



Implementation of Electronic Student Worksheets with the Project-Based Learning (PjBL) model to Improve Motivation and Learning Outcomes

Tintin Kurniasih

State Junior High School 14 Banjarmasin, Indonesia

tintinkurniasihsmpl4bjm@gmail.com

Abstract

The purpose of this study was to determine the increase in motivation and learning outcomes by implementing electronic student worksheets with the Project-Based Learning (PjBL) model on the topic of physical and chemical changes in online learning in class VII-E of SMP Negeri 14 Banjarmasin. The research method used is Classroom Action Research. The research was carried out in 2 cycles: action planning, implementation, observation, and reflection. Data sources come from teachers and students through observation, tests, non-tests, and document review. The data analysis technique used is quantitative analysis. The questionnaire results on the learning motivation of class VII-E SMP Negeri 14 Banjarmasin in the I cycle was 23.33%, and the II cycle was 63.33% in the high category. Furthermore, the student learning outcomes test results for class VII-E SMP Negeri 14 Banjarmasin in the I cycle, 56.67% completed learning, and 43.33% did not complete learning. While in the II cycle, 86.67% finished studying, and 13.33% did not. Based on the results of this study, it can be concluded that the application of electronic worksheets with PjBL on the topic of physical and chemical changes in online learning in class VII-E of SMP Negeri 14 Banjarmasin in the 2020/2021 academic year can increase student motivation and learning outcomes. Therefore, the electronic student worksheets with the model (PjBL) can be chosen as an alternative to online and offline learning to increase motivation and learning outcomes.

Keywords: Electronic Student Worksheets; PjBL; Motivation; Learning Outcomes

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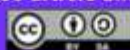
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INTRODUCTION

In a situation where time, place, and distance are the main obstacles in the learning process during the Covid-19 (global pandemic) pandemic, one way to overcome the challenges and difficulties of the face-to-face learning process is to

conduct a distance learning process (Dewi & Sadjiarto, 2021; Handayani, 2020; Kusuma & Hamidah, 2020). This Covid-19 condition challenges all elements to permanently keep classes permanently active even though schools have been closed for online learning



using platforms on applications, websites, social networks, and learning management systems. (Bao, 2020; Basilaia & Kavadze, 2020; Gunawan et al., 2020).

One of the schools that have felt the impact of the Covid-19 pandemic is SMP Negeri 14 Banjarmasin. SMP Negeri 14 Banjarmasin has carried out an online learning process since the 2019/2020 school year, starting in the odd semester. SMP Negeri 14 Banjarmasin, especially in class VII-E in science subjects, learning activities are carried out with assignments. In this learning process, the teacher gives the task of reading and summarizing the material in the student textbook and instructing students to complete the exercises and questions in the student textbook. In addition, sometimes teachers provide learning videos obtained from youtube by sharing video links on whatsapp class groups (WAG).

Based on the results of questionnaires and interviews with science subject teachers who teach in class VII SMP Negeri 14 Banjarmasin, it was stated that in the learning process, several obstacles were found, namely: 1) students' motivation to participate in learning was low, only 35%; 2) The attention and responsibility of students towards the assignments given by the teacher are very low 40%; 3) students are less enthusiastic in participating in learning 42%; 4) students have difficulty understanding science learning concepts 33%; 5) students have not been able to study independently at home without a learning companion 39%; 6) the low creativity of teachers in providing teaching materials that are suitable for use in online learning 38%; 7) student learning outcomes decreased, only 30% of the total number of students who finished studying.

The Minister of Education and Culture (Mendikbud) provides seven ways of learning from home that can be

applied, including dividing classes into small groups and trying the learning model (PjBL) because it can train collaboration, cooperation, and empathy for students (Anis & Puspitasari, 2020; Pohan, 2020).

The PjBL model can help students in group study develop their skills, and the projects they work on can provide a personal experience to students while also emphasizing student-centered learning activities (Erlinawati et al., 2019; Pasaribu & Simatupang, 2020; Rati et al., 2017).

The project-based learning process that can be implemented requires teaching material that supports learning activities. One of the teaching materials used in project-based learning is the student worksheet. However, due to the Covid-19 pandemic, which requires carrying out the distance learning process, innovation is needed in an student worksheets version electronic.

Electronic student worksheets is one of the electronic teaching materials used in online learning (Apriadi, 2020; Latifah, 2016; Suryaningsih & Nurlita, 2021). According to (Diani, 2016; Kurniawati et al., 2021; Simatupang et al., 2019), electronic student worksheets must be prepared based on the needs and conditions of students. SMP Negeri 14 Banjarmasin, in its learning, has not used teaching materials in the form of worksheets. Teaching materials used in education are only based on student textbooks. This research has a novelty that combines the electronic student worksheets with the PjBL model, so it is hoped that the learning process using the electronic student worksheets with the PjBL model can help in learning activities at home during online learning.

Based on this, it is necessary to have teaching materials that teachers can use in the online learning process. With the electronic worksheet, teachers can use electronic teaching materials to support project-based learning activities more

effectively during the online learning process. This study aims to improve students' motivation and learning outcomes on the material properties of physics and chemistry by applying PjBL-based electronic worksheets to class VII-E students of SMP Negeri 14 Banjarmasin in the 2020/2021 academic year.

METHOD

The design of this research is classroom action research. The learning improvement model used in this research uses the Kemmis and Taggart models (Paizaluddin & Ermalinda, 2012). Each cycle includes planning, action, observation, and reflection. This research was conducted in two cycles consisting of two meetings.

The subjects in this study were students of class VII-E of SMP Negeri 14 Banjarmasin, totaling 30 students consisting of 14 males and 16 females. The research was carried out for two months, starting in September-October 2020. Improved learning using electronic worksheets in which there is a PjBL model syntax consisting of 1) starting with the essential question; 2) planning project work rules; 3) making a schedule of activities; 4) monitoring the progress of project participants; 5) assessment of student work; 6) evaluation of student learning experiences. In addition, the learning process is conducted online, such as through WAG and zoom meetings.

Data collection techniques using test and non-test instruments. The test instrument consists of 20 multiple choice questions according to topic indicators' physical and chemical properties. The non-test instrument uses a Likert scale questionnaire consisting of 30 statements with choices of always, often, sometimes, rarely, and never. Data analysis in this study used qualitative and quantitative data analysis. The qualitative data analysis

refers to the analytical method of Miles and Huberman, which consists of three steps, namely 1) Data presentation, 2) data analysis, and 3) concluding. Minimum Mastery Learning used in this study is 75. This research is said to successfully improve student learning outcomes if class completeness reaches 85% of the total number of subjects (students).

RESULTS AND DISCUSSION

The following is Figure 1 of the electronic student worksheets with the PjBL.



Figure 1 Electronic student worksheets with the PjBL

Classroom action research conducted in class VII-E of SMP Negeri 14 Banjarmasin 2020/2021 on science subjects on physical and chemical properties was conducted online during the Covid-19 pandemic. The research results in the first cycle can be seen in Table 1.

Table 1 Student learning outcomes in science subjects cycle I

Category	Frequency	Percentage (%)
Complete	17	56.67
Not Complete	13	43.33

Based on Table 1 above, it was obtained that the learning outcomes of science were obtained by the mastery of student learning outcomes in cycle I with a minimum learning criteria value (KBM) of 75 as many as 17 people or about 56.67% declared complete and 11 people or about 43.33% declared incomplete. Referring to classical completeness determined by the Ministry of Education and Culture, which is 85% of students must complete learning, these findings are stated to have not reached the completeness value.

The results of this study still have several weaknesses in learning, namely, 1). Students still find it challenging to understand the science subject matter delivered; 2) students still rarely ask questions when they do not understand the subject matter presented; 3). Students are still not motivated to do independent learning at home; 4). Students find it challenging to do the tasks given through the electronic student worksheets; 5). Students are not so enthusiastic about the learning process. These findings will be used as reflection material for improvement in learning in cycle II.

After the learning process in the first cycle, a learning motivation questionnaire was given to determine students' learning motivation in applying electronic student worksheets with PJBL. The student learning motivation questionnaire results in the first cycle can be seen in Table 2.

Table 2 The results of the student learning motivation questionnaire in cycle I

Category	Frequency	Percentage (%)
Low	10	33.33
Medium	13	43.33
High	7	23.33
Total	30	100

Based on Table 2 above, it can be seen that the learning motivation of students in the first cycle is in the high category, which is 7 or 23.33%.

Therefore, it is necessary to improve the learning process in cycle II.

Learning in cycle II was improved based on learning weaknesses in cycle I. The improvements to learning in cycle II included: 1) discussions in Whatsapp groups were increased to help students who were constrained by the teaching and learning process; 2) improvement of electronic student worksheets by providing more active and creative learning activities, and 3) provide learning videos that are included in the electronic student worksheets. After improving learning, the electronic student worksheets is given essay questions to measure students' ability after working on the posters that they have made. An assessment of learning outcomes was carried out on the poster product and the essay questions to measure learning achievement. The implementation of learning in cycle II can be seen in Table 3.

Table 3 Student learning outcomes in science subjects cycle II

Category	Frequency	Percentage (%)
Complete	26	86.67
Not Complete	4	13.33

From Table 3 above, the findings of student learning outcomes in cycle II were 86.67% declared complete, and 13.33% declared incomplete. This states that the findings of learning outcomes in cycle II are classically complete. After learning in cycle II, to find out the learning motivation of students in implementing electronic student worksheets with PJBL, a learning motivation questionnaire was given in cycle II. The student learning motivation questionnaire results can be seen in Table 4.

Based on Table 4 above, it can be obtained that the learning motivation of students in cycle II is in the low category of 16.67%, the medium category is 20%, and the high category is 63.33%. Therefore, from the three

categories of student learning motivation, it can be seen that students have the highest learning motivation in the high category, namely 63.33%.

Table 4 The results of the students' learning motivation questionnaire in cycle II

Category	Frequency	Percentage (%)
Low	5	16.67
Medium	6	20.00
High	19	63.33
Total	30	100

After improving learning in cycle I and cycle II, the results of reflection in cycle I are then implemented in cycle II. The comparison of the learning outcomes of class VII-E SMP Negeri 14 Banjarmasin students who were carried out in online learning during the Covid-19 pandemic can be seen in the figure 2.



Figure 2 Comparison of learning outcomes

Figure 2 above shows an increase in student learning outcomes in cycle I and cycle II. In the first cycle, 56.67% of students finished studying, and in the second cycle were 86.67%. However, constraints were encountered in the first cycle. Namely, students are still challenged to understand the subject matter. Therefore, efforts need to be made to learn that students more easily understand. The next obstacle found in the first meeting in cycle I was the lack of motivation to learn. This can be seen from the few students who want to join in the zoom meeting and the less active students when learning.

The next obstacle encountered was the low awareness of students to do the

tasks given. This can be seen when working on assignments given to students. Only 12% of students want to send their assignments according to the given time, which is two days after the meeting. The rest of the students must be reminded and asked to do the given task. The last obstacle is that the electronic student worksheets that has been prepared has not yet involved students' activeness in learning activities. Therefore, it is necessary to make improvements and revisions to the electronic student worksheets, allowing students to be active in learning.

After making efforts to improve the reflection on learning activities in cycle I, the results of student learning completeness obtained are as many as 86.67% declared complete learning. The learning outcomes in cycle II were declared classically complete. In cycle II the improvement efforts that have been made in learning are, 1) improving the appearance and learning activities in the electronic student worksheets which can give the spirit of learning by including a video link from youtube; 2) in the learning process, researchers always provide opportunities for students to ask and answer questions given by researchers; 3) researchers are more active in inviting students to discuss in WAG related to subject matter and assignments that they have not understood; 4) researchers provide notes to students via WAG to report whether they have sent assignments or not.

Learning carried out in cycle I and cycled II through the application of electronic student worksheets with PjBL on physical and chemical properties make students motivated to be active in learning. PjBL-can encourage students to be active and creative in learning. In the electronic student worksheets used in cycle II, students become creative and innovative in working on the given project. The results of improving students' learning motivation in cycle I

and cycle II can be seen in the figure 3.



Figure 3 Comparison of students' learning motivation

Based on Figure 3 above, there are differences in students' learning motivation after improving learning in cycles I and II. This increase in learning motivation can be seen from improved learning results. Where before researching cycle I, students have low learning motivation. Then improvements were made to learning in the first cycle by applying electronic student worksheets with PjBL on physical and chemical properties. This is because the learning process is less interactive and students are still not yet motivated to carry out learning in terms of student readiness. In science learning, interactive learning needs to be carried out so that learning is more meaningful (Chang et al., 2016; A. Purnama & Suparman, 2020; G. . Purnama & Suparman, 2019).

Furthermore, improvements were made to the learning process in cycle II. After learning in cycle I, several weaknesses was found in learning. The weakness in cycle I was corrected in cycle II, and electronic student worksheets innovation was carried out by providing a youtube video link in the electronic student worksheets used in learning (Lailiah et al., 2021; Raysha et al., 2020; Wati et al., 2021).

After learning in cycle II, students have a high learning motivation of 63.33%. This can be seen from students' learning outcomes, wherein learning, students must make a product in a

poster. Students can hone their creativity by working on posters, starting from delivering exciting content and poster designs. Therefore, students become more motivated to do the tasks given by researchers. In addition, students become more aware of the material presented because the material being studied is closely related to students' daily lives. In answering the question of evaluating learning activities in the electronic student worksheets, students can answer questions well.

The results of implementing electronic student worksheets with PjBL on the topic of physical and chemical properties can provide new experiential knowledge to students, namely, 1) Students can develop their creativity in making posters; 2) The interaction of students with researchers becomes more active in discussing the subject matter or assignments given to students, where the researcher serves as a teacher who brings the subject matter.

Thus, the improvement of learning carried out in Class VII-E of SMP Negeri 14 Banjarmasin by applying electronic student worksheets with PjBL on the topic of physical and chemical properties as much as two cycles can increase student's motivation and learning outcomes.

CONCLUSION

Based on the test of learning outcomes and the results of student learning motivation questionnaires in cycles I and II, there was an increase in student motivation and learning outcomes. Thus, it can be concluded that the application of electronic student worksheets with PjBL based on physics and chemical properties in online learning in class VII-E of SMP Negeri 14 Banjarmasin in the 2020/2021 academic year can increase students' learning motivation and learning outcomes. Furthermore, the results of this study can be used to develop further research related to the

use of electronic student worksheets with PjBL with different science materials and to measure the improvement of other skills.

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