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PROBLEM BASED LEARNING MODELS IN STUDENT SCIENTIFIC WRITING ABILITY

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ABSTRACT

This research begins with findings, when students express ideas in written form they often experience difficulties, both in the use of words and grammar. Ideas and ideas become decisive in producing a scientific paper. Therefore, this research aims to describes the use of *problem-based learning* models to improve students' scientific writing skills and analyze students' scientific writing results after using the *problem-based learning* model. This study uses a quantitative approach to the type of experimental research. This research was conducted in the Scientific Writing Techniques course of the Indonesian Language Education Study Program at Billfath University. The stages of this research consisted of three stages, namely pre-test, treatment, and post-test. From the results of the research that has been done, it is obtained by using the *problem-based learning* model, students are able to explore problems in learning Indonesian Language and Literature. Furthermore, the problem is used as a preliminary study which is then given a solution to the problem. In addition, students also develop proposals based on the results of a literature review and the solutions provided. Use of Models Problem Based Learning makes it easier for students to understand the material because they learn through the problems that arise and how to solve the problems they find. Judging from these results, the *Problem Based Learning* model can help increase the creativity of writing student scientific work because *problem-based learning* makes students' thinking abilities optimized through a group or team work process systematically.

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INTRODUCTION

Competency standards on language aspects possessed by a person, namely listening, speaking, reading, and writing. These four aspects form the basis for supporting the delivery of thoughts and ideas, both in writing and orally (Nirwana & Abd. Rahim Ruspa, 2020). By mastering these four aspects of language, skills in expressing thoughts and ideas in writing will be more directed and skilled.

Hierarchically writing skills are the highest language skills because they are learned after several other skills. Writing skills will not come by itself, but through continuous practice and practice (Sismulyasih Sb, 2015). Writing practice is an important part that must be done by students so that the ability to present thoughts and ideas is increasing.

The fact that there are many students who have difficulty in mastering writing skills. These difficulties are very visible when writing scientific papers, such as papers, proposals, and theses. The difficulties encountered when writing, namely the difficulty of determining the problem and how to express the problem in addition to other technical problems (Cahyani, 2010).

Based on the results of observations made on students' writing difficulties, it is known that the difficulties that are often experienced are fear of starting to write and topic selection errors. Students are less able to make opening paragraphs and make conclusions about the contents of paragraphs. and the placement of word choices in paragraphs is still lacking. If students' writing skills are good, then imagination will be sharper, language mastery will increase, and increase self-confidence (Yanti et al., 2018).

When students put ideas into writing, they often experience difficulties, both when using words and grammar. Ideas and ideas are decisive in producing scientific writing. In essence, everyone has ideas and ideas, but most students are still unable to express ideas and existing ideas. In addition, writing ethics is an important thing that must be considered by students besides grammar. Students need to be directed to continue learning to write scientific papers so that they are used to presenting their creative ideas (Taryana, 2021).

Scientific work is a report or writing on the study of a problem by a person or team by taking into account established scientific principles and ethics (Seran et al., 2020). Scientific principles are important when writing scientifically so that what is

written can be discussed in depth. The breadth and depth of study depends on the level of competence possessed by students based on their knowledge.

Writing scientific papers as a mandatory task for a student is based on established standard guidelines. Each tertiary institution has guidelines for scientific writing which are used as a reference by all students when producing scientific work. Both when writing papers, reports and final assignments, all refer to the guidelines set by the tertiary institution.

In addition to referring to existing writing guidelines, scientific writing needs to use an appropriate learning model so that ideas and ideas can be explored properly. Learning models can help students relate material to real life (Sukmawati, 2021). Learning models that can help students explore ideas and ideas, namely *problem-based learning* (PBL) or *problem-based learning*.

The *problem-based learning* model is learning that focuses on students' ability to solve problems by using all their knowledge. Problem based learning is also referred to as giving problems related to everyday life to students and then students in groups look for alternative solutions to solve these problems (Wulandari & Surjono, 2013).

The *problem-based learning* model or *problem-based learning* is a learning model that is based on many problems that require authentic investigation, namely investigations that require real solutions (Fitri et al., 2020). In the *problem-based learning* model, the lecturer guides students to outline a problem-solving plan so that it becomes activity stages. Lecturers can provide examples of the use of skills and strategies needed by students to complete these tasks. Lecturers also create a class atmosphere that is flexible and oriented towards student inquiry efforts.

The *problem-based learning* learning model refers to a learning approach that focuses on the process of solving problems by obtaining the necessary knowledge (Narsa, 2021). The *problem-based learning* learning model has the advantage of making students learn with inspiration, teaching group thinking, and using related information to try to solve problems, both real and hypothetical. In addition, learning problem-based l earning trains students to synthesize their knowledge and skills before applying to problems, so that the material provided is easy for students to remember (Abdurrozak & Jayadinata, 2016).

This research is supported by previous research, first research from (Dewi et al., 2015) with the results of student responses to the application of the *problem-based*

learning method are said to be positive. This is due to the existence of situations that allow learning activities to occur optimally. In addition, learning is built with a dialogic atmosphere and a continuous question and answer process, interactive dialogue learning, non-monotonous learning methods and selection of authentic material. The second supporting research is research (Shofwani & Rochmah, 2021) with the result that *problem-based learning* can increase student interest and learning outcomes in operational management courses. The third supporting research (Muhson, 2009) model *problem-based learning* can improve student achievement. Students demonstrate a good understanding of advanced statistical concepts and applications. The purpose of this research is to analyze the use of *problem-based learning* models to improve students' scientific writing skills.

LITERATURE REVIEW

Writing Scientific Papers

Scientific work is one of the results of the process of research, observation, review, and thoughts on a particular topic or subject matter (Wibowo, 2012). Furthermore (Sudjana, 2020) states that scientific works are human products on the basis of knowledge, attitudes, and scientific ways of thinking. Scientific work is one of the most important parts for a student to complete his studies. Thus, mastery of scientific work must be owned by every student so that they can think logically and full of planning.

Students need to master writing skills, especially writing scientific papers so they can practice their ability to think coherently and not give opinions without a recognized reference base. Writing scientific papers trains students to think about finding solutions to a problem based on sources, not just ideas. Every idea set forth in a scientific work is followed by supporting ideas to reinforce what has been conveyed. Students writing scientific papers practice their ability to express ideas or ideas that are in their minds (Seran et al., 2020).

Writing scientific papers has several benefits namely *first,* students have experience conducting scientific research using systematic methods and steps and according to the rules or rules of writing. *Second,* students can learn to do research individually, such as conducting observations and interviews as well as receiving comments and responses from respondents. *Third*, writing scientific papers is one way to train students to be able to use scientific language. *Fourth*, students will learn to present data from research that

has been done and learn to answer questions and objections in the process of producing scientific work. In addition, scientific writing can be a tool for storing memory, helping solve problems, practicing orderly and orderly thinking (Wibowo, 2012).

Learning Model

The learning model is a package or frame of the application of learning approaches, methods and techniques. The learning model is a form of learning that is illustrated from the beginning to the end of the lesson which is presented specifically by educators in the classroom (Aqib & A, 2016). Learning models can be grouped into four groups, namely social interaction models, information processing models, personal-humanistic models, and behavior modification.

Each learning model used by educators aims to maximize student learning activities. The focus of these learning activities, namely the achievement of predetermined learning objectives. The different goals to be achieved make the learning model used different, so that the learning model will adjust the learning objectives.

The learning model needs to be adapted to the goals to be achieved. So, educators should understand and know various kinds of learning models so that they can be applied in the classroom. Learning will feel meaningful if it applies a learning model that is in accordance with what the educator wants to achieve in the lesson plan.

Problem-based learning Models

The *problem-based learning* model is a learning model that is based on many problems, so it requires authentic investigations, namely investigations that require real solutions to problems (Trianto, 2010). *Problem-based learning* is a learning model by making confrontation with practical problems or learning begins with giving problems. Thus, the *problem-based learning* model is a learning model that begins with presenting a problem, so that it is able to carry out authentic investigations to find a solution.

The principle of *problem-based learning* models, namely providing problems as the first step in the learning process, the problems presented are in the form of real problems in everyday life because the better the effect on improving learning outcomes (Amir, 2010). The educator's task is only as a facilitator who directs students to seek and find solutions to predetermined problems. In addition, *problem-based learning* can develop students' critical thinking skills.

The *problem-based learning* model is an innovation in learning, because in *problem-based learning* students' thinking abilities are optimized through systematic group or team work processes (Mungzilina et al., 2018). In learning, students are trained to solve problems by conducting investigations. Students are under to think and reason by using data not only limited to arguments without evidence.

Problem-based learning Model Steps

The *problem-based learning* model focuses on learning to use various students' thinking abilities individually and in groups to solve problems so that they are meaningful, relevant, and contextual. *Problem-based learning* aims to improve students' ability to apply concepts to new problems or integrate higher-order thinking skills, a desire to learn, direct individual and group learning, and improve skills (Asriningtyas et al., 2018). The problems presented in learning come from real problems experienced by students so that the use of this learning model can provide real and direct experience to students.

The stages of the *problem-based learning* model are as contained in table 1 below (Rerung et al., 2017).

PBL phase		Lecturer Behavior
Phase 1	Provide orientation regarding problems to students	Discuss learning objectives, describe important requirements, and motivate students to be involved in problem solving activities.
Phase 2	Organizing students to research	Helping students to define and organize tasks related to the problems given.
Phase 3	Assist independent and group investigations	Encouraging students to obtain appropriate information, conduct experiments, and seek explanations and solutions.
Phase 4	Develop and present artifacts and *exhibits*	Help students plan and prepare appropriate artifacts, such as reports, video recordings, models, and help students convey them to others.
Phase 5	Analysis and evaluation of the problem solving process	Helping students reflect on their investigations and the processes that students do.

Table 1. *Problem-based learning* Phases

(Source: Arends, 2008)

METHOD

This study uses a quantitative approach to the type of experimental research. The aim is to identify students' abilities in scientific writing using the PBL model. The type of experiment used is a quasi-experiment. The experimental design used in this study *is the one group pretest-posttest design*. This design is a research design in which there is a group that is given an initial test, treatment, and a final test (Sugiyono, 2014). The treatment is declared as the independent variable and the results are declared as the dependent variable. An overview of the research design can be seen below.

O1 XO2 _ _

Information:

O_1 = Execution of Pretest

X = Treat given

O_2 = Execution of Posttest

This research was carried out by the Indonesian Language Education Study Program in the Basic Research Methods course. This research will be carried out from April to August 2022. According to Sugiyono (2014), the experimental stages of research are as follows.

Subject	Pretest	Treatment	Pascates
E	O1	X	O2

Table 2. Stages of Experimental Research (Sugiyono, 2014)

The data collection technique was carried out using the non-test method in the form of assignments to write scientific papers. What is being measured is the ability of students to write scientific papers using the PBL model. The instruments used are assessment sheets and assignment sheets to write scientific papers. Data analysis techniques in this study used quantitative techniques, namely using the t-test.

RESULT AND DISCUSSIONS

Result

This study aims to determine the use of the *problem-based learning* method on the subject matter of writing student scientific work and the results of student scientific writing using the *problem-based learning* method. This research was conducted in semester 4 (four) in the basic research methods course. Writing scientific papers is an outcome of basic research methods courses. In order for students to be able to write scientific papers, the appropriate method is used. The

method is a *problem-based learning* method or is called *problem-based learning*. The application of the *problem-based learning* method in lectures is carried out through quasi-experiments. Pseudo-experiments, in which students are given pre-tests to measure their level of ability or understanding in making scientific work. Based on the results of the initial test then given treatment using the *problem-based learning* method and followed up with the product. There are 2 (two) data obtained from this study, namely the initial test data and the final test data. The results of the research that has been done can be presented in the following summary.

Data	Pretest	Posttest
Subject	31	31
The highest score	82	86
Lowest value	70	77
Average value	75,32	81.58
Middle value	76	82
Standard deviation	3,20	3,12

Table 3. Description of Pretest and Posttest Score Data

From the table above it can be seen that there was an increase in the average score of 6.35 in both groups. Next, the data were tested for normality and homogeneity. The summary of the normality test results for the pretest data distribution is presented in the following table.

Data	N	Sig level.	Sig *(2tailed)*	Criteria	Information
Pretest	31	5%	0.011	P>0.05	0.011>0.05= **Normal**
Posttest	31	5%	0.010	P>0.05	0.010>0.05= **Normal**

Table 4. Summary of Normality Test Results

From the pre-test data above it can be seen that the pretest data obtained *a sig (2-tailed)* of 0.011 while the posttest data obtained *a sig (2-tailed)* of 0.010. This shows that the pretest and posttest data are normally distributed because *the sig (2-tailed)* obtained is greater than 5% *sig (2-tailed) > 0.05*. Thus, the data meets the requirements for analysis.

Next, the data were tested for homogeneity. The summary of the results of the pretest and posttest data homogeneity calculations is presented as follows.

Data	*Lavender statistics*	df1	df2	*sig (2-tailed)*	Information
Pretest and Posttest	0.034	1	60	0.854	0.854>0.05= **Homogeneous**

Table 5. Summary of Homogeneity Test Results

Judging from the table above, it can be seen that the pretest and posttest data have homogeneous variants because sig. 0.854> 0.05. From the results of the pretest and posttest variance homogeneity test calculations, it was shown that the two data met the requirements for analysis because the calculated significance value was greater than the 0.05 (5%) significance level.

These data have gone through prerequisite tests, namely normality and homogeneity tests. The test results show that the data has a normal and homogeneous distribution. Therefore, the data meets the requirements to be analyzed using the t-test. The t-test was conducted to test the effectiveness of using the *problem-based learning* model to improve students' scientific writing skills both in the pretest and posttest. The following is a summary of the results of the pretest and posttest t-test data.

Data	T count	T table	Df	Information
Pretest and Posttest	-19,904	-2,042	30	$T_{count} < T_{table}$ -19,904<-2,042 **: no Significant**

Table 6. Summary of t-test results

From the table above it can be seen that the value of t count (t_h) is -19.904 with df 30. The value (t_h) is then consulted with the t table value (t_{tb}) at a significance level of 5% and df 30. The results obtained are t tb of 2.042. This shows that the value of t h smaller than t tb (-19.904<-2.044). Thus the results of the t-test on the pretest and posttest scores show differences. In other words, the initial and final conditions of students' scientific writing abilities have increased.

Discussion

Problem Based Learning Models in Improving Students' Scientific Writing Ability

Problem-based learning method was carried out from April to June 2022. The research was carried out during lectures in the Basic Research Methods course. The research was carried out from meeting 9 (nine) using the *problem-based learning* method. Prior to the application of *the problem-based learning* method, students were taught using discussion and lecture methods. Discussion and lecture methods are used to instill research concepts in students. At meeting 9 (nine), students are taught to use the *problem-based learning* method. The use of *the problem-based learning* method follows the existing syntax, as described below.

PBL phase		Lecturer Behavior	Activities performed
Phase 1	Provide orientation regarding problems to students	Discuss learning objectives, describe important needs, and motivate students to be involved in problem solving activities.	Explain learning objectives and explore potential problems in the field of learning Indonesian language and literature.
Phase 2	Organizing students to research	Helping students to define and organize tasks related to the problems given.	Students make observations regarding the potential problems raised in order to find a solution.
Phase 3	Assist independent and group investigations	Encouraging students to obtain appropriate information, conduct experiments, and seek explanations and solutions.	Students conduct a literature review to find the right theory based on the problem
Phase 4	Develop and present artifacts and *exhibits*	Help students plan and prepare appropriate artifacts, such as reports, video recordings, models, and help students convey them to others.	Students compile proposals based on the results of a literature review and the solutions provided.
Phase 5	Analysis and evaluation of the problem-solving process	Helping students reflect on their investigations and the processes that students do.	Student proposal seminar results of group work alternately.

Table 6. Syntax or Steps for Learning Scientific Writing with the *Problem Based Learning Method*

In using this *problem-based learning model*, students are able to explore problems in learning Indonesian Language and Literature. Furthermore, the problem is used as a preliminary study which is then given a solution to the problem. In addition, students also develop proposals based on the results of literature studies and the solutions provided.

Student Scientific Writing Results after Using the *Problem Based Learning Model*

The results of students' scientific writing after using the *problem-based learning* model can be known in the implementation of the posttest. The results of the t-test analysis obtained t_{count} (t_h) of -19.904 with df 30. The (t_h) value was then consulted

with the t_{table} value (t_{tb}) at a significance level of 5% and df 56. The results obtained were t_{tb} of -2.042. This shows that the value of t_h is smaller than t_{tb} (-19.904 <-2.042). Thus, the results of the t-test on the pretest and posttest scores show differences.

The results of the t-test show that there are significant differences in the implementation of the pretest and posttest. The use of *problem-based learning* models has an influence on improving students' scientific writing skills. This is in line with Abdurrozak & Jayadinata (2016) which states that probl-m based learning learning trains students to synthesize their knowledge and skills before applying to problems, so that the material provided is easy for students to remember. The use of this model can hone student creativity because students are faced with a problem so they must have critical power to find a solution.

In addition, based on the results of the research analysis previously presented, it can be concluded that the average student scientific writing results from pretest to posttest has increased, this increase can be described as follows:

1. The average increase in student scientific writing results from protest to pretest increased by 6.35%, from 75.32 to 81.58.
2. Highest score increased from 82 to 86.

The increase in the average value of students' scientific writing results is influenced by the use of the *Problem Based Learning model*. Learning using the *Problem Based Learning model* can stimulate open-mindedness and encourage students to carry out more critical learning through problems found related to everyday life.

Based on the results of researchers' observations of student activities, information was obtained that there was an increase in student creativity in writing scientific papers. This shows that students give a positive response to the courses they take. Both in paying attention to the teaching material presented and enthusiastically asking questions about material that was not understood. By using *Models Problem Based Learning* makes it easier for students to understand the material because they learn through the problems that arise and how to solve the problems they find. Indirectly students can know as well as how to apply it. Judging from these results, the Problem Based Learning model can help increase student writing creativity. This is in line with (Mungzilina et al., 2018) which states that the *problem-based learning* model is an innovation in learning, because in *problem-based*

learning students' thinking abilities are optimized through a systematic group or teamwork process.

CONCLUSIONS

In using this *problem-based learning model*, students are able to explore problems in learning Indonesian Language and Literature. Furthermore, the problem is used as a preliminary study which is then given a solution to the problem. In addition, students also develop proposals based on the results of literature studies and the solutions provided. There is a significant difference in the implementation of the pretest and posttest. The use of *problem-based learning* models has an influence on improving students' scientific writing skills. Learning using *the Problem Based Learning* model can stimulate open-mindedness and encourage students to carry out more critical learning through problems found related to everyday life. Thus, it is hoped that educators will use *the problem-based learning model* as a choice of learning model to improve students' scientific writing. This is because the model has been proven to have an effect on use in learning**.**

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