The subjects of this research were 64 students from 2017 A and B section. The data were analyzed using descriptive qualitative and quantitative analysis. The results of this study indicate that the practical hand book based on problem-based learning students of biology education STKIP PGRI West Sumatra is effectiveness because it can increase the activities, and learning outcome.

Keywords - Effectiveness, Practical handbook, Problem based learning

I. INTRODUCTION

Learning can not only be formed in teaching and learning activities in the classroom but also through practicum activities (Amri and Ahmadi, 2010). Practical or observational activities that done in the laboratory, or field practice activities in the environment can make students able to observe the object directly and also can increase the activity and creativity of learning (Nasution, 2010). After students learn a concept, they can prove the truth of the concept by practicing (Sudrajad, 2009).

One of the subject that have practical is introduction and laboratory techniques. Practical activities are accompanied

by guidebooks that are designed by the team of lecturers of the subject. The design of the practicum guide is suitable to the material that has been taught during class lecture meetings. Practical guides that have been designed by the introductory and laboratory techniques team oriented problem-based learning approach. PBL encourages students to learn and solve problems by developing the ability to analyze and manage information based on their own experiences or new experiences that faced the students themselves (Sugiyono, 2015). In another sense, the problem-based learning model is done with the provision of stimuli in the form of problems that are then solved problems by

students who can add the skills of students in the achievement of learning materials (Suprijono, 2014). Arends (2013) said that the essence of PBL is to present a variety of authentic and meaningful problem situations to students, which can serve as a springboard for investigation and investigation. This means that problem-based learning taught the students to start learning activities with a problem that must be solved, resulting in new knowledge.

Problem-based learning is an approach of learning that used real-world problems as a context for students to think critically and problem-solving skills, and to acquire deep knowledge and concepts of subject matter. According to Hakkarainen (2011), the learning process with designed well by problem-based learning model will make the learning process more meaningful for the students. Learning process with problem-based learning model also improves students ability in analyzing and solving problems as revealed by Ge, et al., (2011) learning with problem-based learning model can increase the concentration of students who have difficulty in developing value and strong knowledge base. Aspects of student concentration include: (1) disclosing reasons; (2) apply knowledge in solving complex problems; (3) transferring knowledge in new situations.

Tawfik, et al., (2014) said that the best learning of the students when the learning takes place contextually and focuses on the issues that occur around and relevant to the field being studied. The learning process undertaken by students is responsible for what they learn (self-learning) as they investigate a problem that allows them to have many solutions. The process of learning a concept, students learn to be able to have the ability to solve the problem so it can be communicated to the others. The problem-based learning model specifically requires the following elements: (1) student-centered learning; (2) presentation of problems as a learning process; (3) independent learning; (4) collaborative learning in groups; (5) group discussions focusing on problem-solving; (6) the facilitator.

The results of Kelly and Flaysion (2007 and 2009) studies on the development of PBL-based chemicals module modules suggest that PBL-based practice activities are more effective. This is evidenced by better student learning outcomes than traditional practice. Students consider practicum with PBL module more fun and not boring. Learning with the PBL module is done for one semester and the learning is successful because students choose to continue the learning system using the developed PBL module. Learning in the laboratory using the PBL module has been successful in improving students' learning

motivation, students' self-learning abilities, discussion skills and group work and problem-solving skills.

The results of research conducted by Surif (2013) on the implementation of PBL in secondary education ie students become more skilled in solving problems given by teachers, student discussion skills increased, students skilled in self-study. In addition, the implementation of PBL in secondary education also improves students' soft skills, student motivation, student communication skills, cooperative skills and independent learning ability. Research conducted by Atan, et al., (2005) compares the effectiveness of PBL with content-based learning (CBL). The results showed better student performance in PBL than CBL. In addition, PBL is applied more able to increase students' knowledge. Other research conducted by Huang and Wang (2012) with the title of PBL application in language translation course lectures stated that PBL improves student's learning motivation significantly and improve students ability in translating the language.

Based on the explanations as mentioned before, it is necessary and important to conduct a research- related with the development of subject-specific pedagogy (SSP) of natural sciences based problem based learning model to improve students' scientific literacy and learning outcomes on theme environment.

II. THE RESEARCH METHOD

A. Type of the Research

The type of research is development research (Research and Development) which consists of 4 stages are define, design, develop and disseminate. This researched is develop stage (effectiveness).

B. The Subject of the Research

The subjects of this research were 64 students from class 2017 A and 2017 B

C. Development Procedure

The phase that done in this researched is develop. Develop phase showed the effectiveness of a practical guided book in motivation, activity, and result of learning.

D. Data Analysis Techniques

Data obtained from the effectiveness test will be analyzed by descriptive analysis.

1. Observation Analysis Student Learning Activity

Analysis of observation results from a lecture who aims to see student activity in the learning process. Data on

student learning activities on learning activities analyzed by using percentage (%) proposed by Sudjana (2005)

$$\text{Percentage} = \frac{F}{N} \times 100$$

P = Percentage

F = Frequency of active students

N = Total number of students

Table 1. Criteria Activity Effectiveness of Student

Criteria	Activity level	Range (%)
Very Low	Very not effective	0-20
Low	Not effective	21-40
Midle	Effective less	41-60
High	effective	61-80
Very High	Very Effective	81-100

Source: Riduwan (2010)

2. Analysis of Learning Outcomes

Student learning outcomes will be compared with the existing value STKIP PGRI SUMBAR. Range values as follows

A=100-81

B=80-66

C=65-56

D=56-46

E= $\leq$ 45

III. RESULT AND DISCUSSION

A. Student activity in conducting practicum activity

Assessment of student activity is done by observation sheet by two observer. Student activity is assessed seven times practicum activity which tested try, practicum activity can be seen in Table 2.

Table 2. Student Activity Value in Conducting Practicum Activities

No	Observer	Student Activity Observation Score								Average Score (%)	Category
		asp 1	asp 2	asp 3	asp 4	asp 5	asp 6	asp 7	asp 8		
1.	Observer 1	91	88	91	91	91	91	91	90	91	Very effective
2.	Observer 2	92	91	91	91	95	94	94	94	92	Very effective
Average		92	90	91	91	93	93	93	92	92	Very effective

The result of student activity in doing practicum activity is with very effective category. This means that generally students have been active in doing activities when practicum done using practical handbook based on problem based learning. Sagala (2017) stated that the students will always be passionate and eager to follow the learning process and do all the tasks that are given during the activity in practice learning. The practicum succeeds in creating a conducive atmosphere so that the whole student is active in learning. So students will increase their activity if held practicum in the learning seen from the observer observation at the time of lab. Previous research has also proved that learning that places activity as primary, provides more opportunities for direct contact with various learning objects, can establish good relationships and can improve high-level thinking skills and encourage the use of critical analytical and active participation (Sezgin, 2013).

B. Learning Outcome

Learning outcomes were obtained from the tests given in the form of an objective test. This test was given at the last meeting after all practicum activities were conducted, after the students finished doing the seven activities of the experiments that were tested. Learning results obtained can be seen in Table 3.

Table 3. Learning Outcome of Students in STKIP PGRI West Sumatra

Class	Learning Outcome	Practical value
2017 A	69,66	85,14
2017 B	64,07	85,18
Rata-rata	66,87	85,16

The Learning outcome of student activity in doing practicum activity is high. This means that generally students have been active in doing activities when practicum done using problem based learning. The usage of a Problem Based Learning based practical hand book can improve learning outcomes rather than practicum without using a practical handbook (Prasetyo, 2011). The student practicum value is also high. Students' science process skills will be better if the students participate directly in the experiment and will be skilled if they get guidance from the practical hand book on each experiment (Wenning, 2006). High learning outcomes can also be influenced by the high motivation of students in conducting practicum activities, such as those in the test results of student motivation questionnaires, because the motivation in learning is a condition that encourages students to do learning to improve the quality of learning (Turan, 2011).

IV. CONCLUSIONS AND SUGGESTIONS

Based on the result of the research, it can be concluded that *the practical hand book based on problem-based learning students of biology education STKIP PGRI West Sumatra is effectiveness because can increase the activities, and learning outcome.*

Based on the result of the research, it is necessary for lectures to Practical hand book based on problem based learning model to improve activity and learning outcomes in practise learning.

REFERENCE

- [1] Amri dan Ahmadi. (2010). *Proses Pembelajaran Inovatif dan Kreatif dalam kelas*. Jakarta: PT. Prestasi Pustakaraya.
- [2] Arends, Richard I. 2013. *Belajar Untuk Mengajar, Learning to Teach*. Jakarta: Salemba Humanika.
- [3] Atan, H., Sulaiman, F. & Idrus, R.M.. (2005). The Effectiveness of Problem Based Learning in the Web Based Learning Environment for the Delivery of an Undergraduate Physics Course. *International Education Journal* 6 (4) : 430-437.
- [4] Ge, X., Planas, L.G. & Er, N. 2011. A Cognitive Support System to Scaffold Student' Problem Based Learning in a Web based Learning Environment. *Interdisciplinary Journal of Problem Based Learning* 4 (1) : 30-56.
- [5] Hakkarainen, P. 2011. Promoting Meaningful Learning through Video Producing-Supporting PBL. *Interdisciplinary Journal of Problem Based Learning* 5 (1) : 33-53.
- [6] Huang, K & Wang, T. 2012. Applying Problem Based Learning (PBL) in University English Translation Classes. *The Journal of International Management Studies* 7 (1) : 121-127.
- [7] Kelly, O & Finlayson, O. 2007. Providing Solution Through Problem Based Learning for the Undergraduate 1st Year Chemistry Laboratory. *Chemistry Education Research and Practice* 8 (3) : 347-61.
- [8] Nasution. 2010. *Berbagai Pendekatan Dalam Proses Belajar & mengajar*. Jakarta: Bumi Aksara
- [9] Prasetyo, Z, K. 2011. *Pengembangan Perangkat Pembelajaran Sains Terpadu Untuk Meningkatkan Kognitif, Keterampilan Proses, Kreativitas Serta Menerapkan Konsep Ilmiah Peserta Didik SMP*. Laporan Penelitian Nomor: 1805/UN34.17/LK/2011. Program Pascasarjana Universitas Negeri Yogyakarta Yogyakarta (Online). Diakses Tanggal 13 Juli 2018.
- [10] Riduwan, 2010. *Belajar Mudah Penelitian*. Bandung: Alfabeta
- [11] Sagala, N. L., Rahmatsyah, Mariati, P. S. 2017. The Influence Of Problem Based Learning Model On Scientific Process Skill and Problem Solving Ability Of Student. *IOSR-JRME*. 7(4)
- [12] Sezgin, G.S., Caliskan, S. & Sahin, M. 2013. A Comparison of Achievement in Problem-Based, Strategic and Traditional Learning Classes in Physics. *International Journal on New Trends in Education and Their Implications*. 4(1) : 154-164.
- [13] Sudrajat, H. 2009. *Pengembangan Perangkat Percobaan Konsep Rotasi untuk Pembelajaran Fisika Di SMA dan Universitas*. Tesis. Program Pascasarjana UNP.
- [14] Sugiyono. 2012. *Statistik untuk Penelitian*. Bandung: Alfabeta.
- [15] Suprijono, A. 2015. *Cooperative Learning*. Surabaya: Pustaka Belajar.
- [16] Surif, J. 2013. Implementation of Problem Based Learning in Higher Education Institutions and Its Impact on Students' Learning. *The 4th International Research Symposium on Problem Based Learning* : 66- 73.
- [17] Tawfik, A., Trueman, R. J. & Lorz, M.M. 2014. Engaging Non-Scientists in STEM through Problem-Based Learning and Service Learning. *Interdisciplinary Journal of Problem Based Learning* 8(2) : 74-84.
- [18] Turan, S. dan Ozcan, D. 2011. Hacettepe University Medical School Students' View On attitudes Towards Problem Based Learning. *Egitim Ve Bilim*. 36(162)
- [19] Wenning Carl J. And Wenning Rebeca E. 2006. A generic model for inquiry oriented labs in postsecondary introductory physics. *J Phys. Teach Edu.* (Online). 3 (3): 24-33.