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Development of Project Based Learning Type Practicum Guide with Zoom Cloud Meeting on Electrolyte and Non-Electrolyte Materials in SMA

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Abstract

This research is a research development practicum guide in the field of chemistry education. The aims of this research are 1) to getpractical guide based on type syntax Project Based Learning 2) Get the type practicum guide Project Based Learning. 3) Significant increase in learning outcomes that are taught using Zoom Cloud Meetingand a practical guide developed with the type Project Based Learning. 4) The effectiveness of the learning process that is taught by using Zoom Cloud Meeting by usingtype practicum guide Project Based Learning. The stages in this research are (1) Syntax analysis of the Project Based Learning learning model to determine the components of the chemistry practicum guide according to the Project Based Learning type, (2) Compile and develop a chemistry practicum guide for electrolyte and non-electrolyte materials in accordance with the Project Based type syntax. Learning, (3) Standardization or or feasibility test of practicum guides to teacher validators, (4) Implementation of practicum guides for class X students of SMA Negeri Unggul Sigli, (5) Analyzing the effectiveness of Project Based Learning type practicum guides in electrolyte and non-electrolyte learning by using Zoom Cloud Meetingwhich has been tested. The results of the feasibility test for the Project Based Learning type practicum guide 3.50. While the effectiveness of the use of Project Based Learning type practicum guides seen from student learning outcomes, it is known that the experimental class I that does not use Project Based Learning type practicum guides usesZoom Cloud Meeting an average of 56.00 with an increase in learning outcomes of 51.4% while the experimental class II which uses a Project Based Learning type practicum guide by using Zoom Cloud Meetingan average of 81.75 with an increase in learning outcomes of 58.8%. So it can be concluded that the Project Based Learning type practicum guide is feasible to be used as a practicum guide in schools, with an increase in learning outcomes using a Project Based Learning type practicum guide that usesZoom Cloud Meeting higher value compared to student learning outcomes without using a practicum guide

Keywords
development of practicum guide; PBL type; zoom meeting

I. Introduction

At the beginning of 2020, the world was shocked by the outbreak of the corona virus (Covid-19) which later infected almost all countries in the world. The outbreak of this virus has an impact of a nation and Globally (Ningrum *et al*, 2020). Covid 19 pandemic caused all efforts not to be as maximal as expected (Sihombing and Nasib, 2020). According to Roycnhansyah (2020), people's behavior during the pandemic has changed, including WFH, everything virtual, transport mode choice, up to access control. The use of

technology that used to be more as a support for secondary work or even recreation, has turned into a main work facility. This also has an impact on the education system in Indonesia. In the education sector, for example, teachers and students will be accustomed to distance learning interactions. Education is one of the efforts to improve the ability of human intelligence, thus he is able to improve the quality of his life (Saleh and Mujahiddin, 2020).

So that learning activities must be carried out in an innovative, interactive, inspiring, fun, challenging and motivating way for students to participate actively, and provide sufficient space for initiative, creativity, and independence in accordance with the talents, interests, and physical and psychological development of students. Permendikbud No. 59 of 2014). Process standards regarding learning activities are carried out with the current curriculum. Therefore, the standard process is currently being developed through the curriculum using Zoom Cloud Meeting.

The desire to create teaching and learning activities in the classroom ideally and the demands for the amount of material that must be mastered by students sometimes make it difficult for teachers to focus on the quality of the practicum carried out by students. There are many obstacles experienced by teachers in maximizing students' practicum activities. According to several studies that have been carried out, among others: Tuysuz (2010) there are obstacles in the implementation of practicum in schools, including the unavailability of a chemistry practicum guide that can direct students during practicum, teachers also do not have a guide in assessing science process skills and scientific attitudes, materials and chemistry lab tools.

II. Review of Literature

2.1 Learningwith Zoom Cloud Meeting

Learning is also a series of teaching and learning processes that end with changes in behavior, because almost every behavior shown is the result of learning. Learning is developed by improving the mindset related to learning patterns, namely: (1) student-centered, (2) interactive learning (interactive teacher-student-society-natural environment, other sources/media), (3) learning is designed in a network (students can gain knowledge from anyone and from anywhere that can be contacted and also obtained via the internet), (4) active seeking learning (active student learning is strengthened by a science approach learning model), (5) group learning (team-based), (6) multimedia-based learning,(7) learning based on customer needs (users) by strengthening the development of the special potential of each student, (8) learning patterns of single knowledge (monodiscipline) into learning multiple sciences (multi-disciplinary), and (9) critical learning (Permendikbud no. 59).

2.2 Learning Framework

The learning process at all levels uses a scientific approach and covers three domains, namely attitudes, knowledge, and skills. In the learning process based on a scientific approach, the attitude field is intended that students know about the 'why'. Sphere aims at skills so that students know about the 'how'. For the field of knowledge so that students know about 'what'. The end result is the mastery of balanced attitudes, skills, and knowledge competencies so that they become good people (soft skills) and people who have the skills and knowledge to live decently.

2.3 Practical Guide in Chemistry Learning

Practical guides are absolutely necessary for every school that has laboratory facilities so that practicum activities can take place in an orderly manner according to learning objectives. In the process of learning chemistry, practical guidebooks are included as learning resources or teaching materials.

The components that must exist in the practicum guide are: First, the title of the practicum must be short and can describe in general the practicum activities to be carried out, Second, the purpose of the practicum contains statements that will be carried out in practicum activities in more detail, Third, the basic material theory related to practicum activities, Fourth, the tools and materials used are tools needed in practical activities, Fifth, how to work contains the steps that must be taken in carrying out practical activities, Sixth, prelab questions contain questions that will test initial abilities the practitioner before doing the practicum, Seventh, the implementation of the practicum which must be in accordance with the steps specified in the guide, Eighth,general report that must be completed by the practitioner after completing the experiment. Ninth, discussions and suggestions are submitted related to the practical experiment (Arifin, 2000).

2.4 Scientific Approach With Method *Project Based Learning*

*Project Based Learning*is a learning model that uses projects/activities as the core of learning. Project-Based Learning is designed to be used on complex problems that students need to investigate and understand. Through*Project Based Learning*The inquiry process begins by raising a guiding question and guiding students in a collaborative project that integrates various subjects (materials) in the curriculum. When questions are answered, students can directly see the various main elements as well as various principles in a discipline that is being studied. This model uses the problem as the first step in collecting and integrating new knowledge based on experience in real activities.

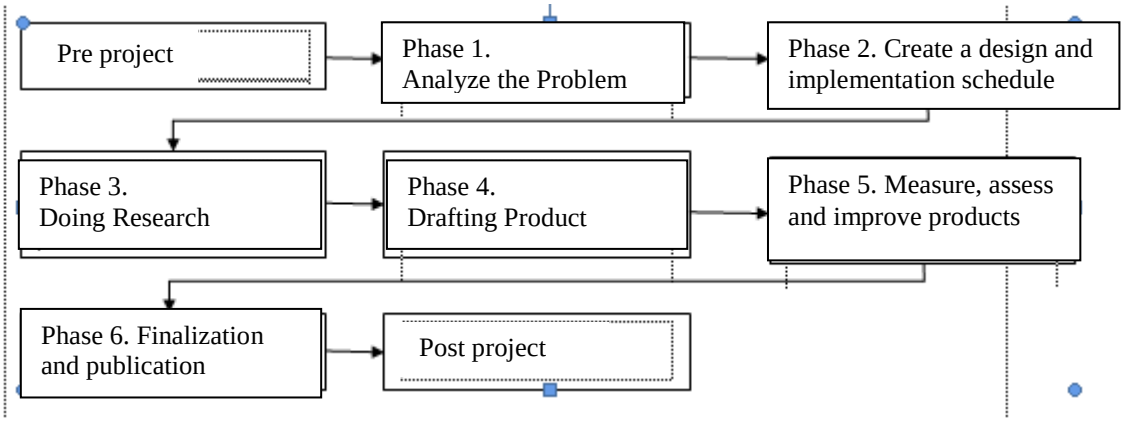

Figure 2. *Project Based Learning Model Syntax (Abidin, 2014)*

2.5 Conceptual Framework

Chemical material has the characteristics of thinking in understanding natural phenomena, conducting investigations and is a collection of knowledge, all three of which are processes and products. Learning chemistry with the scientific method begins with a problem. Therefore, finding out if there is a problem is preceded by the process of seeing nature. In solving a problem, it is necessary to have a systematic scientific method.

With the development of practicum guides through the Project Based Learning type, the ability of students to think critically will be further increased. If students have good thinking skills, the mastery of concepts in knowledge will be better. This improvement in

thinking skills will have an impact on improving students' cognitive, affective and psychomotor learning outcomes.

III. Research Methods

3.1 Sample and Population

This research was conducted in the city of Sigli at a school that has adequate laboratory facilities. This research was conducted in the academic year 2021-2022, in April 2021 - August 2021. The time of this research was adjusted to the schedule of electrolyte and non-electrolyte materials that had been allocated in high school. The population in this study were all chemistry teachers who taught class X, XI, and XII and all high school students in class X for the academic year 2021/2022 on electrolyte and non-electrolyte solutions, due to limited time, funds, personnel and facilities to support this research. The research that will be carried out is only on grade X high school students in the second (even) semester of the 2021/2022 academic year at Sigli State Senior High School. The sample is a selected part of the population so that all population characteristics are reflected in the sample taken (Sudjana, 2002). So that the sample that will be studied is only one school, namely SMA Negeri Unggul Sigli in Pidie District. The determination of this high school as a sample is because the researcher is familiar with all the chemistry teachers, making it easier for researchers to carry out the research. Furthermore, with these considerations, two classes were taken, provided that one class without using a Project Based Learning type practicum guide with making it easier for researchers to carry out the research. Furthermore, with these considerations, two classes were taken, provided that one class without using a Project Based Learning type practicum guide with making it easier for researchers to carry out the research. Furthermore, with these considerations, two classes were taken, provided that one class without using a Project Based Learning type practicum guide withZoom Cloud Meeting and one class using a Project Based Learning type practicum guide with Zoom Cloud Meeting. The research method is a picture that guides someone to do research (Nazir, 2005). This research is Research and Development (R&D) and experimental. At the end of the study, the students' learning outcomes from the two practicum guides with different approach methods were compared with statistical analysis. The research and development (Research and Development) and Experimental procedures include the following stages: (1) analyzing the syntax of a scientific approach that is in accordance with the material to be discussed in the guide, (2) compiling a practicum guide with a scientific approach of Project Based Learning type, (3) validate the practical guide to lecturers and teachers, (4) the product is a practicum guide that is tested by high school students, (5) prepares RPP (Learning Implementation Plan) according to the indicators that will be achieved by students, and requires high school students to use electrolyte and non-electrolyte practicum guides to be tested, instruments test to measure test results, (6) determine the population and research sample, (7) conduct a pretest before doing the practicum using a practicum guide. The pretest was carried out to equalize the students' initial ability data and calculate the normalized gain, which will be used in statistical analysis hypotheses, (8) carry out the learning process in the laboratory on the subject of electrolytes and non-electrolytes which are divided into two classes: experimental class I without getting a Project Based Learning type practicum guide while the second experimental class getting a Project Based Learning type practicum guide with Zoom Cloud Meeting, (9) held a posttest to students after being given a practicum guide using Project Based Learning type with Zoom Cloud Meeting . This test was carried out to see which method was more appropriate to apply to the electrolyte and non-electrolyte

solution material, (10) to process the data obtained from both student results, and (11) to analyze the data obtained from the research and make a conclusion.

IV. Results and Discussion

The initial stage of the research was the development of a Project Based Learning chemistry practicum guide using: Zoom Cloud Meeting. Adapted to KI and KD chemistry SMA class X semester 2. Project Based Learning type SMA chemistry practicum guide on electrolyte and non-electrolyte solution material with Zoom Cloud Meeting which was developed according to the 2013 curriculum. Then the practicum guide was integrated with the PjBL type. In this chemistry practicum guide based on Project Based Learning, researchers pay attention to several things, namely, (a) analyzing Project Based Learning type syntax, (b) developing a practicum guide based on Project Based Learning syntax, (c) suggestions or input from lecturers mentor. After the development of a project-based learning type high school chemistry practicum guide, the next step is to test the appropriateness standards of content, language, and presentation by distributing standardized questionnaires to lecturers and teachers as expert validators. The compiled questionnaire is given a score of 1-4 for each point. The scores obtained are summed and given a value, then averaged to obtain response data to the feasibility standard of a chemistry practicum guide based on the type of Project Based Learning with Zoom Cloud Meeting for SMA class X semester 2. From the results of the questionnaire given, it can be seen the response of lecturers and teachers chemistry to the feasibility test Chemistry practicum guide based on the type of Project Based Learning SMA with Zoom Cloud Meeting class X semester 2. The next stage is to test the use of a chemistry practicum guide based on the Project Based Learning type to students to determine the improvement in student learning outcomes between the Project Based Learning type practicum guide. The instrument is in the form of test questions obtained from students' pre-test and post-test scores to be presented in the analysis of research instrument data. The next step is to prepare a draft of the project-based learning chemistry practical guide for electrolyte and non-electrolyte materials in accordance with the syllabus and chemistry curriculum. In the preparation of this practicum guide, the focus of attention is how the appropriate practicum stages and have a significant difference to the type of Project Based Learning.

The type of Project Based Learning is expected to make students more active in learning. The draft of the chemical practicum guide for electrolyte and non-electrolyte materials using Discovery type learning and Project Based Learning type was prepared separately because the implementation of the practical guide was carried out in different classes within the same school. The practicum guide was compiled and developed through several student and teacher handbooks circulating in the market and then developed based on the 2013 curriculum implementation research guidebook published by the Ministry of Education and Culture in 2014 in accordance with Ministerial Regulation No. 59 concerning the high school curriculum with specialization in science and also the 2013 high school chemistry syllabus. Improvements to the practicum guide are carried out based on suggestions and inputs that have been given by lecturers and teachers. The results of the analysis of chemistry practicum guides that have been validated by lecturers and teachers are as follows:

4.1 Aspects of Practicum Coverage

The results of the assessment of the feasibility of a Project Based Learning type practicum guide on electrolyte and non-electrolyte materials in class X SMA are based on the scope of the practicum.

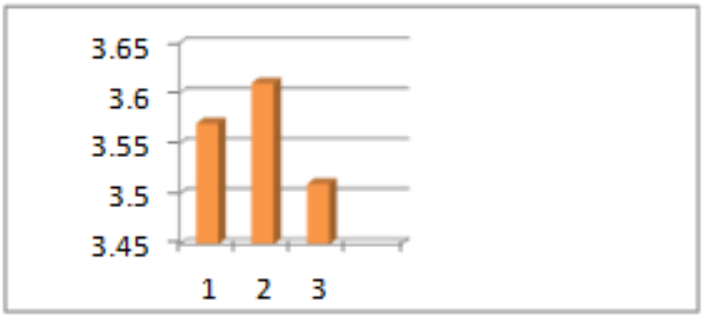

Figure 2. *The scope of the practicum*

There are 3 components related to the aspects of the scope of the practicum, namely, 1) The breadth of the practicum for the Project Based Learning type with an average value of 3.57 is valid, meaning it is feasible and does not need to be revised, 2) The compatibility of the practicum with KD and KI for the Project Based Learning type with an average value the average is 3.61 is valid meaning that it is feasible and does not need to be revised, 3) The suitability of the practicum objectives with learning indicators for the Project Based Learning type with an average value of 3.51 is valid meaning that it is feasible and does not need to be revised.

4.2 Systematic Aspects of Presentation

The results of the feasibility test for the class X electrolyte and non-electrolyte practical guide which has been developed based on the Project Based Learning type in the practical scope aspect has an average value of 3.41, which means that the Project Based Learning type guide is valid and very feasible so that it does not need to be revised.

4.3 Aspects Contain Productivity Insights

The results of the feasibility test for the class X electrolyte and non-electrolyte practical guide which has been developed based on the Project Based Learning type in the practical scope aspect has an average value of 3.47 is valid, which means it is also very feasible and does not need to be revised.

4.4 Curiosity Stimulating Aspect

The results of the feasibility test for the class X electrolyte and non-electrolyte practical guide which has been developed based on the Project Based Learning type in the practical scope aspect has an average value of 3.26 is valid, which means it is also very feasible and does not need to be revised.

4.5 Aspects of Developing Life Skills (Life Skills)

The results of the feasibility test for the class X electrolyte and non-electrolyte practical guide which has been developed based on the Project Based Learning type in the practical scope aspect has an average value of 3.50 is valid, which means it is also very feasible and does not need to be revised.

4.6 Design Aspect

Based on Design The results of the feasibility test for the class X electrolyte and non-electrolyte practical guide which has been developed based on the Project Based Learning type in the practical scope aspect has an average value of 3.33 is valid, which means it is also very feasible and does not need to be revised.

4.7 Language Aspect

Feasibility Test for Project Based Learning Practicum Guides Based on Language. The results of the feasibility test for the class X electrolyte and non-electrolyte practical guide which has been developed based on the Project Based Learning type in the practical scope aspect has an average value of 3.36 for the Project Based Learning type is valid, which means it is also very feasible and does not need to be revised. To find out the effectiveness of the chemistry practicum guide based on the type of Project Based Learning on student chemistry learning outcomes, a trial was carried out using a test instrument for students. The questions used as instruments are standard and valid for use. To find out the improvement in student learning outcomes who are taught using this chemistry practicum guide, this research was carried out at the SMA Negeri Unggul Sigli school.

This study involved two classes, consisting of an experimental class taught using a Project Based Learning type practicum guide developed with the 2013 curriculum and an experimental class taught using an existing practicum guide at school. in school and in Experiment II class, Project Based Learning type practicum guides are 33.00 and 56.00, respectively. The average score of the posttest in the Experiment I class of the practicum guide at school and the Experiment II class of the Project Based Learning type of practicum was 44.00 and 81.75.

Based on the data from the pretest and posttest results, it was found that there was a difference in the average pretest and posttest scores of students in chemistry experiments, so it was necessary to determine the normalized gain value for chemistry learning outcomes in that class. The average value of normalized gain in experimental class I and experimental class II is 0.31 and 0.68, respectively.

It was concluded that the lowest normalized gain average value was found in the Experiment II class, which was taught without using a Project Based Learning type of practicum guide, while in the experimental class I, which was taught using an existing practical guide at school, the average normalized gain value was 0.31.

Based on the student's score, the effectiveness of the practicum guide that has been developed can be tested based on the type of Project Based Learning. Normality test and homogeneity test were carried out using pretest and posttest data on student chemistry learning outcomes using SPSS Version 16.0 for Windows. The significance level of normality is 0.269 > 0.05, so it can be concluded that the data above is normally distributed. Normality test to see if the data used above is a normal distribution. The results of testing the normality of student learning outcomes on the development of a Project Based Learning chemistry practicum guide are normal. Learning analysis was carried out on 2 experimental classes using a Project Based Learning type practicum guide, by observing the learning process in the classroom.

V. Conclusion

The Project Based Learning type practicum guide which has been validated based on suggestions or input from 20 teachers and 1 lecturer, there are 7 aspects in the feasibility test of a practicum guide in the first aspect based on the scope of the practicum, the second aspect is systematic presentation, the third aspect contains insight productivity, the fourth aspect stimulates curiosity, the fifth aspect Aspects of Developing Life Skills (Life Skills), the sixth aspect of design, and the seventh aspect of language in the Project Based Learning type practicum guide, all of which are very feasible to use and do not need revision.

Based on the results of data analysis in schools, it shows that there are differences in learning outcomes between the practicum guides in schools and the Project Based Learning type on electrolyte and non-electrolyte materials at SMA Negeri 2 Sigli class X semester 2 using the 2013 curriculum and obtained an average score in class Experiment I using a practicum guide at school is 45.00 with a 40% increase in learning outcomes and the average value of the experimental class II using a Project Based Learning type practicum guide is 81.75 with a 72% increase in learning outcomes. So it can be concluded that students who use practicum guides at school have lower grades than students who use Project Based Learning type practicum guides.

Based on the results of the discussion, it is more effective to use a practicum guide for the teaching and learning process, especially on electrolyte and non-electrolyte materials, namely the Project Based Learning type practicum guide which is more effective.

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