The Efficiency of PjBL (Project Based Learning) Model Assisted By E-Worksheet on Student Learning Outcomes in Science Subjects

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Abstract: The objective of this investigation was to evaluate the impact of e-student worksheets and the PjBL (Project Based Learning) paradigm on fifth-grade elementary school students' scientific learning results. A single group pretest-posttest is used in the research's quasi-experimental design. Purposive sampling is used in the sampling process, and Class V A is the experimental class. Research instruments up to 20 multiple-choice questions that have undergone validity and reliability testing. The experimental class has consistent and frequent distribution of data on learning outcomes. The Paired Sample T-test was utilized to analyze the data. The outcomes of the data analysis revealed 0.00. If the Sig level. < 0.05 then 0.00 < 0.05. These findings may lead to the conclusion that project-based learning (PjBL), which is supported by e-worksheets, has an effect on students' learning outcomes in science as Ho is declined and Ha is approved.

Keywords: e-Worksheet; Learning Outcomes; Project Based Learning; Science.

Introduction

Sourced from Law No. 20 of 2003 on the National Learning System the chapter 1 and article 1 mentions, Learning is an intentional effort to create an environment that promotes learning and an educational procedure that actively empowers students to develop the qualities—such as spiritual fortitude, inhibitions, character, ability, virtue, and abilities—necessary for themselves, their fellow citizens, nations, and countries. Learning has a module or teaching material that will always be applied at any time to students in the learning process at school. One of them is thematic education. Thematic education is an integrated education that uses the theme in linking some subjects so that they can share meaningful experiences with students. In the theme, there are some modules that are taught, one of which is Natural Science Education.

Natural Science is a knowledge that pursues the events that exist in nature (Fahrezi et al., 2020). Because science and nature are closely intertwined, science classes can be challenging for students because they are abstract within nature. Therefore, in mastering science subjects, something positive behavior is needed from within the students and science behavior is the main aspect that influences students participants in achieving maximum learning outcomes in science subjects (Siregar, 2020). Stated that Natural Science has different challenges and properties based on existing (Vasconcelos et al., 2015).

According to (Hasibuan, 2015), learning outcomes are the abilities that students gain as the outcome of a learning experience. These skills contain cognitive, emotional, and motor components. Learning outcomes are behavioral changes resulting from the teaching and learning process (Yanto, 2015). According to (Palittin, Ivylentine Datu, Wihelmus Wolo, 2019), learning outcomes are also influenced by the facilities owned by the school. Complete and adequate facilities will make students eager to learn, and easily understand

the material delivered to produce good grades. Therefore, it is necessary to follow up in order to increase results for students' education and teachers must be more imaginative in their lesson (Friskilia & Winata, 2018).

Some studies found that many science learning outcomes are still low. According to (Hastuti & Budianti, 2014) the average value of science subjects in Bantargebang II Elementary School assisted by visual media is still very low at 62.14%. (Indra Sukma et al., 2022) revealed that the results of science learning at Pasir Putih 03 Elementary School still very low, the lowest value obtained by experimental class students is 68 % and 56% in control class.

School are still low and need ways to improve them, because there is still a lack of attention from teachers in using learning models that are less varied when teaching so that students sometimes feel bored in the learning process. One of them is also a student worksheet which is only in the form of a regular question sheet.

According to (Safitri et al., 2022) students low results for scientific education caused by the use of student worksheet that has not been supported during the process of science education. Student worksheet is very important because it contains a guide and a facilitator for students that provides content, directions, and summaries that students will use to enhance their learning results (Rahmawati & Wulandari, 2020). There fore according to (Tur Rosidah et al., 2021) there are new innovations that can be applied in making student worksheets, namely by compiling electronic-based student worksheets. According to (Widiyanti & Fitrotun Nisa, 2021) The learning process can be made more exciting by the use of computer-based student worksheets, which will eventually lead to improved student educational results.

Apart from that, with the help of e-worksheets for students for enhancing their educational results, learning activities also have to employ learning models that involve children to be capable to understand themselves in the process of learning both individually and in groups (Nurhadiyati et al., 2020). One instructional strategy that has the potential to utilized for boosting pupil learning results is project-based learning (PjBL) (Voorberg et al., 2017).

According to (Darmawan, 2021) educational paradigm The project-based learning (PjBL) methodology strives toward multifaceted issues and places a strong emphasis on learning through participation in real-world assignments. With the project based learning model according to (Hartono & Asiyah, 2018) , it makes students more eager to learn in making projects and will increase good learning outcomes by

collaborating or working together in groups. According to (Maros et al., 2021) the transition of traditional teaching methods to project-based teaching made a fundamental change from initially focusing on teachers to focusing on students.

This is why researchers use a PjBL assisted e-LKPD model because the learning model is crucial to obtain good learning results.Using the e-lkpd-assisted pjbl model can make students more and more desire to improve good learning outcomes because the expenditure model is interesting and not boring.With the help of e-LKPD that is not only written in general makes students also use the technology correctly, e-LKPD can be accessed anywhere using a mobile phone or gadget. Many of these modern times students use gadgets to play games. This means that teachers should be able to create a more modern way of learning. then it will change the use of the gadget more positive to learn one of them using an electronic-based LKPD.

Based on the description that has been explained, it is necessary to resolve the conflict to fix the learning model in elementary school science subjects. In consequence, the researchers conducted a study entitled "The Effectiveness Of Project Based Learning Model (PjBL) Assisted By Electronic-Based Student Worksheets On Student Learning Outcomes In Science Subject Of Class V Students At Dukuh 08 Pagi Elementary School".

Method

The method of pre experimental design was the research methodology employed in the current study, this design has experimental results that are veriable dependent not solely influenced by the independent variable. This happens as a result of the sample not being randomly chosen and the lack of a control variable. One group pretest-posttest (beginning test-final test of a single group) is the sort of design used in this study. This style can be noticed in the table 1

Table 1. Pretest-Posttest Design for One Group

Pretest.	Perlakuan.	Postest.
O1	X	O2

(Nuryanti, 2019)

Description :

O1   : Pretest Score (before using PjBL assisted by e-student worksheets model)

X   : Providing PjBL assisted by e-student worksheets model)

O2   : Postest Score (after using PjBL assisted by e-Student worksheets model)

This study was conducted at Elementary School Dukuh 08 Pagi Jakarta. The sample used by the researcher is purposive sampling technique. (Lenaini,

2021) said purposive sampling is a technique for determining samples with consideration. Non-Probability The size of the sample employed in the present inquiry was decided through sampling. One sampling technique is non-probability sampling that does not provide each member of the population with an equal opportunity to be sampled. The experimental class for the sample study was Class V A, which included a total of 29 students.

In this design, pretest used to determine the initial state of the group prior to treatments is given, so that researchers can determine the initial condition of the group. Pretest questions are given as many as 20 questions that have passed the validation test stage. After knowing the initial condition of the group, the treatment with learning model Project Based Learning (PjBL) assisted by e – student worksheets. Then the group was given a post test with the same questions to find out the state after the treatment to obtain results of the comparison of changes.

Normality and homogeneity test is conducted after obtaining the results of pretest and postest students. Normal test method used by researchers is Shapiro-Wilk using SPSS 22.0. Quraisy, (2020) said the Shapiro-Wilk test is an effective and valid normality test method used for small samples. Based on the Shapiro-Wilk approach, research data is deemed to be distributed normally if the Sig value is more than or equal to 0.05 and non-normally distributed otherwise.

The Levene Test method was employed by the researchers in this investigation on SPSS 22.0, which is a method to measure the variance of data distribution in the homogeneity test. Levene homegenity test criteria refers to the value of Sig > 0.05 then the variant of homogeneous data, meaning that the assumption of homogeneity test is fulfilled and if the value of Sig. < 0.05 then the data's variance doesn't correspond to homogeneous, meaning that homogeneous test assumptions are not fulfilled.

Normative and homogeneity tests should be performed after analysis. The third test is the Paired Sample T-Test, which employs two paired samples. Using the value of Sig as the criterion, T-Test for Matched Samples decides whether to accept Ho or reject Ha. If Sig. (2-tailed) is less than 0.05, Ho is approved and Ha is denied; otherwise, Sig. (2-tailed) must be more than 0.05.

Result and Discussion

The aim of this study is to ascertain and show if employing the PjBL or the Project- Based Learning Model by an electronic worksheet aids students in Class V A Dukuh 08 Pagi Elementary School in meeting their science learning objectives. Student learning outcomes are very important from every final process in learning, therefore it needs the right and appropriate learning model, utilizing the Project- Based Learning (PjBL) learning style with the aid of an electronic worksheet.

Susanti et al., (2022) claim that the project-based learning approach gives teachers the chance to direct classroom learning by including project work. As a result, according to (Titu, 2015), the Project Based Learning paradigm can result in some learning projects that can be leveraged to enhance learning outcomes. It is obvious if the benefits of Learning Model Project- Based Learning (PjBL) assisted by e-worksheet provide guidance to students following the modern era to use electronic media properly as an aid to support students ' ability to solve problems in several ways in accordance with the problems given so that it can affect learning outcomes.

Sumarti et al., (2017) revealed that e-worksheet will help students to overcome time constraints in learning because students can design or work on their own outside of learning hours. According to Indriani et al., (2022) another advantage of e-worksheet is that it can be combined with various media such as video, audio, animation, and images as interesting as possible. Nugraheni, (2022) also explained that the advantages of e-worksheet are efficient in time, place and cost, environmentally friendly because it does not require materials that harm the environment, making e-worksheet can be adjusted as desired, and can be accessed anywhere because it is digital-based.

Project tasks given in electronic The use of media can benefit students to access them anywhere and anytime so as to shorten the time in the process. Project work also provides an opportunity for students to freely express ideas, opinions and ideas in completing tasks from designing, solving problems, doing risert to what will be done so that students are more independent in completing a given project.

The material applied to students is science subjects on theme 7 subtheme 2 learning 2 about the change of heat to changes in temperature and the the form of objects. Activities carried out on the first day of the study in Class V A (experimental class) is to give a pretest (before treatment) with a total of 20 valid questions. On the second day students pay attention and listen to the learning material described by the researcher, before being given an e-worksheet-shaped task that has been provided in google drive and can be accessed through a link provided by the researcher. After the researcher explained the material, students were given tasks in the form of e-worksheet through a Whatsapp group by accessing

the link given by the researcher and acting it out at home in accordance with the project that had been assigned. After that, students send documentation evidence of the results of working on the project to the researcher via Whatsapp. The last day or the third day students made a group to conclude the results of the project that has been done and then presentate it in group. After that, post test (after treatment) were given to the students. Here is the form of e-worksheet given to students are as seen in Figure 1.

Figure 1. E-Student Worksheet

Based on the study's result, obtained data before treatment (pretest) learning model Project Based Learning (PjBL) assisted e-worksheet in the experimental class. the calculation culminates are displayed in Table 2.

Table 2. Distribution Of Pretest Frequency Data

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	40-45	3	10.3	10.3	10.3
	46-50	2	6.9	6.9	17.2
	51-55	7	24.1	24.1	41.4
	56-60	7	24.1	24.1	65.5
	61-65	5	17.2	17.2	82.8
	66-70	3	10.3	10.3	93.1
	71-75	2	6.9	6.9	100.0
	Total	29	100.0	100.0	

Regarding on the table above, it is concluded that the percentage score of learning outcomes before being given treatment (pretest) learning model Project Based Learning (PjBL) assisted by e-LKPD in experimental classes totaling 29 highest students were

at intervals of 51-55 and 56-60 as many as 7 scores (24.1%), then intervals of 61-65 as many as 5 scores (17.2%), intervals of 40-45 and 66-70 as many as 3 scores (10.3%), intervals of 40-45 and 71-75 as much as 2 scores (10.3%), intervals of 40-45 and 71-75 as much as 2 scores score (6.9%).

Based on the score of learning outcomes before being given treatment (pretest) learning model Project Based Learning (PjBL) assisted e-worksheet depicted in the form of histograms that is shown in Figure 2.
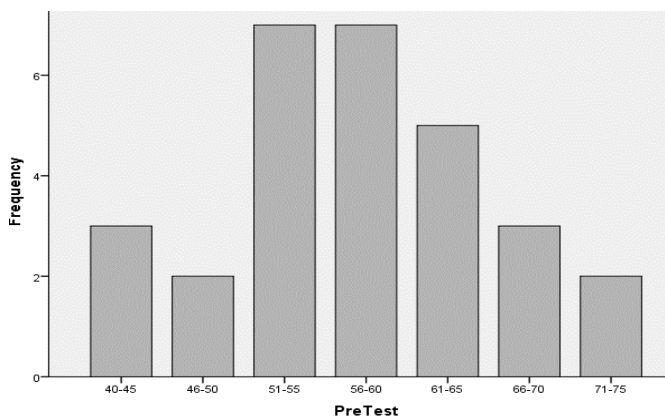

Figure 2. Pretest Score Using SPSS 22.0

After testing the frequency data pretest learning outcomes in SPSS 22.0, through the questions given to 29 students consisted of 20 multiple choice questions. Next is to calculate the statistical facts regarding the data are displayed in table 3.

Table 3. Statistics Descriptive Pretest

N	Valid	29
	Missing	0
Mean		59.31
Median		60.00
Mode		55[a]
Std Deviation		8.632
Minimum		40
Maximum		75
Sum		1720

Based on the calculation of descriptive statistics, data obtained amounted to 1720, the average value is 59.31, the middle value is 60.00, the most value is 55, the standard deviation (std. deviation) is 8.632, 40 is the minimum and 75 is the maximum value. In addition to the pretest data the researchers proceeded to distribution of frequency data on the postest. The calculation outcomes are displayed in Table 4.

Regarding the above table, it is concluded that the percentage score of learning outcomes after being given treatment (postest) learning model Project Based Learning (PjBL) aided by e-worksheet in the VA class of 29 students is higher than the results before being given

treatment (pretest) with the highest scores are at intervals of 76-80 as many as 9 scores (31.0%), then intervals of 71-75 as many as 8 scores (27.6%), intervals of 66-70 as many as 6 scores (20.7%), intervals of 60-65 as many as 3 scores (10,3%) 86-95 by 2 scores (6,9%) and 81-85 by 1 score (3,4%).

Table 4. Distribution of Postest Frequency Data

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	60-65	3	10.3	10.3	10.3
	66-70	6	20.7	20.7	31.0
	71-75	8	27.6	27.6	58.6
	76-80	9	31.0	31.0	89.7
	81-85	1	3.4	3.4	93.1
	86-90	2	6.9	6.9	100.0
	Total	29	100.0	100.0	

Based on the score of learning outcomes after treatment (postest) learning model Project Based Learning (PjBL) assisted e-worksheet depicted in the form of histograms that are displayed in Figure 3.
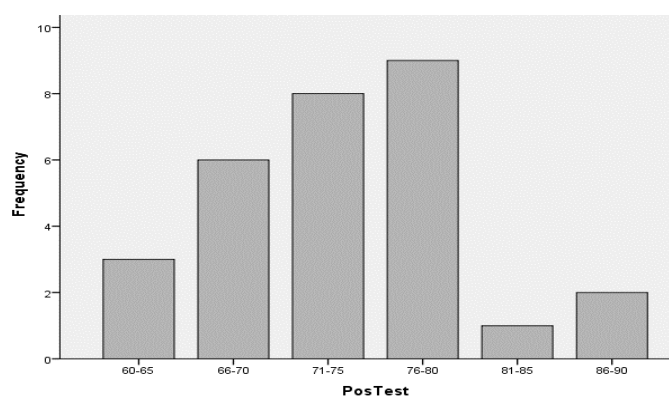

Figure 3. Postest Score Using SPSS 22.0

After testing the frequency data postest learning outcomes on SPSS 22.0, through the questions given to 29 students consisted of 20 multiple choice questions. Furthermore, the calculation of statistical descriptions also on the data are displayed in Table 5.

Table 5. Statistics Descriptive Postest

N	Valid	29
	Missing	0
Mean		75.69
Median		75.00
Mode		80
Std Deviation		6.908
Minimum		60
Maximum		90
Sum		2195

Based on statistical calculations of data description in Table 5. Then the data obtained by the number of 2195,

the average value is 75.69, the middle value is 75.00, the most value is 80, the standard deviation (std. deviation) is 6.908, 60 is the lowest value, and 90 is the highest. After that, to establish normalcy, the Shapiro-Wilk test is applied. Table 6 displays the details about the output.

Table 6. Normality Test Results

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Pre Test	.136	29	.179	.963	29	.398
Pos Test	.163	29	.048	.943	29	.121

Based on the calculation it obtained a value of Sig. pretest obtained by $0.398 > 0.05$ and the value of Sig. postest of $0.121 > 0.05$, subsequently, it may be said that the results of pretest and postest value are distributed normally.

In addition to performing normality test is to perform homogeneity test on the data. This homogeneity test using Levene's Statistic method with a substantial level of more than 0.05. Here is the ouput data that are seen in the Table 7.

Table 7. Homogeneity Test Results

Pretest Postest			
Levene Statistic	df1	df2	Sig.
1.170	1	56	.284

Levene's statistical approach was used to conduct a homogeneity test, and the result was significant at a value of $0.284 > 0.05$, indicating that the test was successful. It indicates that the data are homogeneous.

After the data from each sample pretest and postest proved to be homogenous and normally distributed, then the data is processed by a hypothesis test that is the T-test Paired Sample test. It can be concluded because the symbol worth. It is $0.000 < 0.05$ (2-tailed). It has a significant contrast between the outcomes of Science Learning in the pretest and posttest experimental class because Compared to Ho, Ha is approved. It also implies that it has a significant correlation between the results of Science Learning in Class V A students of Dukuh 08 Pagi Elementary School and the usage of Project Based Learning Model (PjBL) facilitated by e-worksheet. The following calculation results on SPSS 22.0 is shown in Table 8.

Table 8. T-test Results

	Mean	Std. Deviation	T	df	Sig. (2-tailed)
Pre Test-Pos Tets	-16.379	8.117	-10.867	28	.000

Based on a Sig. value of 0.000 < 0.05 for the Paired Sample T-Test in SPSS 22.0. Conclusion: The Project Based Learning Model (PjBL) implementation in Class V A Dukuh 08 Pagi Elementary School has proven to be highly successful because the distinction among the hypothetical class's scientific comprehension scores upon the pretest and posttest.

Research by (Cahyaningsih et al., 2020) discovered that the PjBL learning paradigm has a positive impact on students' understanding of science in the fifth grade of elementary school. Their findings are consistent with this research. This is based on the T test, it was obtained thitung > ttable which is 15,601 > 2,023, Ho was subsequently refused, while Ha was approved, demonstrating the efficiency of Project- Based Learning methodology in addressing the study's findings on the fifth-grade scientific learning outcomes. (Maelani et al., 2021) also found that using the Project- Based Learning (PjBL) type of learning led to changes in the learning results of positive and significant students.

In the results of the study (Hening et al., 2019) The success of Project- Based Learning (PjBL) strategy on connections with educational outputs is also consistent. The results of students' learning can be observed through the acquisition of a higher posttest than the pretest. The average value of pretest obtained 67.75 while posttest obtained an average of 81.25. The findings of the related study carried out by (Goldstein, 2016) also determinded that the Project Based Learning (PjBL) approach encourages more meaningful learning and more active student involvement in learning so as to get good results in learning.

Conclusion

The discoveries of the study provide credence to the notion that the project-based learning (PjBL) paradigm, supported by electronic worksheets, has a positive impact on students at Dukuh 08 Pagi Elementary School.

Author Contributions
Conceptualization, H.A. and M.; software, H.A.; validation, M.; writing—original draft preparation, H.A.; writing—review and editing, H.A. and M.

Conflicts of Interest
The authors declare no conflict of interest.

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