Application of the Problem Based Learning Model Through the Use of Waste as a Teaching Aid Media in Elementary School Students

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Abstract

Research with the title Application of the Problem Based Learning Model through the Use of Waste as a Teaching Aid Media for Elementary School Students. This research is motivated by the importance of using waste as a teaching aid medium in the learning process for elementary school students, which needs to be given a very interesting priority, given its existence. Efforts to utilize waste so that used items that are no longer used can be processed as media materials for teaching aids to support the learning process. The research method used was an experimental method, the population used was students from the Mazroatul Ulum Private Madrasah Ibtidaiyyah, South Tangerang. Indonesia, the number of samples in the research was 30 students. The data collection technique uses questionnaires, pretest posttest and documentation. The research results show that the R value or correlation coefficient between the Problem Based Learning variable on waste utilization is 0.982, meaning the program has an influence, namely 0.982, which means sufficient or moderate. This can be seen from: 0.00-0.20 means very low or very weak, 0.20-0.40 means low or weak but certain, 0.40-0.70 means quite means moderate, 0.70- 0.90 means high or strong, 0.90-1.00 means very high or very strong. Meanwhile, R_{square} is also called the coefficient of determination. It can be read that the R_{square} value shows 0.633. This figure can be interpreted that the school environment on achievement motivation is 63.3% while the remaining 76.7% is influenced by other factors.

1. Introduction

The waste problem is known as a very complex issue, especially in big cities, it cannot be denied that student behavior has an important role in this waste problem. Facts seen in the

field show that there are still many students who do not dispose of their rubbish properly, even though rubbish bins are available around the school. If attention to waste is used properly, it can be more useful, of course teachers can be more creative in creating teaching aids that have educational value. The new paradigm is to change that waste only has to be thrown away, it needs to be recycled and used as a teaching aid to support the learning process, and can be a significant source of income.

Every action carried out by students, either individually or in groups, whether at home, at school, or elsewhere, can produce waste, including organic and non-organic waste, waste is the result of daily human activities or natural processes which are solid or semi-solid, can be organic or non-organic materials, and can be decomposed or non-decomposed, which are considered to no longer have value and are discarded into the environment. Many individuals feel that waste is a problem, even though in fact waste continues to increase all the time and knows no rest, because every entity continuously produces waste.

The use of the Problem Based Learning, problem-based learning model has a significant positive impact on students' learning motivation and critical thinking abilities in managing waste around the school environment. This is because increasing students' learning motivation and critical thinking skills does not only require knowledge, but also prioritizes students' activities in everyday life. In this way, it is hoped that it can increase students' learning motivation and critical thinking abilities. It is known that every day, waste is generated by families or households, especially in school environments. The main priority is to utilize waste before environmental pollution occurs which could endanger students' health. Therefore, systematic, comprehensive and sustainable efforts are needed to utilize waste, which includes steps to reduce and handle waste.

Students are guided to develop a mindset that focuses on reducing and handling waste. Waste reduction includes the three 3R principles, namely reuse, reduce and recycle, while waste handling involves the processes of separation, collection, processing and final disposition. Next, students are given guidance to create learning media according to the author's instructions. Regarding students' ability to utilize waste in everyday life, especially in the school environment, it has still not reached an adequate level. They can only apply some material in daily practice, while most of the other material still requires guidance from educators. Understanding the importance of utilizing waste, students need to be taught to utilize used items and transform useless items into more useful items to be used as teaching aids in the learning process.

Therefore, a learning approach is needed that can create a learning environment that encourages increased knowledge, thought processes, management and utilization of waste. One option to overcome this situation is to utilize waste through the application of problem-based learning methods. Problem-based learning is a learning approach that requires students to actively think to understand a learning concept through situations and problems introduced at the beginning of learning. The main goal is to train students in problem-solving skills using a problem-solving approach. This learning model has the potential to improve students' conceptual understanding and creative thinking abilities in studying biology, so that

students can gain maximum benefits from the learning process and results. According to Danial (2010:3), a problem-based learning approach gives students strength in analyzing issues surrounding waste management and utilization. This approach emphasizes an active learning process and involves students physically and mentally in solving problems related to waste management and utilization through cooperative group work. Therefore, through the application of this learning model, it is hoped that it can have a positive impact on students' learning skills and achievements. Problem Based Learning is a learning method that challenges students to collaborate in groups to find solutions to real problems.

Based on some of the descriptions above, the author is interested in researching the use of waste and learning about students' critical thinking skills which are still lacking, namely providing learning to students using the Problem Based Learning model as well as providing assignments or material for managing and utilizing waste. It is hoped that this PBL model can run optimally when equipped with methods that can support the learning process.

The results of observations that have been made show that at MIS Mazro'atul Ulum, the problem-based learning (PBL) method has been implemented, but student still face difficulties in separating organic and non-organic waste. Therefore, this research aims to give students the task of exploring and identifying problems related to waste in the school environment and finding solutions to overcome these problems through waste management. Thus, students will have the opportunity to gain hands-on experience, develop personal skills holistically, and promote harmonious cooperation among fellow students. Through this assignment, it is hoped that students can also train their critical thinking skills in solving environmental problems and utilize school waste for the recycling process, thereby producing products that have greater value and benefits.

2. Theoretical Study

2.1 The Nature of Waste Utilization

The concept of waste utilization can be interpreted as activities that involve making the use of resources more meaningful in the learning process. Garbage on the other hand is a term commonly used to refer to solid waste. Waste is the residual result of various materials that have undergone various actions, either because they have been used to a large extent, through processing, or because they have lost their economic value. Viewed from a social and economic perspective, waste often has no economic value, and from an environmental perspective, it can cause pollution or disturbance to the ecosystem.

Waste is discarded or abandoned material as a result of human activities or natural processes that has no economic value. In the dictionary of environmental terms, waste is defined as materials that have no economic value, materials that are not useful for general purposes, damaged materials, product that are defective in the manufacturing process, excess materials, or rejected materials. Garbage includes solid and semi-solid waste made from various types of materials, both organic and inorganic, which can burn or not burn, including metals and non-metals. Waste refers to items that are considered unusable and discarded by the previous owner or user, although for some people they still have potential benefits if managed properly

according to applicable procedures. Waste accumulation is caused by a number of factors, such as the volume of waste exceeding the capacity of final waste disposal sites (TPA), the rare practice of using waste in school or public environments, and the lack of policy support from the government. Waste classification includes:

a. Organic trash

Organic waste includes food scraps, such as pieces of meat, fruit, vegetables, and so on. Examples of this type of waste include scrap metal, various types of rocks, broken glass, bones, and the like. This type of waste, because of its hard physical properties, can be used to level low land or can even be used as paving material for paths. Waste or garbage can also mean something that is not useful and is thrown away by most people, they think of it as something that is useless and if left for too long it can cause disease even though with proper waste management it can turn this waste into an economic object (Iswan:2022:6055). However, with the right efforts, metal waste can be recycled into useful items, rocks can be used to retain soil in low areas or as paving materials for footpaths, broken glass can be re-melted and made into useful items, while bones , if crushed and processed can be used as fertilizer and for other purposes.

b. Inorganic Waste

According to Alex (2012:9-10), inorganic waste refers to the remains of synthetic materials, such as plastic, paper, metal, glass, ceramics, and the like. Based on the method of decomposition by microbes, organic waste is divided into two different types in terms of management and utilization, namely: 1). Wet Waste, consisting of organic material that rots easily if left wet. Examples of this waste include most household waste, including food scraps, vegetables and fruit, 2).Dry Waste, consisting of inorganic materials, most of which do not decompose easily.

Based on the explanation from the experts above, organic waste is food waste such as meat, fruit, vegetables and the like. Examples of waste from inorganic substances are hard objects such as pieces of metal, various types of stones, broken glass, animal bones, and so on. This type of waste, because of its hard physical properties, can be used to fill low ground or to widen pedestrian paths. Dry waste consists of inorganic materials, most of which do not decompose easily.

2.2 Benefits of Waste

The benefit of waste is that it is leftover material that has the potential to damage the environment and cause disease. Some people may have a negative view of waste and not consider turning it into something more useful. However, effective use of waste requires dedication and patience, producing various sources of energy that can be reused from the waste. Several cities around the world, including big cities in Indonesia, have succeeded in making good use of waste. With cooperation between various parties, a region can find the right way to utilize its waste properly. This is good news for the residents of the region, as Sweden has demonstrated. This country, with its royal system, has created new innovations in waste management, so that the level of waste production is very low. Sweden is now known

as one of the cleanest countries in the world. Benefits of efficient waste management: Effective management of waste can provide positive benefits for humans. There are several benefits that humans can gain when they understand how important it is to manage waste well. The five benefits of waste management are:

a. Save Energy

Transforming waste into new energy sources has the potential to significantly reduce human energy consumption. The types of energy that can be produced from this process are very diverse, including fuel and compost, and many others. Using waste as fuel, for example, can produce much greater energy savings than using coal as the main energy source. An example of this can be found in Sweden, where the use of fuel creates savings of 0.061 SEK per KWh compared to the use of coal.

b. Reducing Pollution

Overuse of natural resources can result in increased levels of pollution and contribution to global warming. One of the best solutions to reduce pollution levels and protect the earth from the impacts of global warming is through good land management. Even though it is important, it is important to remember that this land processing process takes quite a long time. For example, in making chemical fertilizers that are easy to access and guaranteed results for farmers, this is different from compost fertilizer which is produced through processing organic waste. The process of making compost is sometimes complicated and time consuming, and the results are not always optimal.

Apart from that, efforts to reduce pollution can also be directed at water sources by converting waste water into a source of fuel, electrical energy, and used for agricultural irrigation. In the context of overcoming air pollution, efficient waste management can produce nitrogen compounds that can be inhaled by all creatures safely.

c. Save Natural Resources

The benefits of efficient waste processing also involve saving existing natural resources, thereby preserving nature. For example, the use of tissue made from tree fibers has caused damage to forests and its impact on the ecosystem within them. As an illustration, one tree can be used to produce two packs of tissue, while one tree can only produce enough oxygen to support three people. This reflects that the use of tissue has reduced the availability of oxygen on earth. In fact, the use of tissue can be replaced with cloth napkins, so as to maintain the availability of natural resources in a stable condition.

d. Economical

With creativity and strong determination, trash can become valuable. This means that, in addition to creating attractive products, costs can be minimized. This is something that needs to be considered when being able to use waste as material to create products with high selling value.

e. Saving money

Man's desire to obtain certain goods requires him to spend money as payment. However, for those who understand the benefits of efficient waste management, there is potential to reduce costs. Based on these benefits, researchers have taken it as one of the parameters in the assessment in their research. In the context described above, converting waste into new energy sources has the potential to reduce human energy needs. Using waste as fuel can produce greater energy savings than using coal as the main source of energy.

2.3 Positive Impact of Waste

When studying the impact of waste, it is necessary to look at it from a positive perspective, not just the negative aspects. Waste has significant consequences for human life and other beneficial organizations. The positive impacts of waste include: a. Waste has great potential as fertilizer in the ecosystem; b. Opening new job opportunities for scavengers; c. Waste can be converted into biogas. Even though there are various types of waste, what can naturally decompose into fertilizer in the ecosystem is organic waste, such as leaves.

Apart from that, wet waste that arises as a result of human activities, such as in markets or taxes, can also be converted into fertilizer through the composting process, which is a recycling method to reduce the amount of waste. Scavenging activities provide livelihoods and income for many people, especially in big cities like Jakarta. Although this job carries high risks, the lack of work in some cases forces them to undertake it. Credit should be given to them because through this activity, thousands of tons of waste, including plastic, cans and scrap metal, can be recycled every year. Waste also has the potential as a source of biogas with special treatment, which can reduce dependence on fossil fuels such as kerosene for cooking purposes. The use of waste as biogas material needs to be socialized and training is needed on the manufacturing method. Cost savings can be achieved because the raw materials for biogas are relatively easy to obtain and do not have to be purchased.

Waste should not only be viewed from a negative perspective, but also needs to be considered from a positive perspective. One of the positive aspects is the creation of new jobs for scavengers. Apart from that, waste can be converted into biogas. Waste varies, but the type of waste that can be used as fertilizer in the ecosystem is organic waste, such as leaves, because this type of waste can decompose naturally. Even though this activity has high risks, the lack of work means that some people are forced to involve themselves in this activity. Therefore, we should reward them, because through this activity, thousands of tons of waste every year, including plastic, cans and scrap metal, can be recycled.

2.4 Negative Impact of Waste

Garbage has a very detrimental impact on humans and other living creatures, and disturbance to other living creatures also has an impact on human life. Some of the negative impacts of waste if it is not managed seriously by various parties include: Causing ecological damage to both land and aquatic ecosystems. Causes the spread of disease, causes flooding, causes unpleasant odors or foul odors and disturbs the aesthetics of an area. Disposal of rubbish or waste into water, for example, has an impact on the life of organisms in aquatic ecosystems. For example, dumping waste in a lake can cause excessive growth of water hyacinth that

covers the surface of the water. This results in a lack of oxygen in the water, which disrupts the life of fish and other aquatic organisms. The presence of water hyacinth also prevents sunlight from reaching aquatic plants, so that photosynthesis is disrupted, and this has an impact on reducing oxygen levels in the water. In addition, aquatic organisms can die from toxic chemicals in waste that is dumped into the water.

In terrestrial ecosystems, careless disposal of waste can also cause ecological damage, especially if the waste is in the form of plastic which is difficult to degrade by soil microorganisms. Plastic can persist for centuries in the environment, and land polluted by plastic waste becomes infertile, making it unsuitable for agriculture. In this context, it is important to manage waste properly and responsibly in order to reduce its negative impact on the environment and the lives of humans and other living creatures. River or lake water contaminated by rubbish is not a good choice for human use, for example as a source of water for bathing or cooking. Using polluted water can cause various health problems, such as skin diseases if used for bathing, or potential poisoning if used for cooking.

Garbage can also produce unpleasant odors and disturb the appearance of the environment, which in the end can reduce the aesthetic value of an area. Therefore, ideally, waste should not remain in Temporary Storage Places (TPS) for long and must be immediately disposed of in the waste storage areas that have been provided or waste bins that have been provided, as is already the case in many cities, including the City of Padang, which has many TPS are in the form of waste storage tanks spread across various sub-districts, as well as available waste hanging places.

2.5 The Essence of the Problem Based Learning Model

Understanding Learning Models, the learning model refers to the arrangement of delivering teaching material which includes various aspects before and after the learning process directed by the teacher. According to Kardi and Nur, as expressed in Trianto (2010: 52), the learning model includes the learning approach that will be used, including teaching objectives, as well as classroom management, explaining that the learning model is a plan or framework used as a guide in designing the curriculum, determining various learning tools, both in the classroom and in tutorial learning settings.

A learning model is a plan or pattern that is used as a guide in designing learning in class or in tutorials. A similar statement was also conveyed by Dahlan, as stated in Sutikno et al (2014:57), who considers a learning model as a plan or pattern used in compiling a curriculum, organizing learning materials, and providing guidance to teachers in the classroom or other learning environments, a learning model is a conceptual framework that describes systematic procedures for organizing learning experiences to achieve certain learning goals. By referring to the views of the experts above, it can be concluded that a learning model is a plan or pattern that is used as a guide and guidance in implementing the learning process, both in the classroom and in other learning settings.

2.6 Understanding Problem Based Learning

The Problem Based Learning (PBL) learning model is a learning approach that uses problems

as the main subject. Dutch in Shoimin (2014:130) explains that students' learning model uses real problems as a context to develop creative thinking and problem solving abilities while gaining knowledge. Finkle and Trop, as quoted in Shoimin, describe Problem Based Learning as a curriculum and teaching tool that simultaneously develops students' abilities in dealing with complex everyday problems. Poorly structured problem solving systems are also part of this approach. Apart from that, Tan, as explained in Rusman (2010:229), states that Problem Based Learning is an innovation in learning because this model maximizes students' thinking abilities through systematically structured group or team work. In this way, students can activate, hone, test and improve their thinking abilities on an ongoing basis.

According to Boud and Feletti, as stated, Problem Based Learning is one of the most important innovations in the world of education. Meanwhile, Margetson, also in Rusman (2010:230), notes that the Problem Based Learning curriculum helps develop lifelong learning skills by forming an open, reflective, critical and active mindset, in the context of Problem Based Learning (PBL), explaining that this model starts by giving students a problem, which they then have to solve to gain new knowledge. Apart from that, students are expected to be actively involved in the teaching and learning process. By referring to the opinions of the experts above, it can be concluded that Problem Based Learning involves students in learning that is centered on problem solving, improving thinking abilities, and sustainable acquisition of knowledge.

2.7 Characteristics of the Problem Based Learning (PBL) Model

According to Hosnan (2014:300), in his work the Problem Based Learning model has several characteristics, including: 1). Presentation of the Problem or Question, Learning settings focus on presenting problems or questions that have significance for both students and society. The questions and problems raised must meet the requirements of being authentic, clear, easy to understand, summarize various aspects, and have practical value. 2). Linkages with Various Disciplines, The problems presented in PBL should connect or involve various fields of science. 3). Authentic Research, The inquiry involved in PBL must be authentic. In addition, this investigation is needed to find solutions to problems, develop and test hypotheses, collect and analyze data, conduct experiments, formulate conclusions, and communicate final results. In order to maintain the authenticity and meaning of teaching material, PBL focuses on using problems or questions as a starting point in learning. The problems are designed to motivate students, encourage critical thinking, and develop authentic inquiry skills. 4). Produce and Exhibit Results/Work, In problem-based learning, students have the responsibility to organize the results of their research in the form of work and communicate the results of their work. This means that the solutions found by students in solving problems must be presented or documented in the form of a report or presentation. 5). Collaboration, In problem-based learning, learning tasks, such as solving problems, are carried out collaboratively between students in small and large groups, and also involve students in collaboration with the teacher.

Based on the above findings, it is important to note that in problem-based learning, the inquiry required is authentic. In this context, students have the responsibility to organize the

results of their research in the form of work and present the results of their work. This means that the solutions found by students in solving problems must be presented in the form of a report or presentation. Based on the characteristics of the Problem Based Learning model that has been explained previously, it can be concluded that it is a learning model that takes problems as the main focus of learning, which then becomes the object of investigation to find solutions.

2.8 Advantages and Disadvantages

According to Shoimin, the PBL learning model has a number of advantages, as explained in Rerung, Sinon, and Widyaningsih (2017:49). These advantages include: Developing the ability to solve problems in real contexts for students, encouraging students to build their own knowledge through learning activities, focusing learning on relevant problems, eliminating material that is not needed by students, reducing the burden on students in Memorizing or Storing Information, Promoting Scientific Activities Among Students Through Group Work, Encouraging Students to Use Various Sources of Knowledge, such as Libraries, the Internet, Interviews and Observations, Developing Self-Assessment Skills for Students, Increasing Students' Abilities Learners in Scientific Communication through Discussions or Presentations, Opening Opportunities for Students to Overcome Learning Difficulties Individually through Peer Teaching in Group Work.

By restructuring the statements above, the advantages of the PBL model can be explained. There are several weaknesses in the Problem Based Learning model according to Shoimin, as mentioned in Rerung, Sinon, and Widyaningsih (2017:49), which include: Not all subject matter suitable for problem-based learning because there is material that requires the teacher's role in presenting it. More appropriate for use in learning contexts that emphasize problem solving abilities. In classes with a high level of student diversity, there may be difficulties in distributing tasks. In order to rephrase these statements, the shortcomings in the Problem Based Learning model can be outlined.

2.9 Characteristics of the Problem Based Learning Model

Utilization of Diverse Knowledge Sources and Processes According to Barrow in Shoimin (2014:130-131), there are characteristics of Problem Based Learning, which include: Student-Centered Learning. The learning process in Problem Based Learning prioritizes the role of students as learning subjects. Because Problem Based Learning is in line with the concept of constructivism, which encourages students to develop their own understanding, Authentic Problems become the Center of Focus in Learning. The problems given to students in Problem Based Learning are real and relevant problems, so that students can easily understand the problem and are able to apply it in their future professional context. New information is obtained through Self-Guided Learning.

Meanwhile, according to Tan in Rusman (2010:242) states that the characteristics of Problem Based Learning are: Asking questions or problems; Focuses on interdisciplinary linkages; authentic inquiry; Producing products or works which are then exhibited, and collaborating. Based on the opinion above, it can be concluded that there are several characteristics of the

Problem Based Learning Model, namely: Learning begins with a problem; Submission of questions or concerns; Students can find their own solution to a problem; Using small groups; Produce products or work and present them; There is an evaluation of problem solving.

3. Finding

3.1 Description of Research Results

In the context of problem solving, students may not yet have a real understanding, so they try to find it themselves through various sources, such as books or other information, leaning occurs in small groups, so that scientific interaction and exchange of ideas occurs in an effort to build knowledge collaboratively, the learning process carried out in small groups. The groups created require a clear division of tasks and the setting of clear goals. Teachers act as facilitators, in implementing Problem Based Learning, teachers only act as facilitators. However, teachers must always monitor the progress of students' activities and encourage them to achieve the targets they want to achieve. Based on the results of data analysis through statistical tests in this Research, the model for implementing Problem Based Learning using waste as a media for teaching aids used for learning by students has very positive results, such as the results of statistical tests such as the following table:

Table 1. Frequency Distribution of Variable X

No	Interval class		Frequency		Xi	F.X1	Average
			absolute	Relative			
1	40	62	0	0%	51	0	155.3214
2	63	85	0	0%	74	0	
3	86	108	0	0%	97	0	
4	109	131	0	0%	120	0	
5	132	154	26	46%	143	3718	
6	155	177	30	54%	166	4980	
7	178	200	0	0%	189	0	
Total			56	100%	840	8.698	

Description of Problem Based Learning Data variable Y. Data on student learning motivation was obtained from a validated questionnaire. The questionnaire consists of 39 statements with the types of negative statements and positive statements. The data was measured using a

likert scale, so that the lowest interval score data was obtained, namely 39 and the highest interval score, namely 195. The results can be seen in the table as follows:

Table 2. Frequency Distribution of Variable Y

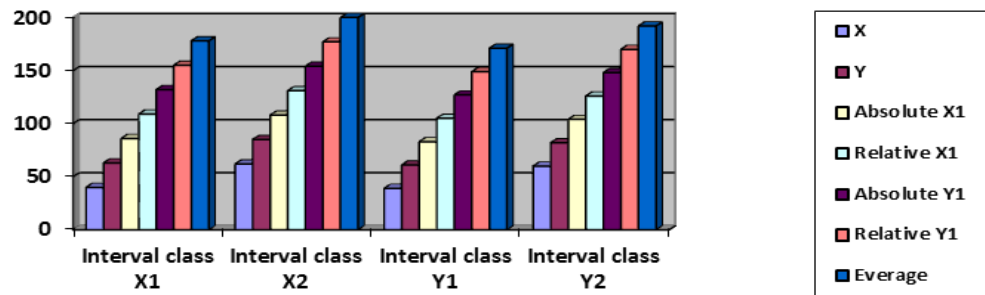| No	Interval class		Frequency				Average
			absolute	relative	Xi	FXi	
1	39	60	0	0%			
2	61	82	0	0%	71.5	0	
3	83	104	0	0%	93.5	0	140.25
4	105	126	3	5%	115.5	346.5	
5	127	148	48	86%	137.5	6600	
6	149	170	0	0%	159.5	0	
7	171	192	5	9%	181.5	907.5	
	Total		56	100%	759	7.854	

Simple Linear Regression Test

Regression analysis was carried out to obtain an overview of the influence between the independent variable (X), namely Problem Based Learning and the dependent variable (Y), namely Waste Utilization. The following is the data resulting from data processing using SPSS tools:

Table 3. Model Summary

Model	R	R Square	Adjusted R Square	Std. Eror of Estimated
1	0,982[a]	0,633	0,225	7.234

a. *Predictors (Constant), Problem Based Learning*

Graph 1. Graph of the frequency distribution of variables XY

The regression analysis used in this section in a simple regression which is based on the functional or causal relationship of one independent variable with the dependent variable R is also called the correction coefficient, so it can be read that the R $_{value}$ or correlation coefficient between the Problem Based Learning variable on waste utilization is 0,982, meaning the program has an influence, namely 0,982, which means sufficient or moderate. This can be seen from 0, 00-0.20 means very low or very weak 0, 20-0.40 means low or weak but certain 0.40-0-70 means quite moderate 0.70-0-90 means high or strong 0.90-1.00 means very high or very strong. Meanwhile R Square is also called the coefficient of determination. It can be read that the R square value shows 0.633. This figure can be interpreted that the school environment on achievement motivation is 63.3% while the remaining 76,7% is influenced by other factors. This means the influence of problem based learning on waste utilization. The following is an ANOVA table which will show the influence between variable X and variable Y, namely:

Table 4. ANOVA

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	1554.109	1	1554.109	29.698	,000[b]
Residual	5128.401	98	52.331		
Total	6682.510	99			

a. *Dependent Variable: waste utilization*

b. *Predictors: (Constant), Problem Based learning*

Based on the ANOVA table above, it can be seen that a significance value of 0.000 means that the significance level has an influence which means the significance is less than <0.50, this can be proven in the ANOVA table which has a significance value in accordance with the requirement <0.50, namely 0.000, and can be seen from the results of the hypothesis test at: T count=5,450>T table=1.984. In the sense that there is an influence of Problem Based Learning on waste utilization. The regression equation obtained is Y=24.014+1.984 this means that if the variable:

Table 5. Co Coefficient[a]

Model		Unstandardized Coefficient		Standardized Coefficient	T	Sig.
		B	Std. Error	Beta		
Constant		24.014	5.927		4.052	,000
		1.346	,247	,482	5,450	,000

a. Dependent variable: Problem Based Learning

To see t $_{table}$, it can be seen with degrees of freedom = n (number of samples) - k (number of variables). So the degrees of freedom are 100-2=98, which is carried out in a 2-way test with a significance of 10%. To see the hypothesis test, what is seen in the t $_{count}$ table is 5,450 and t $_{table}$ is 1.984. Because the value t $_{count}$=5,450>t $_{table}$=1,984.

Table 6. Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	78.3333	30	8.33908	1.52250
	Posttest	87.3333	30	7.84915	1.43305

Interpretation of the Paired Samples t $_{test}$. Based on the discussion of Pair 1's output, it can be concluded that there are differences in the Problem Based Learning model regarding waste utilization in elementary schools. Independent Sample t $_{test}$, the independent sample t test is used to find out whether there is a difference in the average of two unpaired samples. The main requirement in the independent sample t test is that the data is normally distributed and homogeneous.

6. Interpretation of Research Results

In this research, it is the final result of data analysis that the researcher obtained while conducting research in the field. The data obtained by the researcher was interpreted by interpreting the data, where the results were that problem-based planning on waste users had an effect, both from the level of children's knowledge, by knowing the use of waste. in elementary schools, based on the research results, data and facts were obtained, which were then analyzed as a guide and interpreted in the research results as follows:

1. There is a significant impact from the application of the Problem Based Learning

model on waste management by students in the VA class of Mazroatul Ulum Private Madrasah Ibtidaiyah, South Tangerang. Indonesia, which is the control group, as stated in Trianto (2010:52), which explains that a learning model is a plan or framework that is used as a guide in designing the curriculum, determining various learning tools, both in the classroom and in tutorial learning settings. The school environment has an influence on students' motivation to achieve. This indicates that the Based Learning Program can increase students' motivation to utilize waste and protect the environment. So it can be analyzed that the average score that is significantly affected in the control class is 70/80.

2. There is a significant impact from the application of the Problem Based Learning model on waste management by students in the VB class of Mazroatul Ulum Private Madrasah Ibtidaiyah, South Tangerang. Indonesia, which is the experimental group. There are lots of things that can be used to teach children about the use of waste. Teachers teach children through small things first in differentiating types of waste and then inviting them to interact with the use of waste. So it can be analyzed that the average value that is significantly affected in the experimental class is 90/100.

3. There is an influence from the application of the Problem Based Learning model on waste management by students in class 5 at the Mazroatul Ulum Private Madrasah Ibtidaiyah, South Tangerang. Indonesia, both those in the conventional group (Class VA) and the experimental group (Class VB).

Research that was carried out at the Mazroatul Ulum Private Madrasah Ibtidaiyah, South Tangerang. Indonesia, with a total of 30 students as respondents. Respondents were given 1 instrument for each variable X and variable Y which consisted of 50 questionnaire questions. The questionnaire was previously tested on 30 students with the aim and aim of achieving sufficient instrument requirements. Below are presented the results of previous research as a comparison to the author's research. Research from Hasanah (2014), entitled The Influence of the Family Environment on Waste Utilization. The research results show that the r_{count} is $0.99 > r_{table}$ 0.325. So there is a significant influence between Problem Based Learning.

Table 7. Differences between the control class and the Experimental class

No	Element	Control Class VA	Experimental class VB
1.	Mean	78.3333	87.3333
2.	Lowest value	50	70
3.	The highest score	80	100
4.	T_{count}	4,052	5,450
5.	F count	29,698	20,567
6.	R square	0,633	0,225

Based on the analysis table above, the control class and the experimental class have different results, that the comparison in the experimental class has more value in learning with the Problem Based Learning (PBL) model. The mean value of the control class is 78.333 and the experimental class value the score is 87,333, then the lowest score is from the VA class with a

score of 50 and the highest is in the VB class with a score of 100. The t_{count} for the results from the VA class calculation is 4,052. And for calculating the VB class results with a result of 5,450. The calculation for the F_{count} statistic is in the VA class with a value of 29.698 and there is also a VB value with a value of 20.567, the results found in the VB class with influential results.

7. Conclusion

Most people think that waste is a problem, even though waste continues to increase all the time and there are no holidays because every creature continues to produce waste. The paradigm of "trash to be thrown away" needs to be immediately changed to "garbage to be collected," and the paradigm of "managing waste costs a lot of money" needs to be immediately changed to "managing waste brings big income." Therefore, efforts to make people aware of protecting the environment and utilizing waste are very good and very important. This very important awareness must also be spread within the school environment. Waste management must be a priority to prevent environmental pollution which can endanger students' health. Therefore, waste utilization must be carried out systematically, comprehensively and sustainably, including efforts to reduce and handle waste. The Problem Based Learning model can have a positive impact on students' learning motivation and critical thinking skills in managing waste around the school environment. Based on the problem formulation, research results and discussion that have been described, it can be concluded that:

1. The first step in implementation Problem Based Learning is that Students mindset is directed towards waste reduction and handling activities.

2. Then students are taught to create leaning media to improve Students skills in solving waste problems.

3. Based on the results of a simple linier regression test, the school environment has an influence on student motivation to achieve. This indicated that the based learning program can increase Students motivation to utilization waste and protect the environment.

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