The Effect Of Problem Based Learning Model On Students Outcomes In Learning Natural Science Of 5th Grade At UPT SDN 104 Tontonan Anggeraja District Enrekang Regency

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ABSTRACT

This research discusses the effect of the application of the problem based learning model on the science learning outcomes of fifth grade students of UPT SDN 104 Tontonan. This type of research is an experimental research using the One Group Pretest-Posttest Design research design. The independent variable in this study is a problem based learning model. The dependent variable in this study is the student's natural science learning outcomes. The population used is all students of class V as many as 17 students and using a sampling technique that is saturated sample. Data collection techniques in this study were tests, observations, and documentation. The instrument used in this research is multiple choice questions, totaling 15 questions. Data analysis used descriptive statistical analysis and inferential statistical analysis. The results of the descriptive analysis showed that the description of the application of the problem based learning model at the first meeting was running effectively and the second meeting was running very effectively. The achievement of learning outcomes shows an increase when using the problem based learning model, this is proven by the posttest average value being higher than the pretest average value. The results of hypothesis testing using Paired Sample t-test showed a significant value less than 0.05 and the results of T Count > T Table, so H0 was rejected and Ha was accepted, which means that the application of the problem based learning model has an effect on the science learning outcomes of 5th grade students at UPT SDN 104 Tontonan, Anggeraja District, Enrekang Regency.

INTRODUCTION

Education is defined as an essential activity whose activity is to show an existence or an existence in the development of society. Education is something important in life for the continuation of a life, and also for the progress of the nation and state (Fitriana, 2016). In education, there is an effort to maintain and apply cultural and religious values / norms so that they can be useful as well as develop / evolve in the community environment that develops from time to time (Heriyunita, 2016).

In general, Indonesian students have the ability to memorize concepts, theories and laws well. These abilities are not accompanied by the ability to communicate and the ability to implement the knowledge gained. The low ability is influenced by the learning process received by students (Lindawati, 2021). The intended learning process is not only on one learning content, but also includes several, one of which is the content of science learning.

Science learning focuses on providing insights and experiences directly in order to find and act to be able to investigating/exploring the surrounding environment scientifically. Regulation of the Minister of National Education of the Republic of Indonesia No. 23 of 2006 concerning graduate competency standards, especially science learning content, explains that students are required to know and also use information about the surrounding environment logically (reasonable), critical, and also creative. Able to show it with the guidance of teachers / educators. Students are also required to be able to show high curiosity and show their potential in the simple process of solving problems in everyday life.

Various problems faced by students, especially at the elementary school level, are mastery of subject matter that they are still difficult to master. In line with these problems, the school and teachers try as much as they

can to improve the mastery of the material by developing thinking patterns and absorbing more varied learning methods or models (Wardani, 2018).

The reality is found in the field, namely at UPT SDN 104 Tontonan, students are still attached to their habits when studying online where they learn to use *cellphones,* do assignments with the help of parents, even not a few where parents do assignments given by the teacher, causing them to continuously want to play *cellphones* just and lazy to study. This causes students to be unable to show the ability to think, be critical, reasonable, and also creative according to graduate competency standards, especially for Natural Science subjects, therefore, these problems have an impact on the learning outcomes obtained by students

Learning outcomes are *outputs* obtained from inputs that have been given, these outputs and inputs are divided into knowledge, attitudes and skills. This is in line with Nana Sudjana's opinion in a study conducted by Heriyunita (2016) explaining that learning outcomes are abilities obtained after students get experience when participating in a lesson.

The standard of whether or not a learning outcome is good certainly has a certain standard of assessment. Whether or not the learning outcomes are successful can be known if they have met the KKM. KKM is a benchmark for the completion of a teaching and learning process. Low learning outcomes are one of the problems that often occur in the world of education. According to Nurhasanah and Sobandi in Nurilma's research (2021) The achievement of learning outcomes is very important because this can show the quality and ability of students as a result of the learning process that has been followed

The results of research conducted by Nasution (2017) stated that the use of models and student learning outcomes is in the middle category (medium) and there is a close relationship between the use of learning models and student learning outcomes. Therefore, it can be said that student learning outcomes can be improved by applying the right learning model carried out by teachers during the learning process.

Seeing the pre-research results obtained by researchers, namely an interview with the homeroom teacher of class V at UPT SDN 104 Tontonan. Data was obtained that the learning outcomes achieved by students in the odd semester, namely in the 2021/2022 academic year, could be categorized as low in science learning content. The low learning outcomes are evidenced by the low semester scores, namely that almost some students obtained incomplete odd end-of-semester scores, namely as many as 47% who did not reach KKM, where the KKM score in science subjects was 73.

There are several factors that cause low science learning outcomes in the class, namely factors that arise from the teacher and factors that arise from students. The teacher factor is the non-achievement of the application of variations in learning models. In addition, teachers also have difficulty in choosing the right learning media and cause students to be less active and creative in the classroom so that students have difficulty in expressing their respective opinions. Meanwhile, the factors of the students are the lack of interest of students in the content of science learning which causes them not to do assignments, embarrassed to ask questions when they do not understand the material, so that these activities cause boredom to science learning which results in low learning outcomes.

The use of models that are not applied during learning can result in no development in students both in terms of activity and in terms of creativity. This is supported by the opinion of Lindawati (2021), who said that the more creative the teacher manages and creates meaningful learning, the more successful the achievement of learning objectives. This is the main key in determining student achievement, as well as in science subjects.

Permendikbud RI No. 65 of 2013 concerning The Standards of the Primary and Secondary Education Process Chapter IV, in which there is an explanation that to give students the motivation to produce an imaginative and relevant / contextual work, both individually and in groups, it is recommended to apply a learning approach whose final result is a work based on problem solving. The way to increase student activity during the learning process is to apply varied learning models. The learning model makes students active and think critically, namely the *problem-based learning* (*PBL)* model, this statement was put forward by Riswat et al in the research (Agus Rubiyanto, 2021).

The *problem-based learning* model is a model that presents problems that are closely related to students' daily lives that can help in understanding the material provided. Problems are raised at the beginning of learning and then students are tasked with solving given problems (Nofziarni et al., 2019). The use of *problem-based learning* models allows students to solve problems that occur related to daily life and the student's environment. Problem-based *learning* models can encourage and improve critical thinking skills with problem solving itself where students exert all their abilities to think to find / get solutions to the problems faced (Amin, 2017).

Several researchers have proven that the application of *problem-based learning* models in learning can have a significant influence on student learning outcomes. Based on data found in the research of Triani et al, (2019) which states that the use of *problem-based learning* models can improve environmental care attitudes and student science learning outcomes. A similar research was also conducted by Nofziarni et al., (2019) who stated that the use of *problem-based learning* models has an effect and can improve student learning outcomes, namely by increasing the average value of experimental classes that apply problem-based *learning* models.

Based on this, it was concluded that the *problem-based learning* model can be used as a model to optimize the learning process to improve student learning outcomes, therefore a study was conducted with the title "The Influence of the Application of *Problem Based Learning* (PBL) Models on Science Learning Outcomes of Class V Students at UPT SDN 104 Tontonan Anggeraja District, Enrekang Regency". This research was conducted to test or prove that whether the application of *the problem-based learning* model can affect the learning outcomes that will be obtained by students.

A. Learning model

1. Understanding learning models

The learning model is an arrangement used to help or guide in managing PBM in the classroom. According to Arends, the learning model is based on the approach you want to use, including showing targets, stages in the learning process, learning environment and how to manage classes (Djalal, 2017).

Learning models can generate inspiration, interest or enthusiasm for student learning and are even able to develop student learning outcomes (Lahir et al., 2017). This is the reason behind choosing a model is so important for teachers to develop increased student creativity and liveliness. Of course, to realize this, learning activities must focus on students so that students are more dynamic, active, creative and innovative when receiving learning from educators.

Utomo Dananjaya stated that there are two learning models whose activities are student-centered, namely the Cooperative learning model and *the problem-based learning model.* However, to create, create, select, and utilize a learning model, a teacher is faced with the phase of estimating, surveying, assessing or measuring and evaluating a learning model before it is applied (Djalal, 2017).

The conclusion from the description above is that the learning model is a systematic arrangement that can be used as a basis to help in managing classes that can increase students' interest, creativity, activeness and enthusiasm for learning where the selection must be in accordance with the characteristics, learning environment, and tendencies of students in learning.

B. ***Problem Based Learning*** Model

a. Understanding ***problem-based learning*** models

The *problem-based learning* model is a student-centered learning model where problems are faced with those related to daily life (Wardani, 2018). The focus of the *problem-based learning* model is a problem. At this stage, students are expected to be able to develop their own insights, develop their research skills, and be able to think at a high level. Students are required to formulate a hypothesis of a problem that certainly requires reasonable thinking, providing solutions, which are certainly related to everyday life. (Mulyanto et al., 2018). This is in line with the opinion of Malmia et al (2019) who stated, problem-based learning begins with the presentation of a problem, then the problem is packaged into content related to the teaching material being taught which is useful as a tool to gain insight into understanding about something, increase the level of criticality in thinking, self-study, an increased sense of participants, and improve skills in solving problems.

The conclusion of some of the opinions above is that the *problem-based learning* model is a model where in the learning process, presenting problems first related to activities encountered in daily life then students are directed *to activities to find* , namely finding solutions to the problems given. It aims to increase the creativity of higher-order thinking, activeness, and develop students' inquiry skills.

b. The purpose ***of the problem-based learning*** model

The *problem-based learning* model helps students to think innovatively and fundamentally in critical thinking and develop cognitive /intellectual abilities. Each learning model has objectives to be achieved, according to Rizema in research conducted by S.M. Sari (2016), there are several learning objectives in *the problem-based learning* model as follows:

a) Assist students in creating thinking skills, critical thinking, and improving their cognitive abilities.

b) Providing direct experience to students, namely being directly involved in problem solving and becoming a simulation for further problem solving.

c. Characteristics of *problem-based learning* models

According to Rusman (2016), there are characteristics *of problem-based learning* models , namely:

a) Problems are the initial stage when learning
b) The context raised is a problem that occurs in real life but is not terrorized.
c) Problems require a lot of effectiveness/point of view.
d) Problems must be challenging for students to test the mentality of students but at the same time require evidence related to the needs of learning and learning new things
e) The main thing is to learn self-direction
f) Utilizing a wide variety of information, its utilization, and assessment of data sources is a fundamental cycle in problem-based learning.
g) Learning is cooperative, correspondence, and helpful and collaborative
h) Improving *the* ability to think critically in solving problems is as important as mastering the content of knowledge to track the answer to a problem.
i) Acceptance of the process in problem-based learning combines the integration and merging cycles of a learning.
j) PBM involves assessing and evaluating student meetings and the learning process.

Based on the characteristics or traits above, of course, the *problem-based learning* model in learning, begins with the problems raised by students / teachers. At the same time, students broaden their horizons about what they know and what they need to learn in order to find solutions to the problems they face. Students carry out many activities that will hone their logical thinking skills in dealing with a problem, from these characteristics, it can be found the application of *a problem-based learning* model where the process is oriented towards the given problem.

d. Problem based learning model steps

The implementation of *the problem-based learning* model , of course, there are steps that must be prepared, including: recognizing / identifying problems, collecting information, solving problems based on existing information and investigations, choosing solutions to overcome problems, arranging the implementation of problems, carrying out trials of plans to be implemented, and moving to overcome these problems (Sawab, 2017).

Teachers and students must know their respective roles in applying the steps of the *problem-based learning* model . The description of the teacher's role is as a mentor, students as problem solvers (*problem solvers),* while problems as the beginning of challenges, motivation, and also inspiration

The conclusion from the above opinion is that there are 5 stages of applying *the problem-based learning* model. It starts with orienting students to problems by motivating students to be directly involved in problem solving. Next is to organize students to learn, guide when starting the investigation, help develop and display the results of the work they have made, and in the final stage that is to carry out an analysis and evaluate the results of the investigation and the results of the work that has been made.

e. Advantages and disadvantages of *problem-based learning* models

Intan Purnama Sari (2021), describes some of the disadvantages and advantages of the *problem-based learning* model. There are many advantages of the *problem-based learning* model , which can foster students' critical and innovative thinking reasoning, develop problem-solving skills without the help of others, encourage students to learn independently, and by absorbing *the problem-based learning* model , significant learning will be achieved. While the drawback is that if students are not interested in learning, then they will hesitate to try and will result in them not solving the given problem, the readiness of students and teachers is needed in achieving procedures in the *problem-based learning* model, if the problem is not well understood, then the solution provided will not be related to the problem at hand.

The conclusion from the above opinion is that in the application of *the problem-based learning* model , of course, there will be advantages and disadvantages that will arise. These advantages include, *the problem-based learning* model can hone students' critical thinking skills, encourage students to learn independently, and also encourage them to always solve their own problems. While the drawback is that students will find it

difficult to solve the problems given if students do not understand the problems faced, therefore in applying this model, there must first be interest and readiness before its application.

C. Learning Outcomes

a. Understanding Learning Outcomes

Learning is an educational process that occurs in everyone in order to obtain behavioral changes, both in cognitive, psychomotor, and affective forms (Dwijayani, 2019). In learning, of course, learning outcomes are needed, both of which are the result of changes in the level of practice, increased knowledge, and also an increase in the skills and attitudes that a person has.

Learning outcomes are students' abilities in the cognitive, psychomotor, and affective realms, and the norms taught to them, therefore learning outcomes are achievements after students undergo the learning process. This is in line with Nana Sudjana's opinion in a study conducted by Heriyunita (2016) explaining that learning outcomes are abilities obtained after students get experience when participating in a lesson.

Learning outcomes are the result of a process obtained by hard work, created, and done both individually / individually or in groups obtained after undergoing the learning process (Saputri et al., 2018). Learning outcomes are an output of the input provided. The input provided is information in the form of knowledge etc. Meanwhile, the *output* is in the form of actions and performances that prove that they have obtained learning. Learning outcomes are divided into two, namely learning outcomes in terms of knowledge (Cognitive) and learning outcomes in terms of Skills (Psychomotor) A.J.Romiszowski in (Heriyunita, 2016).

The conclusion of some of these opinions is that learning outcomes are something that is obtained after following the learning. These results in question are the abilities in terms of cognitive, psychomotor, and also affective that have been taught. Learning outcomes are also *outputs* obtained from inputs that have been given, these outputs and inputs are divided into knowledge, attitudes and skills.

b. Indicators of learning outcomes

An indicator of learning outcomes is something that arises, is observed, seen, and measured which is evidence that the individual has followed the learning process, which is characterized by changes from within the student (Botty, 2018). The main indicators of the learning outcomes stated by Syaiful Bahri Djamarah in Botty (2018) are:

1) The capacity of the material taught has been achieved, be it individually / individually or in groups. The benchmark for achieving this capacity is with KKM.
2) The behavior set in the learning objectives has been achieved by students, this achievement is either in the form of individuals / individuals or groups.

c. Factors affecting learning outcomes

It is not easy to achieve good learning results, of course, an effort is needed in achieving them. In addition, there are several factors that affect the achievement of learning outcomes. According to Mansur (2015) there are 2 factors that affect learning outcomes, namely

1) Factors that reside in the student *(internal)* which include physiological aspects and psychological aspects. Physiological aspects include physical aspects such as body fitness and also the condition of the five senses. As for the psychological aspect, it includes intelligence, interests, motivations, talents, and attitudes of students.
2) Factors that are outside the student 's self *(external)* which include the physical environment, social environment and learning approach factors. The physical environment is the environment around the school which includes facilities and infrastructure. Facilities and infrastructure that are influential in the learning process in achieving the desired learning outcomes. For the social environment in question is the social environment within the classroom and the social environment in the family. And finally, the learning approach factor is learning efforts which include approaches, models, methods, and strategies used by students in studying learning materials.

Based on the studies above, it is concluded that there are two factors that affect learning outcomes, namely factors from within *(internal)* and factors from outside (*external).* Factors in the self include physiological aspects and psychological aspects. Meanwhile, external factors consist of aspects of the physical environment, social environment, and learning approach factors.

D. Science learning content in elementary schools

a. Understanding Science in Elementary School

Science is one of several main lesson content in the Indonesian educational curriculum program, including at the elementary school level (Giartama et al., 2018). Natural Sciences (IPA) is the investigation of symptoms that are regular as reality, ideas and laws that have been proven correctly in a study. Meanwhile, according to Henny (2017), science is a science that contains living things and the surrounding environment.

Science education in elementary schools is expected to make students master information, reality, ideas, standards, disclosure processes, and have a scientific / logical attitude, which will help students in concentrating on themselves and studying the surrounding environment. Science learning focuses on providing direct insights and experiences in order to find and act in order to be able to investigate / explore the surrounding environment scientifically (Sukawati, 2020).

The conclusion of some of the opinions above, namely Natural Sciences (IPA) in elementary schools is a main learning content in the educational curriculum which includes studying about organisms and their environment, investigating the symptoms that occur in nature that have been proven by a study, by providing direct experiences that are responsible for finding and exploring the environment scientifically.

b. Objectives of learning science in elementary schools

According to permendikbud No. 57 of 2014 concerning the 2013 curriculum, elementary schools explained that the purpose of science learning content is to develop cognitive, affective, and psychomotor aspects of students. Samatowa explained that science in elementary schools should give students the opportunity to develop their curiosity scientifically. This will help students in improving their abilities both in terms of asking questions or looking for answers to questions given based on facts as well as helping to develop a critical way of thinking (Pratiwi, 2018). Providing critical thinking opportunities is a focal point of science subjects. Science subjects are taught using a method called "discovering for yourself" and then faced with a problem that will be solved.

Science learning at the elementary school level is called natural science learning (IPA), with an integrated and integrated concept because it is not separated between biology, chemistry and physics. The general goal of learning science is to encourage students to study science more deeply thoroughly related to real life.

There are several objectives of learning science in elementary schools (SD) which are as follows:

1) Increase curiosity and effectiveness of both science
2) develop process skills in exploring the surrounding environment, solving problems, and making decisions.
3) Increase insight into science designs and are expected to be implemented in real life.
4) Increase self-awareness of the importance of the role of science in life.
5) Directly involved in maintaining, maintaining, and preserving the surrounding environment and gaining an understanding of the importance of respecting God's creatures.
6) Providing knowledge and skills that can be used as a basis when continuing education to the high school level.

METHOD

This research will be conducted using a quantitative research approach. The quantitative approach is used to determine the influence of the application of *the problem-based learning* model on the science learning outcomes of grade V upt students of SDN 104 Tontonan Anggeraja District, Enrekang Regency. Data collection uses *SPSS Version 25.0* with the aim of testing predetermined hypotheses.

Types of Research

The type of research used is *Pre-Experimental Design,* chosen because of the absence of a control class that researchers use but only uses pretests and posttests, but researchers still use quantitative research in managing data.

Time and Place of Research

This research was carried out in the even semester of the 2021/2022 school year in February - March 2022 and was carried out at UPT SDN 104 Tontonan, Anggeraja District, Enrekang Regency.

Research Variables and Design

This study has two types of variables in it, namely free variables and bound variables. *Independent* variables in this study are *problem-based learning* models whose symbol is X, while *dependent variables* are student science learning outcomes symbolized as Y. Research design used is *Pre-Experimental Design* with the type *One-Group Pretest-Posttest Design*. *One-group Pretest-Posttest Design* is a design of a type of pre-experimental research that is only carried out in one class /group without using a control class / group as a

comparison (Saputra et al., 2017). In this design, it does not use a control class and only uses one class, namely class V. this research design can be seen as in the following figure:

O_1 X O_2

Source: Sugiyono (2015)
Information:
O_1 : *Pretest* value (before treatment)
X : Teaching (application of *problem based learning* model)
O_2 : Posttest value (post given *treatment*)

Based on the picture above, the design design in this study only used 1 experimental class by conducting the test twice. Awal research activity, givena *pretest* (O_1) then given *treatment* (X) during learning by applying *a problem-based learning* model, and then at the end the researcher gave a *posttest* (O_2) to find out the development and influence of *treatment* which has been applied in learning. The reason for choosing this design is because it is not possible for researchers to use control classes because the school where the research is researched only has one class per level, especially in class V.

Population and Sample

The population in this study was all grade V students of UPT SDN 104 Tontonan which amounted to 17 students consisting of 13 male students and 4 female students. The sampling technique in this study was with *non-probability sampling* of saturated sampling type. In this technique, all the research populations used as samples because the population was less than 30 people (Sugiyono, 2015). The sample in this study was all students of class V UPT SDN 104 Tontonan who acted as an experimental class that received treatment in learning using *a problem-based learning* model of 17 students consisting of 13 male students and 4 female students.

Data Collection Techniques

The data collection techniques used in this study were tests, observations and documentation. The data collection technique in the form of tests serves to measure the achievement of student learning outcomes on the content of science lessons. The test used is a written test in the form of multiple choice questions for *pretest* and *posttest* which totals 15 questions which will later be validated by validators / experts before the questions are used in research. Next is the observation made by the observer, namely observing the ability of the researcher as a teacher and the activeness of students in the learning process, namely by applying *the problem-based learning* model. In addition, researchers also use documentation which is intended to document photos during the implementation of learning, questions used, and other information related to student learning outcomes such as report cards, etc.

Research Instruments

The instrument used in the implementation of this study was to use tests and observation sheets. The test instrument in this study is in the form of a written test in the form of multiple choices which will be validated by validators / experts before being used in research. The test contains pretest and posttest questions which amount to 15 items of which. The purpose of using this instrument is to measure the achievement of student learning outcomes both before and after being given *treatment*, namely applying *a problem-based learning model.*

The observation sheet used in this study is an observation sheet related to the application of *the problem-based learning* model. The observation sheet is intended for each student and will be filled out by an observer/teacher who will give a grade based on the observation sheet assessment indicators. After the researcher collects data from respondents, then the data obtained must have a scale in his research. The formula for calculating the presentation scale is as follows:

$$\textbf{Category Achievement Percentage} = \frac{\textit{Skor Indikator Pencapaian}}{\textit{Skor Maksimal}} \textbf{ x 100\%}$$

Information:
4: Indicators performed very well
3: Indictor is done well
2: Indicators are not doing well
1: Indicators not implemented

Table 1 Learning Process Success Indicators

Score	category
<20%	Very Less Effective
21% - 40%	Less Effective
41% - 60%	Quite Effective
61% - 80%	Effective
81% - 100%	Highly Effective

Source : Nur Ilma (2021)

Data Analysis Techniques

The data analysis technique in this study uses quantitative techniques used to test the influence of bound variables. The statistical methods used are descriptive statistical analysis and inferential statistical analysis. Descriptive statistical analysis is used the measure of the calculated average (mean), standard of division, maximum, minimum. To simplify the data process used ibm *SPSS Statistics Version 25.0* applications

Inferential statistical analysis was also used in this study, using parametric statistics because the data used was ratio data. The type of parametric statistics used in this study is the *Paired Sample t-test.* Inferential statistical analysis is used to test a research hypothesis. Before testing the hypothesis, it must be done to test the data prerequisites first. The test carried out on the data prerequisite test is the data normality test. The data in this study were processed using the help of the *IBM SPSS Statistic Version 25.0* application. In this study, to test the normality of the *Shapiro Wilk* test was used. After the data is normal, a hypothesis test is carried out using *a Paired sample t-Test* which aims to determine the influence of the application of *the problem-based learning* model on student learning outcomes. The test criterion is if the probability value obtained is greater than the real level of 0.05. If that happens, then Ho is accepted and Ha is rejected. In order to support the research hypothesis above, it can be formulated as follows:

1. H_0: There is no significant influence between the free variable (X) and the bound variable (Y)
2. H_a : There is a significant influence between the free variable (X) and the bound variable (Y)

The criteria for making decisions based on the results of the hypothesis test obtained are as follows:

1) Based on significance:
   a) If the significance or sig *(2-tailed)* value > 0.05, then H_0 is accepted and H_a is rejected.
   b) If the significance or sig *(2-tailed)* value < 0.05, then H_0 is rejected and H_a is accepted.
2) Based on the $_{\text{calculated T value}}$:
   a) If $-T_{\text{Table}} \leq T_{\text{Count}}$ then H_0 is accepted and H_a is rejected.
   b) If $-T_{\text{Calculate}} < -T_{\text{Table}}$ or $T_{\text{Calculate}} > T_{\text{Table}}$ then then H_0 is rejected and H_a is accepted.

RESULTS AND DISCUSSION

The results of the study that show the influence of the application of *the problem-based learning* (PBL) model on the learning outcomes of science class V at UPT SDN 104 Tontonan Anggeraja District, Enrekang Regency will be presented and explained in this section. The results of the study will be analyzed using descriptive statistics that aim to describe the research results from the data collected, the classical assumption test which aims to determine the feasibility of the regression model being used, and regression analysis which is useful for analyzing how the problem-based learning model affects the science learning outcomes of grade V students at UPT SDN 104 Tontonan.

A. Overview of the Application of *Problem Based Learning* Models

The application of *the problem-based learning* model to learning went very well. The application of *the problem-based learning* model to the content of science learning is described through an observation sheet during the learning process which consists of several steps of applying the observed *problem-based learning* model , namely (1) Student orientation to problems (2) Student organizations for learning (3) Guiding Investigations (4) Showing Work Results and (5) Evaluating problem solving. The results of such implementation can be seen as follows:

1. Results of Observation of Learning Implementation

The application of *the problem-based learning* model in learning can be said to run effectively. This can be seen from the enthusiasm and enthusiasm of the students in the learning process carried out. When the teacher delivers the learning material by applying *the problem-based learning* model, student appreciation begins to appear and is seen by the student's direct involvement in learning starting from listening to the teacher's material and explanations well, analyzing the problems given, providing solutions to the problems given, displaying the results of the selected solutions, and jointly concluding the learning results so that it affects the a learning process that makes learning take place very effectively and easily understood.

The results obtained at meeting I, namely the learning process carried out are included in the effective category with an implementation percentage rate of 75% and for meeting II it is included in the very effective category with an implementation percentage rate of 88.63%. The achievement of this implementation is obtained by dividing the indicator achievement score by the maximum score and then multiplied by 100%.

The results of observations that have been made in the learning process with the application of *the problem-based learning* model can be categorized as very effective, with an overall percentage level, namely in meeting I and meeting II which is 81.82%. This is obtained from summing the percentage results at meetings I and II and then being divided in half so as to obtain these results. Based on this, a conclusion can be drawn that the percentage of learning implementation with the application of *the problem-based learning* model has increased and runs very effectively.

B. Science Learning Outcomes of Class V Students at UPT SDN 104 Tontonan

The student learning outcomes used before the treatment are by giving *pretests* to students which are multiple-choice questions totaling 15 questions. Meanwhile, the student learning outcomes used after treatment are by giving *posttests* to students which are also multiple-choice questions used in the pretest but the numbers and options have been randomized first. Each answer to the student's work is then given a score. As the results have been attached, a summary of *pretest* and *posttest* statistics of class V science learning outcomes at UPT SDN 104 Tontonan is described as follows:

1. **Descriptive Statistical Results**

Descriptive statistical results to show the distribution of scores on student learning outcomes and also to answer problems in the problem formulation formulated in this study. The following is a description of the descriptive statistical results.

a. *Pretest*

Statistical results related to *pretest* scores in grade V students at UPT SDN 104 Tontonan, namely classes that have not been given teaching by applying *a problem-based learning* model, can be seen in the following table:

Table 2 Description of *Pretest* Scores

Descriptive Statistics	Statistical Value
Sample count	17
Lowest value	26.67
Highest score 86.67	
Average (*mean*)	58.82
Range	60.00
Standard deviation	15.49
Median	60.00
Mood	60.00

Source: *IBM SPSS Statistic Version 25*

Based on the table above, it can be known that the average value (*mean*) of the *pretest* value is 58.82, the median obtained is 60.00 and the mode is 60.00 with a standard deviation of 15.49 which shows how close the individual data point is to the mean value . The lowest value processed was 26.67 with the highest value being 86.67. The range of values obtained is 60.00 which indicates the range between the most beautiful value and the highest value. The frequency distribution of *pretest* results of student learning outcomes can be seen in the following table

Table 3 Distribution and Presentation of *Pretest* Scores

No.	Value Interval	Category	Frequency	Percentage
1	90 - 100	Excellent	-	-
2	80 – 89	Good	3	17.6 %
3	70 – 79	Enough	1	5.9 %
4	60 – 69	Less	6	35.3 %
5	0 – 59	Very lacking	7	41.2 %
	Sum		17	100 %

Based on the table above, it can be seen that the category with the highest percentage rate is the very lacking category, which is 41.2%. Based on the results of the descriptive data analysis that has been confirmed, it can be concluded that the *pretest* results in class V at UPT SDN 104 Tontonan are in the very lacking category with the most dominant percentage gain.

b. Final* Test *(Posttest)

Statistical results related to *posttest* scores in grade V students at UPT SDN 104 Tontonan, namely classes that get *treatment* / treatment, namely in their learning applying *a problem-based learning* model, can be seen in the following table:

Table 4 *Description of Posttest* Scores

Descriptive Statistics	Statistical Value
Sample count	17
Lowest value	53.33
Highest score of 100.00	
Average (*mean*)	81.95
Range	46.67
Standard deviation	12.85
Median	80.00
Mood	93.33

Source: *IBM SPSS Statistic Version 25*

Based on the table above, it can be known that the average value (*mean*) of the *posttest* value is 81.95, the median obtained is 80.00 and the mode is 93.33 with a standard deviation of 12.85 which shows how close the individual data point is to the average value (*mean*). The lowest value processed is 53.33 with the highest value being 100.00. The range of values obtained is 46.67 which shows the range

between the easiest value and the highest value. The frequency distribution of *pretest* results of student learning outcomes can be seen in the following table:

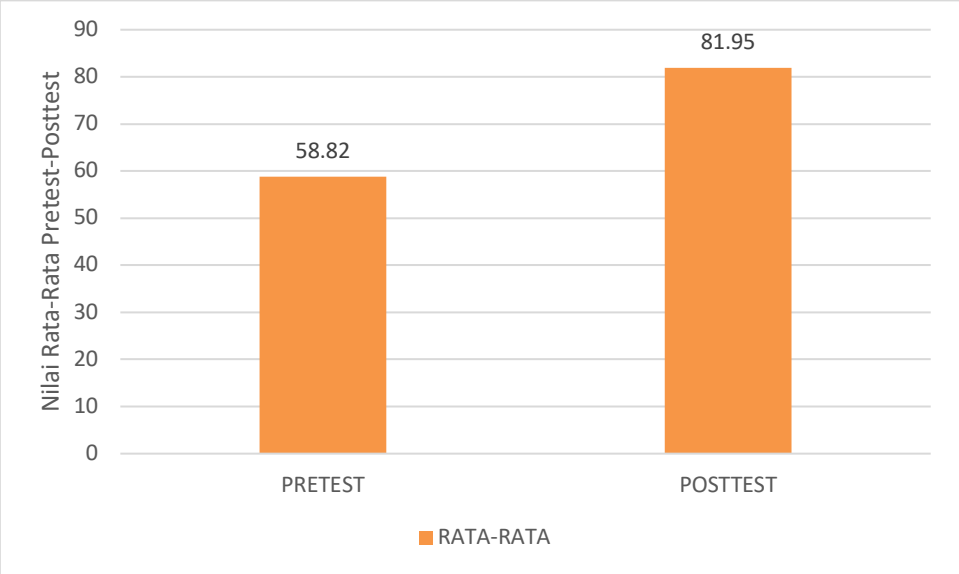
Table 5 Distribution and Presentation of *Posttest* Scores

No.	Value Interval	Category	Frequency	Percentage
1	90 - 100	Excellent	7	41.2 %
2	80 – 89	Good	4	23.53 %
3	70 – 79	Enough	3	17.6 %
4	60 – 69	Less	2	11.77 %
5	0 – 59	Very lacking	1	5.9 %
	Sum		17	100 %

Based on the table above, it can be seen that the category with the highest percentage rate is the excellent category, which is 41.2%. Based on the results of the descriptive data analysis that has been confirmed, it can be concluded that the *posttest* results in class V at UPT SDN 104 Tontonan are in the very good category with the most dominant percentage gain.

The histogram of the student's completion score is as follows:

Figure 1 *Pretest* and *Postest* Average Value Bar Chart.



Based on the calculation of the average learning outcomes test above, it can be concluded that there is an influence on the application of the *problem-based learning* model on the science learning outcomes of class V students.

The average *pretest* result in class V, namely teaching without using *problem-based learning*, was 58.82. Meanwhile, the average *posttest* result , namely teaching using *a problem-based learning* model , was 81.95. Realizing that the data was obtained that there was an increase in *the pretest* and *posttest* results in the class. Therefore, this proves that the application of the *problem-based learning* model in the teaching and learning process can improve the science learning outcomes of grade V students at UPT SDN 104 Tontonan.

C. The Effect of Applying *the Problem-Based Learning* Model on The Science Learning Outcomes of Grade V Students at UPT SDN 104 Tontonan

1. Inferential Statistical Results

Inferential statistical analysis is useful for testing a research hypothesis. Before testing the hypothesis, it must be done to test the data prerequisites first. The test carried out in the data prerequisite test in this study is the data normality test. The data in this study were processed using the help of *the IBM SPSS Statistic Version 25.0* application and obtained the following results

a. Normality Test

A normality test is carried out to check whether the distributed data is normal or not. As for proving that the distributed data is normal or not, the ibm *SPSS Statistics Version 25.0* application assistance is used using the *Shapiro-Wilk method.* The test criteria using *Shapiro Wilk* is that if the significance of the > 0.05 it means that the data is normally distributed. Vice versa, if the significance of the ≤ 0.05 then it means that the distributed data is abnormal. Based on the results of data analysis using the SPSS Version 25.0 application, normality test data were obtained in grade V students of UPT SDN 104 Tontonan. The results of the normality test can be seen in the following table:

Table 6 Normality Test Results *of Pretest* Values and *Postest* Values.

Data	Probability Value	Description
Pretest	0.747	0.747 > 0.05 = normal
Posttest	0.110	0.110 > 0.05 = normal

Based on the table above, the results of the normality test using *IBM SPSS Statistic Version 25.0* with the *Shapiro-Wilk* method obtained *a Pretest* signification value **of 0.747** > 0.05 and *Postest* **0.110** > 0.05 so it can be concluded that the *Pretest* and *Postest* values are normally distributed.

b. Hypothesis Test

The hypothesis test used is the *Paired sample t-Test* which aims to compare the *mean* of *the pretest* and *posttest* using a significance of 0.05. The results of the hypothesis test can be seen in the table below:

Table 7 Hypothesis Test Results

Data	T	Df	Probability Value	Information
Pretest and *Posttest*	-7.141	16	0.000	0.000 < 0.05 = no influence

Based on the output results of the *Paired Sample T-Test* test above, it was obtained that at the level of signification of 5% (0.05), the results were processed from the Sig value. *(2-tailed)* is less than 0.05 i.e. obtaining a value of 0.000 (0.000 < 0.05) which means that H_0 is rejected and H_a is accepted.

Basedon the table it is also obtained that, nilau T_{Count} i.e. - 7.141. As for getting the T_{Table} , it is obtained:

$T_{Table} = (\frac{a}{2} ; n - k - 1)$

$T_{Table} = (\frac{0.05}{2} ; 17 - 1 - 1)$

$T_{Table} = 0.025 ; 15$

$T_{Table} = 2.131$(seen in the T value distribution $_{table}$)

Based on these data, it was obtained that $T_{Calculate} > T_{Table}$ (7,141. < 2,131). Because of this, H_0 is rejected and H_a is accepted which means that there is a significant influence between the free variable (X) and the bound variable (Y).

Discussion

This research is related to the influence of the application of *the problem-based learning (*PBL*)* model on the learning outcomes of science class V at UPT SDN 104 Tontonan, Anggeraja District, Enrekang Regency in the 2021/2022 school year. This research was conducted in class V at UPT SDN 104 Tontonan, Anggeraja District, Enrekang Regency. This study used 2 variables, namely free variables for the use of *problem-based learning* models and variables bound to science learning outcomes for grade V students of SDN 104 Tontonan.

Researchers used 1 class, namely grade V students of SDN 104 Tontonan as an experimental class using *problem-based learning* models and samples in the experimental class totaling 17 students. Data collection was carried out 4 times, the first meeting was giving *Pretest,* the second and third meetings were teaching using *a problem-based learning* model , then the fourth meeting was giving *Postest.*

The data collection techniques carried out are (1) Tests which are techniques to obtain data on the application of *problem-based learning* models to student science learning outcomes. (2) observation sheets, namely sheets to determine the implementation of learning, namely to see the enthusiasm and activeness of students in the application of *problem-based learning* models (3) documentation used to collect data such as documentation of student activities, pretest and posttest scores and learning implementation sheets.

Learning using *a problem-based learning* model goes very well. This can be seen from the enthusiasm of students in participating in the ongoing learning. It can also be seen that students are more enthusiastic in the learning process that applies *a problem-based learning* model because the problems presented are related to problems that occur in their daily lives. This is based on the opinion of Wardani (2018) who said that the *problem-based learning* model is a student-centered learning model where problems are faced with those related to daily life. In addition, according to research conducted by Lestari (2015), it was obtained that by applying *a problem-based learning* model, it can increase students' enthusiasm in learning.

The delivery of learning materials from teachers by applying *the problem-based learning* model brings up student enthusiasm and this can be seen by the direct involvement of students in learning starting from listening to the teacher's material and explanations well, analyzing the problems given, providing solutions to the problems given, displaying the results of the chosen solution, and jointly concluding the learning outcomes so that it affects the process learning that makes learning take place effectively and easily understood.

The steps used by teachers in presenting teaching materials are using a *problem-based learning* (PBL) model which begins with orienting students to problems, then organizing students to be ready to learn, guiding individual and group investigations, presenting work results, and the last is evaluating the problem-solving process that has been carried out. These five steps are contained in the core activities carried out by students during the learning process, either at the first meeting (*treatment I)* or in the second meeting (*treatment II)*.

The process of implementing learning at the first meeting went effectively. The material taught is about several forms of changing the form of objects. At this meeting, the enthusiasm of the students can be seen even though there are 1-2 people who are still shy about expressing their opinions when asked by the teacher. The initial activities carried out were praying, checking attendance, doing *Ice Breaking* and listening to apperceptions. The core activity that students do during this first meeting is to carry out a learning process based on the syntax *of the problem-based learning* model. The core activity that students do is to conduct an experiment related to changes in the form of objects, especially melting and freezing where the experimental process is carried out in groups. Students are given a problem in the form of a symptom that occurs in the experiment, then students are required to solve and find solutions related to the given problem, then students present the results of the solution obtained and then at the end evaluate related to the given problem.

The process of implementing learning at the second meeting went very effectively. The material taught is about several forms of changing the form of objects. At this meeting, the enthusiasm of the students can be seen throughout, the students have begun to actively ask questions and are not as timid as they were during the first meeting. Students began to be active in the experiments they launched, participated in discussions with their group of friends, and even dared to volunteer to present the results of the group work they were working on. The core activities carried out are almost the same as the activities at the first meeting, which distinguishes only in the material taught and tested, which is about yawning and condensing.

The observation results obtained in the learning process with the application of *problem-based learning* models can be categorized as very effective. At meeting I (*treatment I)* the learning process carried out was included in the effective category and based on the results of observations, almost all indicators were carried out well. then at meeting II (*treatment II)* was included in the category of very effective and based on the results of observations, the indicators were carried out well and very well. Based on the percentage of meeting I and meeting II, a conclusion can be drawn that the percentage of learning implementation with the application of *the problem-based learning* model has increased and runs effectively. From this statement, it can be concluded that by applying *the problem-based learning model,* it can increase student activity in learning. This is in line with the results of research conducted by Wati (2019) who said that student activity can increase, namely by applying *a problem-based learning* model, as seen in the acquisition of activeness in cycle I and cycle II which has increased significantly.

Based on the results of descriptive statistical analysis using the SPSS Version 25.0 application, the highest *pretest* value was 86.67 after being given teaching in the form of applying *a problem-based learning* model so that the highest *postest* value was 100. This shows an increase where in the *pretest* no one gets the perfect result, but during *the posttest,* someone reaches the perfect score of 100. This is an excellent improvement for students' science learning outcomes after obtaining *treatment.*

Analytically, the average *pretest* was 58.82 then increased at *the postest* value to 81.95, this shows a significant increase from the average value of *the pretest* and *posttest* which proves that the use of *problem-based learning* models can improve student science learning outcomes. From the average *pretest* and *postest* scores that have increased, it can be concluded that there is an influence on the application of *problem-based learning* models on learning outcomes in class V UPT SDN 104 Tontonan. The increase in student learning outcomes using *the problem-based learning* model is also supported by research conducted by Tanjung (2018), which also shows that there is a positive and significant influence between *the problem-based learning* model and the Scientific Learning approach on learning outcomes.

The application of *the problem-based learning* model in learning, it is hoped that students can explore their knowledge by solving the given problems. The focus of the *problem-based learning* model is a problem. At this stage, students are expected to be able to develop their own insights, develop their research skills, and be able to think at a high level. Students are required to formulate a hypothesis of a problem that certainly requires reasonable thinking, providing solutions, which are certainly related to daily life (Mulyanto et al., 2018). Furthermore, S.M. Sari (2016) who stated that the purpose of the *problem-based learning* model is to provide direct experience to students, namely being directly involved in problem solving and becoming a simulation for further problem solving

Based on the learning objectives, namely that students can identify changes in the form of objects that occur in daily life, the use of *a problem-based learning* model in class V UPT students of SDN 104 Tontonan is one of the ways that has been proven by researchers by looking at learning outcomes in the material of changing the form of objects, namely an increase. This is in line with research conducted by Triani et al., (2019) which proves that there is an increase in the value of the dick class with the experimental class where the experimental class gets treatment, namely teaching using *a problem-based learning* model.

The success of the application of *the problem-based learning* model is evident from the pretest learning outcomes category where it is known that no student obtained a score that was in the excellent category, 3 students were in the good category with a percentage of 17.6%, 1 student in the sufficient category with a percentage of 5.9%, 6 students in the less category with a percentage of 35.3%, and 7 students who were in the very less category with a percentage of 41.2%. Based on the results of the descriptive data analysis that has been confirmed, it can be concluded that the *pretest* results in class V at UPT SDN 104 Tontonan are in the very less category with the most dominant percentage gain of 41.2%.

In contrast to *the pretest score,* the posttest score increased where it was known that 7 students were in the very category with a percentage of 41.2%, initially none of the students obtained it in the *pretest*, 4 students in the good category with a percentage of 23.53%, 3 students in the sufficient category with a percentage of 17.6%, 2 students in the less category with a percentage of 11.77%, and 1 student who was in the very less category with a percentage of 5.9%. Based on the results of the descriptive data analysis that has been confirmed, it can be concluded that the *posttest* results in class V at UPT SDN 104 Tontonan are in the very good category with the most dominant percentage gain. The increase in pretest and posttest results is in line with research conducted by Wardani (2018) which also obtained an increase in posttest scores in cycle I and also cycle II after carrying out learning using a *problem-based learning* model.

Based on these data, it can be concluded that there is an increase in the value of student learning outcomes, this can be seen from the acquisition of *pretest* scores , namely being in the very less category and obtaining *posttest* scores which are in the very good category. Based on this statement, it can be concluded that the *problem-based learning* model can improve the science learning outcomes of students in class V at UPT SDN 104 Tontonan, Anggeraja District, Enrekang Regency. This is in line with the results of research conducted by Pratiwi (2018) which obtained the results that *problem-based learning* models can improve student science learning outcomes. Furthermore, the research conducted by Nofziarni et al (2019) also said that the use of *problem-based learning* models can improve student learning outcomes in the classroom.

The condition in the classroom that is observed at the time of application of the *problem-based learning* model is that students tend to be active in the learning process by participating in solving given problems. The use of *problem-based learning* models is more effectively applied in learning because it can provide an experience of direct involvement of students in learning by participating in finding solutions to problems given.

This will increase students' interest in learning and activeness because they feel they are not bored and will ultimately affect and improve student learning outcomes. This is in line with the opinion of S.M. Sari (2016) who said that *the problem-based learning* model helps students in creating thinking skills, critical thinking, and improving their cognitive abilities.

The results of the data prerequisite test carried out, namely the normality test used before the hypothesis test is carried out which is useful for seeing the feasibility of the data whether it is distributed normally or not. In this normality test, *the pretest* and *postest* data obtained a significance value greater than 0.05 using the *Shapiro-Wilk* method method, therefore it can be concluded that the *pretest* and *postest* values are normally distributed. This is supported by research conducted by Sawab (2017) which also obtained *pretest* and *posttest* significance values greater than 0.05, which means that the data is also normally distributed. According to Farisi et al., (2017), the function of the normality test is to find out the data studied whether it is normally distributed or not and also to function in the future for the t test, because if the data is not normally distributed then the t test cannot be carried out in testing existing hypotheses.

The hypothesis test results in *the paired samples test* table show significant values or *Sig values. (2-tailed)* i.e. 0.00. From this statement, the result was obtained that the significant value of < 0.05 i.e. (0.00 < 0.05) which means that H_0 is rejected and H_a is accepted. Therefore, it can be seen that based on the significance value, it can be concluded that there is a significant influence between the free variable (X) and the bound variable (Y).

The results of *the paired samples test* table not only show the significance value, but also show the Calculated T value. $T_{\text{The calculation}}$ obtained at the output is -7.141, and the result of the output obtains a negative value. According to Raharjo in a study conducted by Nur Ilma (2021) said that the acquisition of negative values occurs because the average value of the pretest is lower than the acquisition of the average value of the posttest, but in that context a negative calculated T value can have a positive meaning. Furthermore, T_{Table} is obtained, which is 2,131. Based on these data, it was obtained that $T_{\text{Calculate}} > T_{\text{Table}}$ (7,141 > 2,131). Based on this, H_0 is rejected and H_a is accepted. Where it means that there is a significant influence between the *problem-based learning* model and the student's Science Learning Outcomes. This influence is evident by the increase in student learning outcomes. From these results, in line with research conducted by Adawiyah (2011) which stated that the application of *the problem-based learning* model can improve student activities and learning outcomes. Furthermore, Nofziarni et al (2019) stated that *problem-based learning* models can improve student learning outcomes in the classroom. Then it is further supported by research conducted by Tanjung (2018) which states that there is an influence of the use of *problem-based learning* models on student learning outcomes.

CONCLUSION

1. The implementation of learning with the application of *the problem-based learning* model in class V of UPT SDN 104 Tontonan Anggeraja District, Enrekang Regency on the content of science learning went very well and was in the effective category because the percentage of categories increased at each meeting.
2. The science learning outcomes of students in class V UPT SDN 104 Tontonan increased when applying *the problem-based learning model.* This is proven by the average value of *the posttest* (after *treatment*) is higher than the average value of the *pretest* (before *treatment*).
3. There is a significant positive influence from the application of *the problem-based learning* model on the science learning outcomes of grade V students at UPT SDN 104 Tontonan Anggeraja District, Enrekang Regency, as evidenced by the T Value $_{\text{Of Counting}} > T_{\text{Table}}$. In addition, the significance value obtained is less than 0.05 which means that Ho is rejected and Ha is accepted.

Based on research that has been carried out , researchers explained several suggestions, including:

1. For teachers, based on the results of research conducted, it shows that *the problem-based learning* model can affect student science learning outcomes, for this reason, it is recommended for teachers to use *problem-based learning* models in science learning and in other subjects in the appropriate material.
2. For students, researchers have expectations where students will hopefully later be able to improve their learning outcomes optimally.
3. For researchers, it is hoped that more studies, understands, and reads various sources or references, especially related to the research that has been carried out.

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