



Improving Student Learning Outcomes with Project Based Learning Chemical Elements

¹Rafini, ²Sugiharti, ³ Tri Rahayu

^{1,2,3} MAN Insan Cendekia Gorontalo, SMKN 2 Nawangan, Pacitan, SMKN 1 Donorojo, Pacitan, Indonesia

ABSTRACT

Classroom action research using a project based learning model with a power point media creation project on chemical elements aims to improve student learning outcomes. Using the project based learning model can actively involve students in the learning process. Assessment can also be carried out comprehensively, starting from cognitive assessment through pretest and posttest. Assessment of attitudes and skills during student presentations and reflections using appropriate research instruments. The results of this classroom action research gave positive results, seen from the increase in students' pretest and posttest scores. The average pretest score is 23.8% and the average posttest score is 67.7%. For the results of the assessment of student presentations which measured attitudes and skills, the data obtained were material readiness reached 94%, attitude during the presentation reached 91% and questions and answers reached 91%. Student reflection on the learning model provides the following data, students like the project based learning learning model with a percentage of 93%, helps solve questions as much as 57%, more actively explores the material during learning as much as 79%, learning is more effective as much as 57% and increases motivation student learning as much as 86%. Learning outcomes increased significantly for cognitive assessment, attitude assessment and skills assessment, which was very good as well as good reflection from students. From the results of this classroom action research, the project based learning method can be an effective method that can be used in learning that produces a product from students' creative work.

Keywords:

Learning Outcomes,
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Point Media

Contact: rafinimargono@gmail.com

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A. Introduction

Law Number 20 of 2003 concerning the National Education System, Article 1 number 1 states that education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble character, and skills needed by himself, society, nation and state. To achieve this goal, continuous curriculum improvement is needed to answer the challenges of global life which are increasingly developing rapidly. The latest curriculum which is currently being implemented during the trial period is the implementation of the independent curriculum as a solution to dealing with student learning loss after facing the Covid-19 pandemic, which requires teachers as teaching staff to be more comprehensive in carrying out assessments in the learning process starting from spiritual, affective, cognitive and psychomotor. These core competencies must be instilled in every student, which will be used as the basis for the assessment process. Learning must be carried out by actively involving students while the teacher as a facilitator observes and serves students who need further information about a concept. During the learning process, teachers in each subject are expected to be able to make more detailed observations of all activities carried out by students.

One learning model that can actively involve students in the learning process is Project Based Learning by creating power point presentation media by students to make it easier for students to understand abstract and contextual material. Classroom action research using the Project Based Learning (PJBL) method has been widely carried out at various levels of education, from elementary school to university. This method provides an active, project-centered learning experience, where students work together in groups to complete real-world projects. This approach not only improves students' understanding of the subject matter, but also develops critical thinking, collaboration and problem solving skills. Classroom action research using the PJBL method has been proven to be effective in increasing students' learning motivation, their involvement in learning, and academic results. Apart from that, this method also supports the development of students' social and emotional skills, such as teamwork, communication and self-confidence. Many classroom action research using the PJBL method have been conducted in various countries, including the United States, Canada, Australia and European countries. The results of this research show that implementing PJBL well can provide significant benefits for students and improve the quality of learning. Classroom action research by Yanuar (2016) shows the results that the application of the project based learning (PJBL) learning model can increase the activity and learning outcomes of Control Systems Engineering students in class XII EI 3 at SMK Negeri 3 Wonosari. Meanwhile, research by Febriati, et al (2020) shows that student learning outcomes when applying the Project Based Learning learning model in designing scientific work proposals are good, this can be seen from the average number produced which is 89.94.

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students work together in groups to complete real-world projects. This approach not only improves students' understanding of the subject matter, but also develops critical thinking, collaboration and problem solving skills. Classroom action research using the PJBL method has been proven to be effective in increasing students' learning motivation, their involvement in learning, and academic results. Apart from that, this method also supports the development of students' social and emotional skills, such as teamwork, communication and self-confidence. Many classroom action research using the PJBL method have been conducted in various countries, including the United States, Canada, Australia and European countries. The results of this research show that implementing PJBL well can provide significant benefits for students and improve the quality of learning in the classroom

The aim of applying the Project Based Learning (PJBL) method in learning Elemental Chemistry material is to improve student learning outcomes in a way that is centered on real experience and application of knowledge. Through projects relevant to daily life or industry, students are given the opportunity to develop a deep understanding of elemental chemistry concepts and relate them to real-world situations. In this context, the main goal is to promote students' creativity, collaboration, problem solving and communication skills. In addition, PJBL also aims to increase students' learning motivation by giving them responsibility for their own learning, so that they can achieve better academic achievements while preparing themselves to face the demands of the complex and dynamic world of work in the future. Thus, PBL aims to create a stimulating, challenging and relevant learning environment, so that students can hone their skills and knowledge effectively in the context of elementary chemistry.

In learning using the Project Based Learning (PJBL) method on Elemental Chemistry material, several problems that students often face can arise. One of the main challenges is the difficulty in understanding complex elemental chemistry concepts, especially when it comes to applying them in practical projects. Students may have difficulty organizing their ideas, planning experiments, or even encounter technical obstacles when creating multimedia presentations. Apart from that, cooperation in groups can also be a problem if there are differences of opinion or lack of effective communication between group members. In addition, students may also feel stressed by the tight time demands to complete the project, especially if they feel less confident about the material being studied. Therefore, it is important for educators to understand this problem and provide the necessary support and guidance to students so that they can overcome these obstacles, gain positive learning experiences, and achieve optimal learning outcomes through the PJBL approach.

B. Theoretical Review

1. Project Based Learning Model

According to Daryanto and Rahardjo, 2012 project-based learning is a learning model that uses problems as the first step to gain new knowledge-based experiences and integrate them into real-world activities (in Anwar et al., 2021). Problem-based learning is a

learning model that originates from a problem which students then need to solve the problem (Purwanto et al., 2016). The Project Based Learning (PJBL) model is a learning model that involves students directly in the learning process through research activities to solve a project or problem. So it can be concluded that the Project Based Learning learning model is a learning model that actively involves students in solving problems scientifically, thinking critically and creatively in finding solutions to existing problems with the products of a project being carried out.

As a learning model that has been known for a long time and is recognized for its ability to develop student competencies, many experts in the field of education have stated its advantages, one of which is according to McDonnell (2007), quoted by Umar (2016), stating the superiority of the Project Based Learning method which is believed to be able to improve abilities. students in:

- a. ask questions, search for information and interpret information (visual and textual) they see, hear or read;
- b. create research plans, record findings, debate, discuss, and make decisions;
- c. work to display and construct information independently;
- d. share knowledge with friends (other people), work together to achieve common goals, and recognize that each person has certain skills that are useful for the project at hand;
- e. displays all the important intellectual and social dispositions needed to solve real-world problems

One of the advantages of using the Project Based Learning learning model is that this learning model is a very good learning model in developing students' various thinking skills, skills in making decisions, activity skills, problem solving abilities which can also foster self-confidence and management self in students (Umar, 2016). The project-based learning model helps students learn: (1) Strong and meaningful knowledge and skills acquired through real-life practice. (2) Expanding knowledge through the credibility of activities in the curriculum which are the subject of the learning process, and carrying out planning or research without time limits where the results or answers from a specific perspective are not previously determined in stages. (3) Gaining knowledge through practical experience and interpersonal cognitive negotiations in a collaborative work environment (Santi, 2011 in Anwar et al. 2021). According to Purwanto, et al., 2016, apart from having various advantages in implementing the Problem Based Learning model, there are also several criticisms of the weaknesses of the Problem Based Learning model. One of the weaknesses in applying the Problem Based Learning model according to Sanjaya (2014: 221) is that when students do not have interest or do not believe that the problem being studied is difficult to solve, then they will feel reluctant to try.

Based on the description above, it can be concluded that arousing students' interest in the problem solving process is an important step to take in a learning process. Therefore, innovation to minimize these weaknesses is very necessary. One problem solving can be done by applying the Problem Based Learning model using PowerPoint media (Purwanto, et al., 2016).

2. Power Point Media

One of the learning media that can be used in the learning process is PowerPoint learning media, this media is very familiar with the world of education, so educators have no difficulty if they want to develop it further or apply it to other material. According to Rayandra Asyhar (2012: 86) the PowerPoint program is a piece of software that is specifically designed to be able to display multimedia programs attractively, is easy to create, easy to use and relatively cheap, because it does not require raw materials other than tools for data storage. Powerpoint is usually used in presentations, but this program has facilities for creating interactive learning multimedia (in Jayusman, 2017). This media can be chosen as a creative learning media because it is multimedia. Multimedia media is a combination of various media elements, such as text, images, animation and video (Rusman, et al., 2013: 295). The multimedia properties as explained above are found in PowerPoint media (Purwanto, et al., 2016).

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The advantages of PowerPoint can be seen in the application which can integrate various multimedia elements. Multimedia elements that can be integrated via PowerPoint, as seen in Figure 1 below.

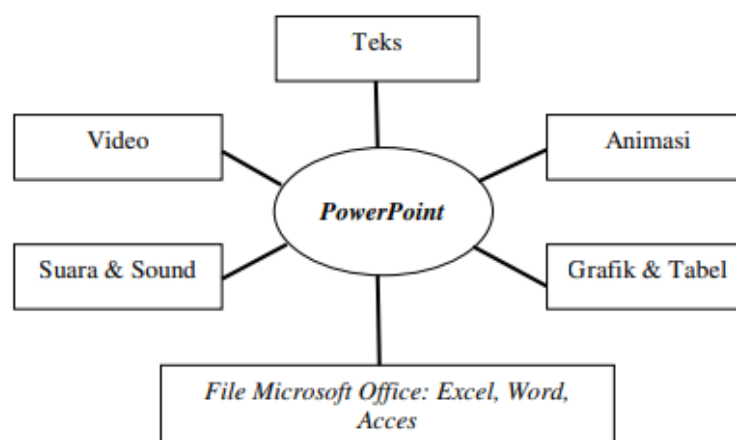


Figure 1: Multimedia Integration in Learning

One of the purposes of using this media is not only to make it easier to convey messages/information, but also to attract students' interest in the learning process. As argued by Smaldino, et al. (2011:194) related to the level of interest and involvement, PowerPoint provides features, such as inserting graphics and sounds, personalizing backgrounds and colors which increase the level of interest and involvement of students (Purwanto, 2016).

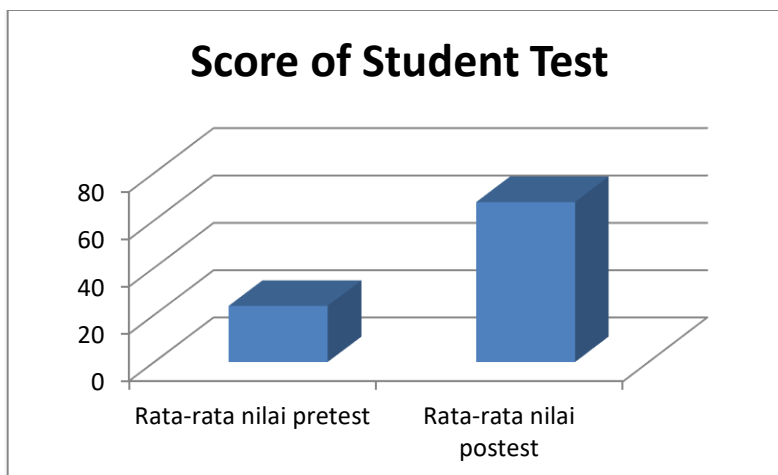
C. Research Methods

This classroom action research was carried out using the Project Based Learning (PJBL) learning model by creating power point learning media by students. The variables for this classroom action research are as follows: the dependent variable is student learning outcomes, the independent variable is learning material and the control variable is the Project Based Learning (PJBL) learning model with the creation of power point learning media. This class action research is a type of class action research (Classroom Action Research) carried out at MAN Insan Scholar Gorontalo. This research approach was chosen because it allows researchers to identify changes that occur in learning elemental chemistry continuously and systematically.

The data collection method used involved observation of the learning process, interviews with teachers and students, and the use of questionnaires to assess student perceptions regarding the learning methods applied. Data validation is carried out by comparing the results of observations, interviews and questionnaires to ensure the accuracy and credibility of the data. Technical data analysis involves grouping data, interpreting findings, and preparing research results reports. MAN Insan Scholar Gorontalo was chosen as the research location because this school has a conducive learning environment and students have a high interest in learning elemental chemistry. This research is expected to provide in-depth insight into the effectiveness of the learning methods applied in increasing students' understanding of elemental chemical material in the educational environment

D. Results and Discussion

With the 3 learning cycles that have been implemented, researchers have found that student learning outcomes have improved. Students with varied learning methods will be challenged and motivated to continue learning. The project based learning method will activate students, develop students' creativity and skills in the learning process, so it will not be boring. The following is a data table of student grades and a graph of student learning outcomes using the project based learning model by creating power point learning media.

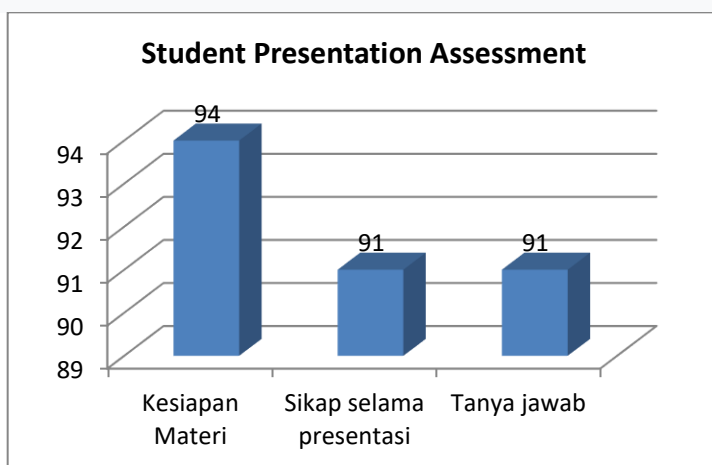


Graph 1 Pretest and posttest scores on student learning outcomes

Based on the graph, student learning outcomes have increased, initial data shows an average pretest score of 23.8% for student mastery of elemental chemistry material. Furthermore, with the power point presentation method by students, the posttest average of learning chemistry material on chemical elements reached 67.7%. Students can understand abstract material well using the students' Power Point presentation learning method. In this learning process, students are trained to be independent and develop literacy skills related to elemental chemistry material.

To arouse students' learning motivation, every teacher should be curious and always monitor why and how children learn and adapt themselves to the learning conditions in their environment. Adaptations that require a long time can be anticipated by teachers by implementing appropriate learning methods. Teachers should also be able to create creative, motivating, innovative and fun learning.

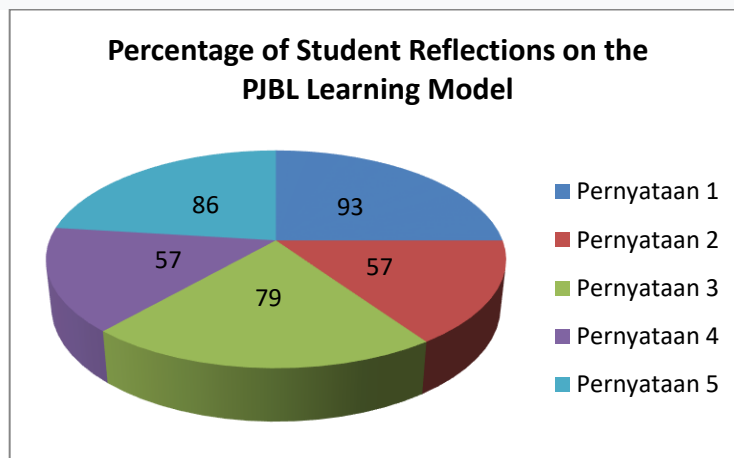
In building student character, presentation is a step to see the existence of students by assessing responsibility for the readiness of presentation material, attitude during the presentation and ability to answer at the end of the presentation session. The following data on student presentation scores is presented in graphical form, including material readiness, attitude during the presentation and questions and answers.



Graph 2 Results of student presentation assessment

Based on the observation graph during learning, it can be seen that material readiness reached 94%, attitude during presentations reached 91% and questions and answers reached 91%. During the learning process students are active, developing insight by making good power points and presentations.

Student reflections also show positive data with more than 50% liking the project based learning model. Students feel more challenged to continue developing themselves. Carrying out literacy and being able to explore lesson material better. Below is a graph of the percentage of student reflections on the project based learning learning model which is as follows:



Graph 3 Results of student reflections on the PJBL learning model

Based on data and student reflection graphs, it can be seen that students like the project based learning learning model with a percentage of 93%, help solve questions as much as 57%, are more active in exploring the material during learning as much as 79%, learning is more effective as much as 57% and improve Student learning motivation was 86%. The use of existing IT facilities is a very important requirement for students in the teaching and learning process. In the era of digitalization, students must follow technological developments, especially in learning.

The results of this classroom action research show positive results through increasing student pretest and posttest scores. The average pretest score was initially 23.8%, which increased significantly to 67.7% in the posttest. In addition, the results of student presentation assessments that measure attitudes and skills also reflect the success of this learning method. Data shows that material readiness during presentations reached 94%, students' attitudes during presentations reached 91%, and ability to answer questions reached 91%. Students also gave positive responses to the Project Based Learning learning model, with 93% liking this method. Apart from that, 57% of students felt this method helped them solve problems, 79% were more active in exploring the material during learning, 57% felt learning was more effective, and 86% felt their learning motivation increased. Overall, student learning outcomes experienced significant improvements in cognitive assessments, attitudes, and skills, while positive reflections from students also

reflect the success of this learning method in creating an effective and motivating learning environment

In this study, the recapitulation results of affective and psychomotor assessment indicators revealed an increase in students' positive behavior and skills when making presentations. Thus, it can be suggested that the application of the Project Based Learning (PJBL) learning model with a focus on making presentations using PowerPoint learning media is effective in increasing students' understanding of elemental chemistry material. For future researchers, it is recommended to design projects with more challenging products, encouraging increased student creativity. These findings have important relevance because they contribute to the development of innovative and effective learning methods, inspiring future researchers to explore the potential of PBL learning methods further in the context of elementary chemistry learning.

Teachers can also instill values in students easily, during the learning process. Assessment can be carried out objectively, because in the learning process, teachers can directly see students' work. The application of this method can also be used as a reference by teachers teaching other subjects, which have abstract material. With this method, a series of assessments can be carried out in one learning process, starting from attitudes, knowledge and skills. Instilling personal values and attitudes as well as developing skills will be integrated into one in the learning process. The application of this project based learning model, apart from making it easier for students to understand the material, also makes it easier for teachers to carry out comprehensive assessments. In this way, teachers' efforts to improve the quality of teaching in order to improve the quality of education can be implemented

E. Conclusion

It turns out, this approach produces a positive impact on students' understanding of chemical elements, which can be seen from the differences in the results of the pre-test and post-test in the cognitive assessment. Affective and psychomotor evaluations are obtained through observations during the learning process, especially when students make presentations. The assessment is carried out using the assessment instruments that have been prepared.

The results of this research show that applying this learning method has a positive effect on students' understanding of elemental chemical material, as can be seen from the difference in the results of the pre-test and post-test in the cognitive assessment. Furthermore, evaluation of affective and psychomotor aspects obtained during learning, especially when students make presentations, provides a comprehensive picture of student development. These factors confirm that this learning approach not only increases students' knowledge, but also strengthens their abilities in terms of emotions and motor skills. These implications provide important guidance for educators and decision makers in combining learning methods that consider cognitive, affective and psychomotor aspects in order to improve overall student learning outcomes.

The weakness of this research lies in its limited scope, where this research was only carried out in one madrasah. This raises doubts about the generalizability of the results of this study to the wider student population. For future research, it is highly recommended to expand the scope of research by involving more madrasahs or schools as research locations. By involving a larger sample, the research results will have a higher level of confidence and can provide a more accurate picture of the effectiveness of the Project Based Learning learning method in increasing students' understanding of elemental chemistry material. In addition, future research could also consider variations in grade level, student background, or use a mixed approach to gain a deeper understanding of the impact of this learning method on student learning outcomes. In this way, more comprehensive and reliable research results can be produced to make a more significant contribution to the field of chemistry education.

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