



## THE EFFECTIVENESS OF PROJECT-BASED WORKSHEETS TO IMPROVE STUDENTS' NATURAL SCIENCE CONCEPT UNDERSTANDING IN ELEMENTARY SCHOOL

Asfa Zulfiyah

Elementary School Teacher Education Program, Postgraduate Program, Islamic State University of Maulana Malik Ibrahim, Malang, Indonesia.  
[200103210011@student.uin-malang.ac.id](mailto:200103210011@student.uin-malang.ac.id)

### EFEKTIVITAS LEMBAR KERJA BERBASIS PROYEK UNTUK MENINGKATKAN PEMAHAMAN KONSEP ILMU PENGETAHUAN ALAM SISWA DI SEKOLAH DASAR

#### ARTICLE HISTORY

**Submitted:**  
30 Agustus 2022  
30<sup>th</sup> August 2022

**Accepted:**  
13 Desember 2022  
13<sup>th</sup> December 2022

**Published:**  
21 Desember 2022  
21<sup>th</sup> December 2022

#### ABSTRACT

**Abstract:** A teacher still becomes a role model in providing a source of science and knowledge in the classroom in Indonesia up to now. Students become inactive and quickly bored during the learning process. It was due to the teacher's teaching style that still uses traditional and less innovative. This research attempts to ascertain the effect of project-based worksheets on elementary school students' natural science concept understanding. The research method uses a post-test-only control design of experimental quantitative research. The population in this research involved the second-grade students of SDI Miftahul Huda. There are two samples, which consist of 24 students of class IIA in the control and 24 students of class IIB in the experimental class. The data analysis used in this research is the independent sample t-test, normality testing, and homogeneity testing. As a result, a sig value (2-tailed) is  $0.000 < 0.05$ , which means  $H_0$  is disaccepted and  $H_1$  is accepted. In addition, a significant difference between the control and experimental classes was discovered. Thus, project-based worksheets can help elementary school students to improve their understanding of natural science concepts.

**Keywords:** student worksheet, project-based learning, natural science concept understanding

**Abstrak:** Saat ini, pengajar masih menjadi pemeran utama dalam memberikan sumber pengetahuan dan ilmu di kelas di Indonesia. Siswa menjadi tidak aktif dan cepat bosan selama proses pembelajaran karena gaya belajar yang masih tradisional dan kurang inovatif. Studi ini mencoba untuk menggali efektivitas dari lembar kerja siswa berbasis proyek dalam meningkatkan pemahaman konsep IPA. Metode penelitian menggunakan *post-test only control design* pada penelitian kuantitatif eksperimen. Populasi dalam penelitian ini melibatkan siswa kelas dua SD Islam Miftahul Huda. Sampel yang digunakan ada dua yaitu 24 siswa di kelas kontrol IIA dan 24 siswa di kelas eksperimen IIB. Analisis data yang digunakan dalam penelitian ini adalah Uji t sampel independen, uji normalitas, dan uji homogenitas. Hasilnya, nilai sig (2-tailed) sebesar  $0,000 < 0,05$ . Akibatnya,  $H_0$  ditolak dan  $H_1$  disetujui. Selain itu, ditemukan perbedaan yang signifikan antara kelas kontrol dan kelas eksperimen. Dapat disimpulkan bahwa lembar kerja berbasis proyek dapat membantu siswa sekolah dasar dalam meningkatkan pemahaman konsep IPA.

**Kata Kunci:** lembar kerja siswa, project-based learning, pemahaman konsep IPA

#### CITATION

Zulfiyah, A. (2022). The Effectiveness Of Project-Based Worksheets To Improve Students' Natural Science Concept Understanding In Elementary School. *Primary: Jurnal Pendidikan Guru Sekolah Dasar*, 11 (6), 1923-1930.  
DOI:<http://dx.doi.org/10.33578/jpfkip.v11i6.9183>.

## INTRODUCTION

Currently, teachers are still the main source of knowledge in classrooms in Indonesia. Students become passive in the learning process because the majority of teaching is still teacher-centered (Al-Tabani, 2014). Additionally, this dulls the environment in the classroom. As part of the teaching and learning process, the teacher does not undertake experiments to clarify the concepts of the content, which is another area where they fall short.

At the elementary school level, science instruction is still dominated by the teacher. And that is still focused on theoretical skills. This affects how well students understand certain concepts in science (Juwanita, 2019). Understanding the idea of science is having an explanation that fully and permanently explains reality through experiments or direct observation (Eliyana, 2020). A science education emphasizes the study of the universe and everything in it from a logical and factual perspective. Science classes examine the natural occurrences that surround us. As a result, science can be a challenging topic for elementary school students (Yolanda and Meilana, 2021). Additionally, one of the crucial skills that students must grasp is the capacity for comprehending Science concepts. In Aen's opinion, understanding the concept is a higher level than the knowledge gained, then it is necessary to have an introduction or knowledge to understand. This means that students can understand a concept based on the subjects they are studying (Aen and Kuswendi, 2020).

However, in reality, students are only presented with hypothetical situations when learning science (abstract). Contrarily, learning will be more enjoyable and meaningful if students participate in it themselves rather than relying solely on teacher explanations. Science is often taught to students by their teachers using a scientific approach that includes observation, experimentation, and analysis

(Wati, Harahap, and Safitri, 2022). Understanding the concept is the foundation for reaching learning outcomes and plays a crucial part in the learning process (Widiawati, Pudjawan, and Margunayasa, 2015). To be able to emphasize conceptual understanding, teachers must be able to relate the real context to the surrounding environment, thus they can develop a level of understanding of the students' science concepts.

Based on the results of observations in Miftahul Huda Islamic Elementary School, the worksheet used is a competency-based worksheet. Questions were accorded to students to measure their understanding of the subject. Student activities have not been helped by the worksheets used. Based on interviews with grade 2 teachers, student's understanding of science concepts needs to be improved. As a result, teachers must be innovative in preparing the teaching materials. It is intended that students can be actively involved in the learning process. Teaching materials can help teachers in their learning throughout the class, because they contain learning components and learning materials for students. Teaching materials used in learning activities can be in the form of Student Worksheets.

Student Worksheets are quite beneficial in the learning process in numerous studies. According to Tri Astari's research, using student worksheets can significantly enhance learning results for students (Astari 2017). Additionally, research conducted by Berwina, et al, shows that student worksheets are very beneficial in the learning process and can improve student learning outcomes (Tarigan, Agung, and Parmiti, 2019). The study demonstrates that the Student Worksheet is a teaching tool that teachers may use to engage students in the teaching and learning process by using it as an alternative, thus students can work on questions and comprehend or acquire the concepts being covered (Nurbaiti and Marbun, 2019).

The creation of project-based worksheets is one of the many variants and advancements in student worksheets that have recently occurred (Sari, Taufina, and Fachruddin, 2020). Worksheets for students that use projects or activities as the medium for a work step are good teaching tools for project-based learning. It attempts to assist learners in exploring, interpreting, and synthesizing data to achieve a range of learning outcomes (Kurnia, 2015). The 2013 curriculum is notable for its use of a scientific approach to learning. A scientific strategy or work process that meets scientific requirements, scientists value inductive reasoning above deductive reasoning (Hilda, 2015). Project-based learning is one of the learning models that is established in the scientific method.

Project-based worksheets, which include a work phase that uses projects or activities as media, are efficient teaching tools used in project-based learning. It seeks to support learners in exploring, evaluating, interpreting, synthesizing, and disseminating knowledge to achieve a range of learning outcomes (Kurnia 2015).

Project-based learning emphasizes student-centeredness and uses environmental concerns to build students' knowledge and learning skills in a contextualized manner (Hilda 2015). Due to the fact that students use a variety of intelligence when working on projects that are carried out in the surrounding environment, project-based learning connects the students skills and is therefore multi-intelligent. Project-based learning, which is founded on constructivism theory and is active student learning (student-centered learning), enables educators to give students direct experiential learning (Amini et al. 2019)

The project-based learning model can create a tangible product while developing conceptual understanding through relevant problem investigations (Alawiyah and Sopandi 2016). Project-based learning is a learning model that emphasizes students' activities in solving a variety of open-ended problems and

applying their knowledge in working on a project to produce a specific authentic product (Sari et al. 2018). Project-based learning is an innovative learning model or strategy that places an emphasis on contextual learning through challenging activities (Kurniasih, Sani, and Pamungkas, 2014). Project-based learning is learning that involves students working in groups to compile a report, experiment, or other project (Mudhofir and Rusydiyah, 2016).

The advantages of using a project-based learning model are: 1) increasing student motivation in compiling projects, 2) increasing problem solving skills, 3) increasing collaboration and cohesiveness, and 4) improving skills in managing resources (Niswara, Muhajir, and Untari 2019). The environment for learning should be one in which students participate actively (Uno, 2011).

Based on the explanations mentioned above, Researchers believe that offering project-based worksheets can be an alternative to help students learn science concepts. Therefore, further research is needed on this matter. This study aims to determine the effectiveness of project-based worksheets to improve elementary school students' understanding of science concepts.

## **METHOD**

This study used a quantitative experimental method with a Post-Test Only Control Group Design. This study use the experimental class and the control class design of comparing different student worksheets. The experimental class uses project-based worksheets while the control class uses regular worksheets. The population in this study were grade 2 students at Miftahul Huda Islamic Elementary School consisting of two groups of samples, 2<sup>nd</sup> grade of Group A as the control class consisted of 24 students and experiment class is 2<sup>nd</sup> grade of Group B, which consisted of 24 students. The research was conducted from 7 March 2022 to 11 March 2022.

The instrument in this study is a multiple-choice test that has been confirmed to be reliable using Cronbach's alpha and a validity test using product-moment. Students are used as research subjects given multiple-choice tests questions. While the data analysis that used in this study included the t-test, homogeneity test, and normality test using the SPSS version 26 program.

Descriptive and quantitative data analysis approaches were used to analyze the data. The data gathered from the outcomes of the pre-test and post-test assessments of learning outcomes in the experimental class is presented using descriptive analysis. The

validity of the test items for learning outcomes, discriminatory power, test difficulty index, and dependability of the questions must all be considered when determining if a test is appropriate for usage or not.

## RESULTS

A post-test was given to the experimental class and the control class to gauge their level of comprehension. According to the test results, the experimental class that used project-based worksheets had an average score of 88, whereas the control group was 82.63. The post-test results are shown in the table below.

**Table 1. The results of the statistical descriptive test of the control class and the experimental class**

	N	Minimum	Maximum	Mean
Post-test control	24	76	91	82.63
Post-test experiment	24	80	95	88
Valid N (listwise)	24			

The post-test results from both classes are noteworthy. The control class has an average value of 82.63, a maximum value of 91, and a minimum value of 76. The experimental class, on the other hand, has an average value of 88, a maximum value of 95, and a minimum value of 80.

A normality test was then conducted using the post-test data processing results for each class. The purpose of the normality test is to determine whether or not the sample class learning outcome data are normally distributed. The Shapiro-Wilk test was used in this study's normality test to demonstrate that the data originated from a normal distribution.

**Table 2. Normality test of post-test data**

Class	Statistics	dF	Sig.
Control class	0.938	24	0.144
Experiment class	0.951	24	0.281

As can be seen from the table above, the SPSS 26 program computation reveals that the experimental class has a sig. of 0.281 > 0.05, and the control class has a sig. of 0.144 > 0.05. Thus, it can be concluded that the post-test data of the experimental class and control class were distributed normally.

Additionally, the homogeneity test was run to determine whether or not the outcomes of the learning test for the experimental and control classes had a homogeneous variance. Levene's test was used in this work to conduct the homogeneity test. The homogeneity test produced the following results:

**Table 3. Test for homogeneity of Post-test Data**

	Levene Statistics	df1	df2	Sig.
Based on Mean	0.4	1	46	0.530
Based on Median	0.399	1	46	0.530
Based on median and with adjusted df	0.399	1	44,590	0.531
Based on trimmed mean	0.390	1	46	0.535

In the table above the posttest data analysis proves the sig. of  $0.530 > 0.05$ . It means sig. if  $> 0.05$  the post-test results for the control class and the experimental class are homogeneous, because it is greater than the standard error. The results of the analysis show that the learning outcomes are normal and have a homogeneous variance. . The data have indicated a normal and homogeneous distribution, thus applying a t-test to evaluate

the hypothesis is the next step based on the results of the preconditioning test.

The SPSS 26 program was used to compute the t-test. To find differences between the experimental class and the control class, this hypothesis test was utilized. The following analysis results were obtained after utilizing a t-test to examine the impact of using project-based worksheets on comprehending the concept of science.

**Table 4. The effect of project-based worksheets using the independent sample T-test**

	F	Sig.	T	Df	Sig. (2-tailed)
Equal variances assumed	0.4	0.530	-4.206	46	0.000
Equal variances not assumed			-4.206	45,068	0.000

The significant value of the findings from the t-test in the preceding table using the SPSS 26 application was 0.000. Therefore, the significant chance that  $H_0$  is rejected or  $H_1$  is approved is less than 0.05. Therefore, it can be concluded that the usage of worksheets with projects in the experimental class had a substantial impact.

## DISCUSSION

The post-test data from experiment and control class wer analized for normality and homogeneity. Before performing the test, the analysis requirements must first be satisfied under the assumptions that the data are (1) normal, which means that the data connection is normally distributed, and (2) homogeneous, which means that the data are compared, making it necessary to test for homogeneity (Riduwan, 2013).

The significant value of the t-test using the SPSS 26 application shows that the use of project-based worksheets has a considerable impact on understanding of the science concept. This study also refers to the constructivism theory of Piaget, which underpins the project-based learning model. Constructivism learning theory, is generative learning in which students generate their knowledge (Suparlan, 2019). Learning and knowledge are formed from student experiences in the context of project activities.

The aforementioned findings are consistent with the findings of research conducted by Arsana, and it appears that student worksheets based on project-based learning have benefits over the creation of other student worksheets, including 1) the encouragement of creativity and 2) the demand for critical thought. 3) The teacher is merely a



facilitator and learning is student-centered when it comes to answering difficulties that appear on worksheets for the students. Teachers can effectively apply learning by using student worksheets that are based on project-based learning (Arsana and Sujana, 2021). If the teacher can utilize the created tool in the classroom consistently and logically without encountering any issues, then it can be considered to be practical (Sugiono 2014).

Using teaching tools like project-based worksheets to engage students in the teaching and learning process is one technique to increase conceptual knowledge. The results of this study are supported by Novita, Darmawijoyo, and Aisyah that Project-based Worksheets have a potential effect on learning outcomes, namely as many as 33 students including the complete category of 82.5% and 7 people who have not completed, namely 17.5% with a minimum competency score 75 (Novita, Darmawijoyo, and Aisyah 2016). The same is true of the study by Hayati, Utaya, and Astina, which found that 1) the quality of student responses to project-based worksheets is decent, and 2) the level of effectiveness of project-based worksheets after learning has good critical thinking qualifications (Hayati, Utaya, and Astina 2016).

Based on the research from Utami, Student learning outcomes in project-based learning with an average value of 76.71 and students with direct learning models have an average value of 72.41 with a value of  $t = 2.829$  with a significance of 0.003 (Yeti Utami 2015). Project-based worksheets on student learning outcomes received a very good response because they contain systematic steps that can lead students to think creatively, independently, critically, and actively, thus learning outcomes will also increase (Sari, Murtiani, and Gusnedi, 2015). The results of the different study explained that in project-based learning there was an increase in classical completeness from the pretest by 59% with an average of 70.4 increasing in the first cycle by 72% with an average of 75.07, and

increasing in the second cycle by 88% with an average of 76,13 (Widiawati et al. 2015).

## CONCLUSIONS

Based on the data collection efforts, it is possible to conclude that the project-based worksheet implementation had an impact on the second-grade of Miftahul Huda Islamic Elementary School students' knowledge of the science concept. This is evident from the substantial disparity between the experimental class and the control class. In comparison to the control class, which exclusively used the traditional worksheet model, the experimental class's average learning outcomes were better. Therefore, it can be concluded that project-based worksheets are suitable and effective worksheets to be used to enhance students' learning of science concepts in primary school.

## RECOMENDATION

The teacher must be able to consider the worksheet used. from the research results that have been described, there are differences between the two study groups that use different worksheets. Thus, the teacher is expected to be able to carry out learning properly using good and innovative worksheets.

## REFERENCES

- Aen, R., and Kuswendi, U. (2020). Meningkatkan Pemahaman Konsep IPA Siswa SD Menggunakan Media Visual Berupa Media Gambar Dalam Pembelajaran IPA. *COLLASE (Creative of Learning Students Elementary Education)*, 3(3), 99–103.
- Alawiyah, I., and Sopandi, W. (2016). Pembelajaran Berbasis Proyek untuk Meningkatkan Sikap Ilmiah Siswa Sekolah Dasar Pada Materi Peristiwa Alam. *Jurnal Penelitian Pendidikan*, 16(2), 167–76. doi: 10.17509/jpp.v16i2.4241.
- Al-Tabani, T. I. B. (2014). *Mendesain Model Pembelajaran Inovatif, Progresif* ,

- Dan Kontekstual. Jakarta: Prenadamedia Group.
- Amini, R., Setiawan, B., Fitria, M., and Yarisda, N. (2019). The Difference of Students Learning Outcomes Using the Project-Based Learning and Problem-Based Learning Model in Terms of Self-Efficacy. *Journal of Physics: Conference Series* 1387. doi: 10.1088/1742-6596/1387/1/012082.
- Arsana, I., Wayan, O. K., and I. Wayan, S. (2021). Pengembangan Lembar Kerja Peserta Didik (Lkpd) Berbasis Project Based Learning Dalam Muatan Materi IPS. *Jurnal Ilmiah Pendidikan Dan Pembelajaran*, 5(1), 134–43. doi: 10.23887/jipp.v5i1.32817.
- Astari, T. (2017). “Pengembangan Lembar Kerja Siswa (LKS) Berbasis Pendekatan Realistik Untuk Meningkatkan Hasil Belajar Siswa SD Kelas IV. *Jurnal Pelangi*, 9(2), 1-20.
- Eliyana, E. (2020). “Analisis Keterampilan Proses Sains Siswa Belajar Ipa Materi Tumbuhan Hijau Pada Siswa Kelas V SDN 3 Panjerejo di Masa Pandemi Covid-19.” *EDUPROXIMA: Jurnal Ilmiah Pendidikan IPA*, 2(2), 87–100. doi: 10.29100/eduproxima.v2i2.1628.
- Hayati, W. I., Sugeng, U., and I. Komang, A. (2016). Efektivitas Student Worksheet Berbasis Project Based Learning dalam Menumbuhkan Kemampuan Berpikir Kritis Siswa Pada Mata Pelajaran Geografi. *Jurnal Pendidikan: Teori, Penelitian, dan Pengembangan*, 1(3), 468–74. doi: 10.17977/jp.v1i3.6174.
- Hilda, L. (2015). *Jurnal Darul ‘Ilmi* Vol. 03, No. 01 Januari.” 03(01).
- Juwanita, R. (2019). Pengaruh Model Pembelajaran Inkuiri Terhadap Pemahaman Konsep IPA Siswa Kelas IV SD N 1 Bumiayu Tahun Pelajaran 2019/2020. undergraduate, IAIN Metro.
- Kurnia, E. I. (2015). Pengembangan Lembar Kegiatan Siswa Berbasis Project Based Learning Pada Kompetensi Dasar Laporan Keuangan Perusahaan Jasa. *Jurnal Pendidikan Akuntansi (JPAK)* 3(2).
- Kurniasih, I., Berlin, S., and Adi, P. (2014). *Sukses Mengimplementasikan Kurikulum 2013*. Surabaya: Kata Pena.
- Mudhofir, A., and Evi, F. R. (2016). *Desain Pembelajaran Inovatif dari Teori ke Praktik*. Jakarta: Raja Grafindo Persada.
- Niswara, R., Muhajir, M., and Mei, F. A. U. (2019). Pengaruh Model Project Based Learning Terhadap High Order Thinking Skill. *Mimbar PGSD Undiksha*, 7(2). doi: 10.23887/jjpsd.v7i2.17493.
- Novita, D., Darmawijoyo, D., and Nyimas, A. (2016). Pengembangan LKS Berbasis Project Based Learning Untuk Pembelajaran Materi Segitiga di Kelas VII. *Jurnal Pendidikan Matematika*, 10(2), 1–12. doi: 10.22342/jpm.10.2.3626.1-12.
- Nurbaiti., and Lismawati, P. S. M. (2019). Pengembangan Lembar Kerja Siswa Berbasis Open Ended Problem Pada Materi Pecahan Untuk Siswa Sekolah Dasar. *Jurnal Education And Development*, 7(3), 207–207. doi: 10.37081/ed.v7i3.1215.
- Riduwan. (2013). *Skala Pengukuran Vaibel-Variabel Penelitian*. Bandung: Alfabeta.
- Sari, D. P., Abna, H., Yanti, F., and Mudjiran, M. (2018). Effect of Pjbl Model and Preliminary Knowledge on Critical Thinking Skills of Grade Iv Students of Kartika Elementary School 1-11 Kota Padang. *International Journal of Educational Dynamics*, 1(1), 205–10. doi: 10.24036/ijeds.v1i1.56.
- Sari, L., Taufina, T., and Farida, F. (2020). Pengembangan Lembar Kerja Peserta Didik (LKPD) Dengan Menggunakan



- Model PJBL di Sekolah Dasar.” *Jurnal Basicedu*, 4(4), 813–20. doi: 10.31004/basicedu.v4i4.434.
- Sari, W., Murtiani, M., and Gusnedi, G. (2015). Pengaruh Lks Berbasis Project Based Learning Terhadap Hasil Belajar Fisika Siswa Kelas X SMA N 13 Padan. *Pillar Of Physics Education*, 5(1). doi: 10.24036/1874171074.
- Suparlan, S. (2019). Teori Konstruktivisme Dalam Pembelajaran. *Islamika*, 1(2), 79–88. doi: 10.36088/islamika.v1i2.208.
- Tarigan, B. N. B., Agung, A. A. G., and Parmiti, D. P. (2019). Pengembangan Lembar Kerja Siswa (LKS) Bermuatan Karakter Untuk Meningkatkan Hasil Belajar IPA. *Journal of Education Technology*, 3(3), 179–85. doi: 10.23887/jet.v3i3.21743.
- Uno, H. B. (2011). *Teori Motivasi Dan Pengukurannya: Analisis Di Bidang Pendidikan*. Jakarta: Bumi Aksara.
- Wati, E., Risma, D. H., and Islamiani, S. 2022. “Analisis Karakter Siswa Pada Mata Pelajaran IPA Di Sekolah Dasar.” *Jurnal Basicedu*, 6(4), 5994–6004. doi: 10.31004/basicedu.v6i4.2953.
- Widiawati, N. P., Ketut, P., and I. Gede, M. (2015). Analisis Pemahaman Konsep Dalam Pembelajaran IPA Pada Siswa Kelas IV SD di Gugus II Kecamatan Banjar. *MIMBAR PGSD Undiksha*, 3(1). doi: 10.23887/jjpgsd.v3i1.5847.
- Yeti, U. (2015). Pengaruh Pembelajaran Berbasis Proyek Terhadap Pemahaman Konsep Kimia Dan Life Skill Siswa Kelas XI IPA SMA 1 Kajen. other, Universitas Negeri Semarang.
- Yolanda, S., and Septi, F. M. (2021). Pengaruh Aplikasi Quizizz Terhadap Minat Belajar IPA Siswa Kelas V Di Sekolah Dasar. *Jurnal Educatio FKIP UNMA*, 7(3), 915–21. doi: 10.31949/educatio.v7i3.1286.