INFLUENCE OF PBL SETS TO INCREASE STUDENT LEARNING OUTCOME AND ACTIVITIES IN CLASS VIII ON LIQUID PRESSURE MATERIAL AT SMP NEGERI 35 MEDAN

Siti Aisyah[1], Nora Susanti[2], and Sri Mulyani[3]
[1]Department of Science Education Universitas Negeri Medan, Indonesia
[2]Department of Chemistry Universitas Negeri Medan, Indonesia
[3]Science Education Teacher, 35th Junior High School Medan, Indonesia

sitiaisyahhapsari72@gmail.com

Abstract

This research aims to determine the influence of the application of PBL SETS learning model on the learning outcomes of class VIII SMP Negeri 35 Medan and to determine the influence of the application of the PBL SETS learning model on the student learning activities of class VIII students of 35th junior high school Medan. The Research type used was quasi-experimental type. The sample of this study was 60 students of class VIII 35th junior high school Medan. The experimental class was class $VIII_5$ and control class was $VIII_6$. The instrument of research used was in the form of 10 items of essay questions and student activity observation sheets. The design of research used is the Nonequivalent Control Group design. The Research data collection techniques used were test and observation. The results of this study indicated a significant influence on learning outcomes of student. The average of student learning outcome in experimental class was greater than in the control class, namely the experimental class value was 73.83 and the control class value was 44.9. The results of the t-test independent samples test showed that the two-tailed significance <0.005. The results of data analysis showed the implementation of the PBL SETS learning model and approach can increase student learning outcomes in class VIII of SMP Negeri 35 Medan on the subject of Pressure in Liquids and the application of the PBL SETS learning model can improve the learning activities of class VIII students of 35th junior high school Medan on the material Pressure on Liquids.

Keywords: Problem Based Learning, SETS, Learning Outcomes, Student Activities, Liquid Pressure

Introduction

Education is a process of changing behavior and attitude of an individual or group of people after going by a certain training and teaching system so that they can change their way of thinking and behavior in accordance with the current educational model (Suardi et al., 2017).

Based on PISA (Program for International Student Assesment) Indonesia is ranked 74th in the math, reading and science categories. Of course, a good learning model and approach must be used to increase education in Indonesia (Widowati et al., 2017)

The development of learning models and approaches is very important. The model becomes important because it is likened to a frame from the implementation of an approach, strategy, method, and learning technique. While the learning approaches in the learning process is starting point by point of view. Approach can also be interpreted as the foundation of thinking or fiolosofi in determining learning.

Based on an interview with student of the VIII grade science teachers at SMPN 35 Medan, the science teacher has not used the learning model but only uses the lecture method. Meanwhile, according to research by Hartley and Davis, in the first 10 minutes of delivering material with lectures, students are only able to absorb 70% of the material presented. Furthermore, the level of student attention has decreased. In the last 10 minutes they only absorbed 20% of the material presented (Helmiati, 2019). In addition, teachers still use the teacher centered learning approach in teaching, where all aspects such as organization, material and time are controlled by the teacher

The results of interviews by the VIII grade science teacher at SMP Negeri 35 Medan showed that student learning activities were still low which included activities of visual, activities of oral, activities of listening, activities metric of, activities of mental, and activities of emotional. Students do activities not on their own initiative, but must be ordered by the teacher. This is contrary to the 2013 Curriculum which emphasizes the affective aspect, namely changes in student behavior or activities. And the competencies to be achieved are competencies that are balanced between attitudes, skills, and knowledge, as well as a holistic and fun way of learning (Bantul & Dahlan, 2013)

Science learning is learning that studies the interaction between an individuals and their life environment, include of natural environment and society, and also its application in technology. In essence, science has four important elements, consist of (1) attitude: curiosity about an objects, natural phenomen, living object and causal relationships that lead to problem solving, (Ekapti, 2016).

SETS approach is an approach that does not only focu(2) process: scientific methods is procedures problem solving, (3) products: in the form of facts, principles, theories and laws, (4) application: implementation of science concepts and scientific methods in human everyday life s on material concepts but must link science with elements consisting of technology, environment, and society. SETS can also be explained as teaching and learning about science and technology in the context of human life experience (Wasiati, 2017). The SETS approach has several objectives. According to Binandja (1999), the SETS approach aims to help students know science, its development, environmental influences, technology and society reciprocally.

The results of previous research explained by (Agustin et al., 2019) show that student learning outcomes using the PBL model can increase students' learning outcomes, where the average score of students' learning outcomes in the experimental class is 80.00 while the average value of learning outcomes in the control class is 69.3. PBL makes the learning atmosphere more active and students think more critically so as to foster the learning spirit in the material Of National Commitment Class VIII Islamic Junior High School Karang Ploso.

Research by Fridani et al, (2020) says that learning using PBL model can improve student learning outcomes at SD Prumnas Mandala Medan where the average of experimental class learning outcome of

83.85, while for class of conventional is around 73.81.

In addition, research conducted by (Susanti, 2020) shows the influence of the SETS approaches on student learning outcome. It can be concluded that there is a progress in four of the six indicators that improve in the experimental class compared to the control class. Students can associate Hydrostatic Pressure material with SETS, the rest are judged to have creative and innovative thinking power. In research conducted by (Rasyid, 2018) regarding the development of SETS-approach learning media can improve activities of student learning.

Research Method

This study was a quasi-experimental study involving two classes with different treatment, namely class of experimental which was treated using the PBL model and the control class was treated conventionally. Class selection was done by purpose sampling. The total population consist of 11 classes. Class VIII-5 was choosen as the class of experimental and class VIII-6 was choosen as the controll class. The design of research used was the nonequivalent control group design . In this study, the collection of data technique collected was used tests and observations. And the instruments were 10 essay tests and Student activities'observation sheet.

Results and Discussion

Learning outcome development can be seen by pretest and postest in eksperimental and controll class.

Table 1. Student learning Outcomes

Description	Eksperimental Class		Control Class	
	Pretest	Postest	Pretest	Postest
Average	45.6	73.83	38.19	44.9
Standard Deviation	10.58	17.07	13.15	15.32
Variance	291.32	130.63	187.73	234.56

From table 1 was known that

experimental class Student learning outcomes increased from the pretest stage of 46.5 to 73.8. At the pretest stage, the student's score range is 35-70. At the posttest stage, the range of students' scores increased to 58-95. Leraning outcomes in controll class increased from the pretest stage of 38.19 to 44.9, but did not reach the minimum completion criteria for science learning, which is 70.

In experimental class, there was an increase in learning outcome model with a SETS approach because during the learning process the teacher explains the problem and then presents facts, cases or conditions that reflect concepts or principles to students. Students can also find information through simple experiments. The student worksheets used have also been integrated with the PBL model with the SETS approach. PBL Model consist of 5 very good syntaxes to be applied in learning, such as orienting students to case or problem, organizing students to learn, guiding an individual or group investigations, presenting works, analyzing and evaluating processes of problem solving . SETS guides students to relate science concepts to other elements such as science, environment, technology and society. There are difference of Learning with PBL and conventional models, PBL model when it is compared to conventional methods will be more effective. The effectiveness, such us students are more active in understanding and the material in groups by doing investigations and inquiries on true problems or fact in their environment, so they get more great impression about what they are learning (Cerling, et al., 2020)

Based on the results of homogenity test (the independent sample test) obtained a sig (2-tailed) value of 0.000 <0.05, it can be concluded that there is an influence or difference in the average learning outcomes of students between the Problem Based Learning (PBL) learning model and the conventional model.

Student activities was measured by observation sheet including six aspects.

Table 2. Table of Student Activities development

Meeting	Visual Activity	Listening Activity	Oral Activity	Mental Activity	Metric Activity	Emotional Activity	Mean
I	59	58	56	53	53	54	55,5
II	82	71	71	65	64	61	69
III	91	89	82	80	80	85	84,5

The development of experimental class student learning activities in each aspect can be visualized through figure 1.
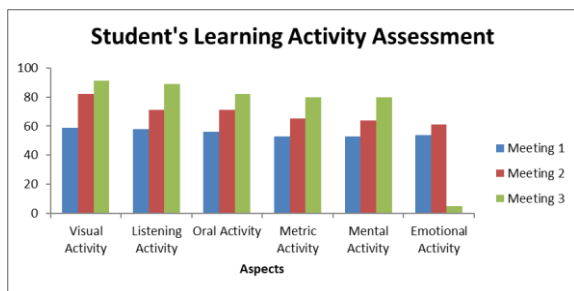

Figure 1. Student's Learning Activities Assesment diagram

Based on the data obtained, student activities during learning in each meeting have increased. Students's learning activities average value at the first meeting was 55.5, at the meeting two it increased to 69, and the third meeting increased to 84.5. The progress in learning activities is due to learning process using the PBL-based SETS (Science, Environment, Technology, and Society) approach and learning model are divided into five syntaxes, namely orienting all of students to problems, organizing all of students to learn, assisting the investigation process individually or in groups, presenting work, evaluating and analyzing the problem-solving process is presented in theory as well as a simple experiment. It is in this syntax that student activities such as visual, oral, listening, mental, metric and emotional activities are observed and improved and can help improve students' cognitive aspects.

Based on students' learning activities observation, in the classroom at the first, second, and third meetings, can be seen from the involvement of all students, enthusiasm of all students when conducting experiments and being active in discussion activities.

At the stage of student orientation to problems, the researcher motivates students by conveying learning objectives and also presenting problems, for example with illustrations or pictures related to hydrostatic pressure. Researchers observed visual activities and listened to students. In the second stages, namely instruct students to learn, the researcher divided students into several groups and distributed LKPD. At this stage the teacher observes visual activities and also listens to students. In the third stage, namely guiding individual and group investigation activities, the researcher directs students to conduct investigations on Pascal's Law based on LKPD instructions. Researchers observed the metric and emotional activities of students, namely problem-solving abilities and also the ability to control emotions when conducting experiments. At the stage of presenting the work, the researcher guides students to develop the results of the investigation and answer the questions in the LKPD and then present them. At this stage the researcher observed visual, listening, oral, mental, metric and emotional activities. Evaluating and Analyzing stages of the problem-solving process, the researcher gives the correct answer and provides reinforcement/feedback to students. The student activities assessed were visual, listening, mental and oral activities.

The results of this research are in line with the results of previous research such as those studied by Sulistyo, et al (2021) conclude that there is an influence of applying the Problem Based Learning (PBL) Model with a Science, Environment, Technology, and Social (SETS) approach to learning outcomes and student learning activities on the material. environment. N-gain for the experimental class is 0.2895 and the control class is 0.2135. The activeness of students in the experimental class increased by 87%. In addition, Wasiso and Hartono (2013) concluded that the application of the Problem Based Learning model with the SETS approach can improve the ability to solve science problems in disaster materials higher than conventional methods. Furthermore, Khairani (2019) concluded that the implementation of the PBL model with the SETS approach can improve student learning absorption and learning outcomes for Biology X MIPA 1st student of Senior

High School Seberida. Johannes et al (2019) conclude that there was an influence of PBL model on learning outcomes of students and students' KPM, there was an increased of PBL model on learning outcomes of students and students' KPM. The previous research by Asusti, et al (2019) conclude that learning science with the SETS approach must developed because application of SETS learning can increase students' learning outcome and scientific attitudes.

Conclusion

1. Student learning outcomes in class of experimental who were treated used the PBL Learning model with SETS approach on the material of Liquid Pressure has positive influence and obtained an average posttest score of of 73.8 which means the average value is above the KKM. The learning outcomes of control class students who were given conventional learning treatment on the material of Liquid Substance Pressure obtained an average post-test score of of 44.9 which means the average value is still below the KKM.

2. Student activities during lessons with the PBL model through six syntaxses have an effect on increasing student learning outcomes.

Reference

Agustin, et al. 2019. Pengaruh Model Problem Based learning terhadap Hasil Belajar PKN Siswa. Jurnal Kajian Teknologi Pendidikan. Vol 2 (2). 158-165.

Astuti, Maya et al.2019. The Effect Of Science, Environment, Technology, and Society (Sets) Approach Assisted by Visual Media on Critical Thinking Ability and Students' Scientific Attitudes In The Material of Living Creator Classification. *Indonesian Science Education Research (ISER).*

Bantul, U. A., & Dahlan, U. A. (2013). 1 , 2 , 3. 1441–1452.

Binadja, A. 1999. Hakekat dan Tujuan Pendidikan SETS dalam Konteks Kehidupan dan Pendidikan yang ada. Makalah Semiloka Pendidikan SETS RESCAM UNNES : Semarang

Cerling, et al. 2020. The Application Of Model Problem Based Learning (Pbl) Against Student Results In Senior High School 11 Samarinda. *Indonesian Science Education Research (ISER).* Vol 2 (1)

Ekapti, R. F. (2016). Respon Siswa Dan Guru Dalam Pembelajaran Ipa Terpadu Konsep Tekanan Melalui Problem Based. 3(2).

Fedriko, Napitupulu, et al. 2019. The Effect Of Problem Based Learning Model On Students Learning Results And Students' Problem Solving Skills. *Indonesian Science Education Research (ISER).*

Fridani, et al. 2020. Pengaruh Minat belajar terhadap Hasil Belajar IPA SD dengan Menggunakan Model Pembelajaran Berbasis Masalah (PBL). Jurnal Pendidikan Pembelajaran IPA Indonesia (JPPIPAI).1 (1).

Helmiati, I. 2019. Model Pembelajaran. Sleman Yogyakarta : Aswaja Pressindo.

Khairani. M., Sutisna & Suyanto, S. (2019). Studi Meta-Analisis Pengaruh Video Pembelajaran Terhadap Hasil Belajar Peserta Didik. Jurnal Biolokus, 2 (1),158-166.

Rasyid, a. 2018. Pengembangan Media Pembelajaran IPA Bervisi SETS Berbasis Edutainment pada Konsep Pencernaan. Jurnal Bio Education. Vol 3 (1).

Suardi, Moh. Pengantar Pendidikan :Teori dan Aplikasi.Jakarta Barat : PT Indeks Permata Puri Media, 2012.

Sulistyo, et al. 2016. Pengaruh Pembelajaran Problem Based Leraning (PBL) dilengkapi dengan Kompendium AL-quran terhadap Minat dan Prestasi Belajar Siswa : Pokok Bahasan Konsep Mol Kelas X Matematika dan Ilmu Alam (MIA) MAN 2 Madiun Semester Genap Tahun Pelajaran 2014/2015. Jurnal Pendidikan Kimia 1(5):96-104.

Susanti, Juli M. 2020. Pengaruh Pendekatan Science, Environment, Technology, Society pada Materi Tekanan Hidrostatis di Kelas XI SMAN 1 Unggul Darul Imarah. Skripsi. Fakultas Tarbiyah dan Keguruan UIN Ar-Raniry.

Widowati, A., Nurohman, S., & Anjarsari, P. (2017). Developing science learning material with authentic inquiry learning approach to improve problem solving and scientific attitude. Jurnal Pendidikan IPA Indonesia, 6(1), 32–40. https://doi.org/10.15294/jpii.v6i1.4851

Wasiso, S. J. 2013. Implementasi Model

Problem Based Learning Bervisi SETS untuk Meningkatkan Kemampuan Pemecahan Masalah IPA dan Kebencanaan oleh Siswa. Journal of Innovative Education. 2 (1).

Wiasti, S. 2017. Pengaruh Pendekatan SETS (Science, Environment, technology, and Society). Terhadap Kemampuan Metakognisi Ditinjau dari Self Regulation Siswa Kelas X SMAN 12 Bandar Lampung. Skripsi. Universitas Islam Negeri Raden Intan Lampung.