

## The Effect of Project-Based Learning Making Dioramas from Inorganic Wastes on Elementary School to Enhance Student's Conceptual Understanding and Creativity

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### Abstract

This study aims to determine the effect of Project-Based Learning on students' conceptual understanding and creativity. In this study, students will carry out a diorama project made from inorganic waste with the theme of the diversity of Indonesian society. This research is quantitative in the form of a Quasi-Experiment type One Group Pretest-Posttest Design. The selection of research samples using cluster sampling techniques. The number of respondents was 97 fourth-grade students at two elementary schools in Subang Regency. This research was conducted using blended learning considering the pandemic situation when the research was carried out. The data collection technique is triangulation which consists of tests, observations, and documentation. The data analysis used was N-Gain analysis, simple regression test, and hypothesis testing. The results obtained prove that there is a significant effect between the Project-Based Learning model on students' conceptual understanding and creativity. This is supported by the research findings on the T-Test about the effect of Project-Based Learning on conceptual understanding, it was found that  $t\text{-count } 9.32 > t\text{-table } 1.68$  which showed a significant effect. Furthermore, the results of hypothesis testing using the T-test the effect of Project-Based Learning on creativity obtained  $t\text{count } 9.29 > t\text{-table } 1.68$  which shows there is a significant effect. The resulting Pearson correlation is 69% which is categorized as a strong influence. This is due to Project-Based Learning, which is an active learning model, so that students can freely express ideas in preparing projects, and there are new learning experiences that can add insight. Based on analysis, can be concluded that the Project-Based Learning can significantly affect on the student ability to understand concepts and creativity.

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## INTRODUCTION

In today's education age, schools are supposed to train and develop students' abilities to possess twenty-first century skills. Collaboration, teamwork, strategic reasoning, and imagination are also twenty-first century talents. In the twenty-first century educational environment, school-based learning programs can be student-centered. A twenty-first-century education system seeks to provide students with fundamental skills and the ability to innovate, use information technologies, and work and survive utilizing life skills (Andrian et al., 2019).

Creativity is one of the aspects of ability that twenty-first-century education emphasizes. Komarudin (2018) disclose imagination can create something new; the work does not have to be unique; it may also incorporate two previously existing elements. Creativity is inextricably linked to the creative thought process since producing a creative action necessitates a stage of creative thinking. Cintia (2017) state innovative thinking can address issues using various types of solutions and master the essence of a problem to communicate thoughts or concepts on a problem subject.

Creativity is not defined only by the presence of a hypothesis. The challenges that exist around us will stimulate creativity. Creative students can solve their challenges and serve as inspiration to those around them (Putro, 2016). Therefore, to foster creativity, it is essential to provide an organized learning activity where students can use their imagination to create something.

What is happening now is that the learning carried out in the classroom seems textual and passive learning occurs, so that understanding and creativity are not maximized. Therefore, learning innovation needs to be developed so that students' understanding of concepts and creativity can develop. Research conducted by Albina et al (2020) shows that conventional learning does not improve student learning outcomes. Project-Based Learning is a method of education that connects technology and daily challenges to serve as a springboard to

develop a project (Lestari, 2018). Project-Based Learning consists of four phases of activity: goals, preparation, execution, and evaluation. These phases are used to present goal tasks or to accomplish learning objectives (Nakada et al., 2018). Project-Based Learning will allow students to conduct investigations, solve problems, engage in student-centered learning, and create products in a process (Suciani et al., 2018).

More specifically, the steps for the Project-Based Learning model, according to The George Lucas Educational Foundation as cited by Wajdi (2017) consist of: (1) question, starting with essential questions, taking fundamental topics that exist in everyday life, and make an investigation; (2) plan, plan a project that can answer problems and guide students to ask questions, plan, the process of building a project; (3) schedule, the teacher and students compile a plan containing the time for the preparation and the tools and materials used; (4) monitor, using authentic judgment; (5) facilitate the process, monitor the process by referring to the assessment rubric; (6) evaluate, assess the role of group members and discuss the shortcomings of the project for improvement.

The justification for implementing the Project-Based Learning model in education is to take advantage of its many benefits. As expressed by Nur (2016) the value of the Project-Based Learning paradigm is that students become accustomed to confronting challenges and are challenged to provide solutions to problems that arise not just in educational settings but also in daily life, creating a sense of social unity. Since students are accustomed to group conversations, they will help teachers become more acquainted with their students and teach them to use experimental approaches when solving problems. Students can address problems through compiling and executing a project.

When students design and assemble a project, a method will help students develop their imagination. Natty et al (2019) the creative process entails the transformation of certain significant elements that are already understood

into a different format, the use of facts in novel contexts, the description of several facets of reality, trends, and analogies, as well as fundamental concepts that have no connection.

The project given to students in this study takes the shape of a diorama constructed entirely of inorganic waste materials. In essential words, dioramas may be used to depict a three-dimensional representation of a real-world condition. As Nadhliroh (2018) described, a diorama is a three-dimensional miniature replica of a real-world scenario. Apart from being used as instructional material, dioramas can also be used as final tasks in the classroom.

Utilizing waste in educational activities will result in creative educational activities. Waste media will help students develop their creativity and sense of environmental stewardship (Rusli et al., 2018). Earning experiences that make use of waste from the surrounding area will help students develop their imagination. According to Santi (2019), recycling waste will help students think more creatively to think openly and consider how they feel and what they can make.

The following indicators are used to assess creativity: (1) fluency, which refers to the ability to generate ideas that are distinct from others in general; (2) flexibility, which refers to the capacity to generate a variety of ideas; (3) originality, which refers to the capacity to generate ideas that are distinct from others that are the product of individual thought; and (4) elaborate, which refers to the capacity to develop and add ideas to detail in detail (Febrianti et al., 2016).

Project-Based Learning can influence idea comprehension in addition to innovation. As stated by Febrianto (2018) intellectual comprehension is the capacity of students to comprehend certain concepts after they have been remembered and then offer a deeper and more adequate definition, illustrations, and interpretations of what he already understands and can articulate it again.

Many indicators can be used to assess a person's ability to comprehend concepts. Suryani (2018) identifies the following indices of logical

understanding: (1) interpretation; (2) example-giving; (3) classification; (4) conclusion-drawing; (5) comparison; and (6) explanation. Students' capacity to comprehend ideas is related to their ability to learn critically and their creativity.

Understanding is gained by activity-based learning, also known as learning through doing. Herniati et al. (2017), learning through doing is a method that seeks to shape and grow student awareness by formative learning experiences that enable students to experience the knowledge learned by the instructor.

The Project-Based Learning model aims to improve learning in the industrial age of the twenty-first century, since twenty-first-century learning activities are based on facts, exercises, and strategies that are extremely useful in the present era (Wijaya et al., 2016). As a result, the Project-Based Curriculum learning model is a crucial learning model for improving student learning and skills in the twenty-first century.

This research was carried out during the Covid 19 pandemic, so that learning in schools was carried out in a synchronous and asynchronous combination. In previous research, it explained the effect of Project-Based Learning on concept understanding and creativity in face-to-face learning. So that during this pandemic it is necessary to carry out the research in different class conditions.

This study aims to determine the effect of Project-Based Learning on students' conceptual understanding and creativity in making dioramas from inorganic waste. The strengths of this study are that it serves as a guide for determining how to incorporate Project-Based Learning to increase idea understanding and innovation. It can be used as a reference for knowing how to incorporate Project-Based Learning in increasing idea comprehension innovation.

## METHOD

The method used in this research is a quasi-experiment type one group pretest-posttest design. The research sample consisted of 97 fourth grade students from two elementary

schools in Subang Regency, West Java, selected using the cluster sampling technique. Essay questions, innovation appraisal rubrics, and student answer questionnaires comprised the testing instrument. The triangulation system was used to gather data, which included experiments, observation, and documentation.

The data collection technique used an essay question instrument that was given before and after the treatment, as well as a response questionnaire instrument that was given after the treatment. The steps for implementing the research are starting from the pretest, then Project-Based Learning is carried out to make dioramas made from inorganic waste, find out the learning outcomes with the posttest, analyze research data, and make conclusions.

Throughout the treatment, students would be divided into multiple classes and then assigned to create a diorama depicting the diversity of Indonesian culture. Themes for dioramas that may be used include dioramas of different traditional buildings, cultural events in a particular geographical state, and diverse geographic systems. Students used inorganic waste materials found in their immediate surroundings to create dioramas. This assignment is designed as a capstone for students and can be used to assess student learning outcomes. Students are expected to submit implementation documents, which can take photographs or recordings, during the diorama-making process. After completing students' group tasks, an evaluation of concept understanding and creativity will be conducted.

The factors in this analysis are Project-Based Learning as an independent variable and intellectual comprehension and creativity as a dependent variable. Since this is a quantitative sample, the data analysis begins with the normality, homogeneity, and linearity tests. Additionally, suppose the data meets the parameters. In that case, the n-gain test, basic regression test. Hypothesis testing using T-test which aims to draw conclusions about the effect of Project-Based Learning on students' conceptual understanding and creativity.

The following is the hypothesis for the impact of the Project-Based Learning on conceptual understanding:

$H_1$  : The Project-Based Learning model has a significant impact on conceptual understanding.

$H_0$  : There is no statistically significant relationship between Project-Based Learning and conceptual understanding

The following hypothesis is made about the impact of the Project-Based Learning model on creativity:

$H_1$  : There is a strong correlation between Project-Based Learning and creativity.

$H_0$  : There is no significant influence between Project-Based Learning and creativity.

Due to the emerging pandemic of Covid-19, this study used a blended learning approach. However, this does not negate the defined study procedure. Paper sheets and Google Forms were used to gather data for the research. Then for collaboration, debate, and recording of student work to promote online learning experiences conducted by the WhatsApp Group.

## RESULTS AND DISCUSSION

Project-Based Learning is a type of cooperative learning that provides opportunities for students to work collaboratively. The Project-Based Learning instructional model requires students to voluntarily conduct an inquiry and complete a specific project (Wijanarko, 2017). Due to the Covid-19 pandemic, this study used blended learning to ensure that learning experiences on a multimedia medium were appropriate for the student's circumstances and characteristics.

The preliminary research exercise included administering a pretest to students to ascertain their baseline ability. The therapy was then administered the following day using Project-Based Learning in a hybrid fashion that combined online and offline learning. Online learning is conducted through Google Meet, while community visits accomplish offline learning. Google Meet was chosen for this study

due to its benefits, including the whiteboard feature, which is available for free, HD media display, ease of use, video encryption program, several appealing display features, and the ability to invite up to 100 participants (Sawitri, 2020).

Students can perform assignments in groups at home and present their work through technology intermediaries while Project-Based Learning is implemented online. Consultations with teachers or academics are conducted through technology intermediaries, so that new challenges in online learning is mastery of technology in learning (Juwanti, 2020). Whereas in offline instruction, the instructor can monitor and observe the project's progress directly. Students can consult directly with one another about the difficulties and challenges they encounter when assembling dioramas.

After completing the diorama project by students, the researcher assesses the artistic product using innovation tests and a posttest. The evaluation of artistic products is a means of evaluating students' ability to create products. It entails evaluating their tool range and usage and their technological and aesthetic consistency (Maruti, 2018). Following the collection of research evidence, data interpretation testing can be used to conclude the research findings. The normality test is used to assess whether or not the data collected during testing operations are normal. The normality test findings are summarized in Table 1.

**Table 1.** Normality Test Results

| Data          | Mean  | D-count | Conclusion |
|---------------|-------|---------|------------|
| Pretest       | 46.57 | 0.12    | Normal     |
| Posttest      | 87.95 | 0.12    | Normal     |
| Project       | 88.91 | 0.12    | Normal     |
| Questionnaire | 82.00 | 0.09    | Normal     |

It is known that the value of the D-table at sig 0.05 with 97 respondents is 0.13. Based on result normality test in Table 1, obtained D-count < D-table. Thus, all of the analysis results presented above are usually transmitted. Then, the post-test scores achieved met the minimum completeness criterion. In addition, the overall

score of the students' diorama project scores indicates their ability to imagine while completing the diorama project. The next test is the homogeneity test which aims to determine the study data obtained from homogeneous or heterogeneous respondents. Table 2 shows the findings of the homogeneity test.

**Table 2.** Homogeneity Test Results

| Data          | F-count | Conclusion |
|---------------|---------|------------|
| Pretest       | 1.77    | Homogen    |
| Posttest      | 1.10    | Homogen    |
| Project       | 1.10    | Homogen    |
| Questionnaire | 1.18    | Homogen    |

The F-table is determined to be 3.09. From the results of the homogeneity test in Table 2, it is obtained that F-count > F-table. As a result, the results of the study can be concluded that the data comes from the same variant population. The last prerequisite test is the linearity test as a prerequisite for the simple regression test. Table 3 shows the results of linearity testing between Project-Based Learning (X) on concept understanding (Y1), and Project-Based Learning (X) on creativity (Y2).

**Table 3.** Linearity Test Results

| Criteria               | X – Y <sub>1</sub> | X – Y <sub>2</sub> |
|------------------------|--------------------|--------------------|
| Deviation of Linearity | 0.15               | 0.40               |
| Significance           | 0.05               | 0.05               |
| F-count                | 1.38               | 1.06               |
| F-table                | 3.09               | 3.09               |
| Conclusion             | Linear             | Linear             |

Based on result linearity test in Tabel 3, obtained F-count < F-table and the effects of linearity deviation is greater than significance. According to the findings of this study, the Project-Based Learning model has a linear association with conceptual understanding and creativity. As a result, both are implied to be able to manipulate one another. The n-gain test was used to determine the gap between students' conceptual understanding before and after implementing Project-Based Learning. The N-Gain value is shown in Table 4.

**Table 4.** N-Gain Test Results

| School | Class | N-Gain | Information |
|--------|-------|--------|-------------|
| PS-A   | 4A    | 74     | High        |
|        | 4B    | 66     | Moderate    |
| PS-B   | 4A    | 77     | High        |
|        | 4B    | 81     | High        |

Based on the results of the N-Gain test in Table 4. Each class in the two elementary schools showed different N-Gain results. Students' conceptual understanding has developed significantly. When students complete a diorama project assignment. They collect a lot of knowledge and consider possible solutions to complete the diorama concept in a suitable way.

The same correlation was addressed in the study conducted by Trianggono (2017) also asserts that conceptual comprehension and creativity have a constructive causal relationship that reinforces their respective roles since the involvement of a thought process accomplishes innovation and then takes actions that result in a learning experience that is directed toward the learning process.

A basic regression test was used to determine the effect of the Project-Based Learning model on students' ability to conceptual understanding. Table 5 presents the results of a simple regression test between Project-Based Learning (X) on concept understanding (Y<sub>1</sub>).

**Table 5.** The Results of Regression Testing on Project-Based Learning (X) on Conceptual Understanding (Y<sub>1</sub>)

| Criteria             | Result |
|----------------------|--------|
| Constant Coefficient | 48.55  |
| The PjBl coefficient | 0.46   |
| R <sup>2</sup>       | 0.47   |
| Significance         | 0.00   |
| Pearson Correlation  | 0.69   |
| T-count              | 9.32   |
| T-table              | 1.68   |

According to the result of regression in Table 5, if the Project-Based Learning attribute is zero or constant, comprehension of the

definition would improve 48.55 points. Additionally, if the variable for Project Based Learning is increased by one point, the variable for quantitative comprehension is increased by 0.46 points. Project-Based Learning has been shown to have a beneficial effect on students' intellectual comprehension.

The learning model's influence on concept understanding is increasing as a result of several supporting factors. Sukmawati (2017) asserts that internal factors such as basic abilities, interests, motivation, and cognitive abilities contribute to conceptual understanding. Apart from that, there are external considerations that cover enabling policies and resources. Increasing the understanding of concepts in each individual student depends on the ability of the students themselves.

Furthermore, the above findings show that the project dependent learning variable influences 48% of the Concept Understanding variable, while the remaining 52% is affected by other factors. The Pearson correlation coefficient is 0.69, indicating a positive relationship between Project-Based Learning and Conceptual Understanding.

To conclude the results of the study, a hypothesis test was conducted. The hypothesis testing results are t-count 9.23 > t-table 1.68, which can lead to the rejection of H<sub>0</sub> and acceptance of H<sub>1</sub>. As a result, the inference is that Project-Based Learning has a significant impact on students' intellectual comprehension ability.

Komarudin (2020) notes that the intellectual comprehension of students who are educated using the Project-Based Learning model is higher than the effects of understanding through applying traditional learning. As a result, the instructor is encouraged to use the Project-Based Learning approach to improve student learning activity and comprehend the resulting concepts.

As previously said, conceptual comprehension is associated with creativity. The more creative students are, the more likely they are to grasp the meaning of the learning material (Botty, 2018). When learning occurs, students

gain practical contact with the content to translate it to a concrete task. As a result of the creative process, information can be absorbed.

Project-Based Learning has the potential to improve conceptual comprehension. When students successfully finish the experiment and share the findings, they will describe a material idea in a better way than before. Furthermore, as the instructor stimulates students' reasoning by posing questions, conceptual comprehension improves (Puspitasari et al., 2020). The teacher's questions in learning are essential questions that can assign students to do certain things (Monika et al., 2018).

In creativity, many metrics are used as a guide to figure out how much creativity students have while studying. Table 6 shows an overview of the percentage of accomplishment of the innovation metrics gained from Project-Based Learning.

**Table 6.** Analysis in the Percentage of Achievement of Creativity Indicators

| Indicator   | Percentage of Performance |
|-------------|---------------------------|
| Fluency     | 28.85%                    |
| Originality | 21.81%                    |
| Flexibility | 25.35%                    |
| Elaboracy   | 24.61%                    |

According to the achievement analysis of creativity indicators Table 6, the indicator of maximum creativity is an indicator of fluency. Lubis (2018) defines fluency as articulating thoughts, responses, or responses to a given problem. Thus, this research demonstrates that students are interested in sharing personal views within their community to create their group's diorama design. Students include suggestions for instruments and resources, a blueprint scheme for diorama forms, the content to be displayed, and the required time.

Project-Based Learning is an inclusive learning paradigm that encourages students to participate in the learning process. It entails dialogue activities to contribute feedback and take an active role in project design in this situation. According to Anggraini (2021) study, there is a rise in student participation during

Project-Based Learning learning events. It is because students are not bored and thus grasp the instructional material more quickly.

Students' involvement in creating diorama ventures contributes to their creativity and understanding comprehension of the ideas involved. The achievement of the fluency measure in the aspect of student imagination demonstrates this. The students' dioramas were the product of teamwork with their community mates. Figure 1, Figure 2, and Figure 3 display each of the students' dioramas



**Figure 1.** Rural Community Life in a Diorama



**Figure 2.** Diorama of a Badui Traditional House



**Figure 3.** Joglo Traditional House Diorama

Based on several dioramas that have been produced by students in Figures 1, 2, and 3, it

can be concluded that students are able to manipulate materials to create dioramas with certain themes. The diorama production process is adjusted to the Project-Based Learning syntax and monitoring carried out by the teacher. The equipment and materials used are inorganic waste found near the student's residence, while the production activities of the diorama project take place in the residence of each student. The materials used are cardboard, plastic straws, styrofoam, and fiber. These materials can be manipulated into different shapes from the previous ones to match the desired shape of the diorama ornament. From the dioramas that students have produced, it can be concluded that students have succeeded in expressing their creativity in groups to change the shape of inorganic waste materials as expected.

From the explanation of the students' diorama results, there is a relationship between Project-Based Learning and creativity. To determine the effect of Project-Based Learning on Creativity, a simple regression test was conducted. The results of the simple regression test between Project-Based Learning (X) on Creativity (Y<sub>2</sub>) are presented in Table 7.

**Table 7.** The Results of Regression Testing on Project-Based Learning (X) on Creativity (Y<sub>2</sub>)

| Criteria             | Result |
|----------------------|--------|
| Constant Coefficient | 50.67  |
| The PjBl coefficient | 0.45   |
| R <sup>2</sup>       | 0.48   |
| Significance         | 0.00   |
| Pearson Correlation  | 0.69   |
| T-count              | 9.28   |
| T-table              | 1.68   |

According to the data in Table 6, if the variable for Project-Based Learning is fixed or zero, the variable for creativity will increase by 50.67 points. If the variable for Project-Based Learning increases by one point, the variable for creativity increases by 0.45 point. Variables associated with Project-Based Learning had a beneficial effect on the creativity component.

Various reasons support the growing impact of a learning model on creativity.

Widiyaningrum (2016) state factors that promote improved creativity are incompleteness and openness in contexts that can lead to questions and environmental factors that prioritize self-initiative to discover, observe and pose questions. Thus, building an environment conducive to innovative activity enables the Project-Based Learning model to have a broader impact on creativity.

Variables associated with Project-Based Learning will impact creativity by 48%, while the remaining 52% is affected by other variables. In the Pearson correlation, the result is 0.69, which suggests that the Project-Based Learning paradigm has a good effect on the creativity component. The final test is a hypothesis test, which is used to make inferences about the testing findings. The findings of hypothesis testing revealed that  $t\text{-count } 9.29 > t\text{-table } 1.68$  between the Project-Based Learning model and creativity. Following that, H<sub>0</sub> is rejected, and H<sub>1</sub> is accepted. According to these findings, there is a significant relationship between the Project-Based Learning model and creativity.

Additionally, the Project-Based Learning approach has a noticeable impact on student creativity. There is an improvement in student creativity following the implementation of the Project-Based Learning model. As students think, they will demonstrate an improvement in their creativity when it comes to solving a given problem by considering possible solutions (Surya et al., 2018). Project-based Learning is a form of active learning in which teachers can create situations that foster creativity in the absence of availability factors. Students will think and develop inventions based on what they see around them, which provides students with opportunities to be innovative. Rati (2017), state creativity emerges from the person itself in the form of a deep desire to be artistic.

Creativity is the product of everything as something that is formed based on the individuality of each individual. Students can seek out resources that correspond to the diorama they are creating, including inorganic waste found around the student that can manipulate into the desired object form. This

method would entail a period of reflection on how to relate information to the ideal type of diorama. Project-Based learning possesses characteristics that can impair students' creativity and conceptual comprehension. These characteristics can motivate students to participate actively in the process of collaborating on assignments and providing ideas. As a result, students receive a practical learning experience indirectly. According to Wulandari et al. (2019), Project-Based Learning will assist students in comprehending content, concepts, and opportunities to communicate ideas and concepts when building their skills, and is successful learning in conveying ideas while perfecting collective projects.

Thus, based on the study's findings and the help of many related studies, it is clear that the Project-Based Learning can affect students' intellectual comprehension and creativity. It aligns with twenty-first century skills, which emphasize creativity as a necessary ability learned through the learning process. The concepts of conceptual comprehension and creativity are strongly intertwined. Creativity enhances comprehension, promotes growth, and sharpens the brain regions associated with pure cognitive Heldanita (2018). As a result, the process of maximal creativity would be proportional to the increase in maximum conceptual comprehension of the term.

The existence of a pandemic certainly affects student learning outcomes. According to Syamsuddin (2021) students' learning motivation has decreased due to inadequate facilities and infrastructure, as well as the lack of supervision of teachers and parents. If using the online system only, students will experience problems in consulting related to the projects they are working on. With a blended learning system, these obstacles can be minimized. The use of online methods is not an obstacle in supporting successful learning as long as the facilities and infrastructure are met. Online learning is learning that is planned, implemented, and evaluated the same as learning in the classroom (Yunitasari & Hanifah, 2020)

In the blended learning system, the online learning process is enhanced by visiting activities by implementing health protocols. This process will increase motivation which can affect student learning outcomes (Yusrizal et al., 2012). The role of parents at home and helping students to communicate with teachers regarding the obstacles faced when carrying out projects is very much needed (Rahma et al., 2021). In addition, visiting activities optimize teacher and student interactions.

## CONCLUSION

The results of the study concluded that Project-Based Learning had a major effect on students' conceptual understanding and creativity. The correlation coefficient of 0.69 indicates a strong relationship between Project-Based Learning and Conceptual Understanding and Creativity. Based on the results of the pretest and posttest, students' understanding of concepts has increased. This is because students are actively involved and get new experiences that can broaden their understanding. As for the realm of creativity, the visible indicator of creativity is fluency. This can be seen when students can generate new ideas in designing and processing inorganic waste into dioramas. Consequently, Project-Based Learning should be used as an attractive learning model to encourage conceptual understanding and creativity to incorporate twenty-first century learning.

## REFERENCES

- Albina, M., & Sutanti, S. (2020). Pengaruh Model Pembelajaran Tutor Sebaya Terhadap Hasil Belajar Patiseri Di SMK Imelda Medan. *Garnish: Jurnal Pendidikan Tata Boga*, 4(1), 9–16.
- Andrian, Y., & Rusman, R. (2019). Implementasi pembelajaran abad 21 dalam kurikulum 2013. *Jurnal Penelitian Ilmu Pendidikan*, 12(1), 14–23.
- Cintia, N. I., Kristin, F., & Anugraheni, I. (2017). Penerapan Model Pembelajaran

- Discovery Learning untuk Meningkatkan Kemampuan Berfikir Kreatif dan Hasil Belajar Siswa. *PERSPEKTIF: Ilmu Pendidikan*, 23(1), 69–77.
- Febrianti, Y., Djahir, Y., & Fatimah, S. (2016). Analisis Kemampuan Berpikir Kreatif Peserta Didik dengan Memanfaatkan Lingkungan pada Mata Pelajaran Ekonomi di SMA Negeri 6 Palembang. *Jurnal Profit*, 3(1), 121–127.
- Febrianto, B., Haryanti, Y. D., & Komalasari, O. (2018). Peningkatan Pemahaman Konsep Matematis Melalui Penggunaan Media Kanting Bergambar Pada Materi Perkalian Bilangan Di Kelas II Sekolah Dasar. *Jurnal Cakrawala Pendas*, 4(2), 32–44.
- Herniati, R., Sulistri, E., & Rosdianto, H. (2017). Penerapan Model Predict Observe Explain Dengan Pendekatan Learning by Doing Untuk Meningkatkan Hasil Belajar Siswa. *Jurnal Fisika FLUX*, 14(2), 120–124.
- Juwanti, A. E., Salsabila, U. H., Putri, C. J., Nurany, A. L. D., & Cholifah, F. N. (2020). Project Based Learning (PjBL) untuk PAI Selama Pembelajaran Daring. *Jurnal Pendidikan Al-Ilmi*, 3(2), 72–82.
- Komarudin, D. (2018). Hubungan Antara Kreativitas Dengan Prestasi Belajar Siswa. *Psymphatic: Jurnal Ilmiah Psikologi*, 4(1), 278–288.
- Komarudin, K., Puspita, L., Suherman, S., & Fauziyyah, I. (2020). Analisis Pemahaman Konsep Matematis Peserta Didik Sekolah Dasar: Dampak Model Project Based Learning Model. *DIDAKTIKA TAUHIDI: Jurnal Pendidikan Guru Sekolah Dasar*, 7(1), 43–53.
- Lapangan (Ppl) Mahasiswa Program Studi Pendidikan Tata Boga. (n.d.). *Media Pendidikan, Gizi, Dan Kuliner*, 7(1), 76–81.
- Lestari, T. P., Sarwi, S., & Sumarti, S. S. (2018). STEM-Based Project Based Learning Model to Increase Science Process and Creative Thinking Skills of 5th Grade. *Journal of Primary Education*, 7(1), 18–24.
- Maruti, E. S., & Kusumawati, N. (2018). Pengembangan Asesmen Alternatif Berupa Penilaian Produk Pada Mata Kuliah Pembelajaran Bahasa Jawa di SD. *Paramasastra Jurnal Ilmiah Bahasa Sastra Dan Pembelajarannya*, 5(2), 155–169.
- Nadhliroh, I., & Prasetyaningtyas, F. D. (2018). Pengembangan Media Diorama Berbasis Audiovisual Pada Muatan Ips Kelas V. *UNNES Journal: Joyful Learning Journal*, 7(4), 25–33.
- Nakada, A., Kobayashi, M., Okada, Y., Namiki, A., & Hiroi, N. (2018). Project-based learning. *Journal of the Medical Society*, 157–163.
- Natty, R. A., Kristin, F., & Anugraheni, I. (2019). Peningkatkan Kreativitas Dan Hasil Belajar Siswa Melalui Model Pembelajaran Project Based Learning Di Sekolah Dasar. *Jurnal Basicedu*, 3(4), 1082–1092.
- Nur, S., Pujiastuti, I. P., & Rahman, S. R. (2016). Efektivitas Model Problem Based Learning (PBL) terhadap Hasil Belajar Mahasiswa Prodi Pendidikan Biologi Universitas Sulawesi Barat. *Saintifik*, 2(2), 133–141.
- Putro, K. Z. (2016). Mengembangkan Kreativitas Anak Melalui Bermain. *Aplikasia: Jurnal Aplikasi Ilmu-Ilmu Agama*, 16(1), 19–27.
- Rahma, F. N., Wulandari, F., & Husna, D. U. (2021). Pengaruh Pembelajaran Daring di Masa Pandemi Covid-19 bagi Psikologis Siswa Sekolah Dasar. *Edukatif: Jurnal Ilmu Pendidikan*, 3(5), 2470–2477.
- Rusli, T. I., Ndibale, W., & Atika, A. (2018). Lipstik (Limbah Plastik Dan Kertas) Sebagai Media Pengajaran Bahasa Inggris Di Sekolah Dasar Negeri. *Jurnal JPSD*, 5(2), 32–38.
- Santi, A. U. P., & Anisah, N. (2019). Meningkatkan Kreativitas Siswa dengan Kreasi Daur Ulang Sampah. *Holistika Jurnal Ilmiah PGSD, III*, 57–66.
- Sawitri, D. (2020). Penggunaan Google Meet Untuk Work from Home Di Era Pandemi Coronavirus Disease 2019 (Covid-19).

- Prioritas: Jurnal Pengabdian Kepada Masyarakat*, 2(01), 13–21.
- Suciani, T., Lasmanawati, E., & Rahmawati, Y. (2018). *Pemahaman Model Pembelajaran Sebagai Kesiapan Praktik Pengalaman*.
- Surya, A. P., Relmasira, S. C., & Hardini, A. T. A. (2018). Penerapan Model Pembelajaran Project Based Learning (PjBL) Untuk Meningkatkan Hasil Belajar dan Kreativitas Siswa Kelas III SD Negeri Sidorejo Lor 01 Salatiga. *Jurnal Pesona Dasar*, 6(1), 41–54.
- Suryani, E. (2018). Profil Kesalahan Pemahaman Konsep Cahaya Pada Siswa Kelas V Sekolah Dasar. *Refleksi Edukatika: Jurnal Ilmiah Kependidikan*, 9(1), 13–18.
- Syamsuddin. (2021). Dampak Pembelajaran Daring di Masa Pandemic Covid -19 Terhadap Motivasi Belajar Siswa SD Inpres 1 Tatura Kota Palu. *Guru Tua: Jurnal Pendidikan Dan Pembelajaran*, 4(1), 45–50.
- Trianggono, M. M. (2017). Analisis Kausalitas Pemahaman Konsep Dengan Kemampuan Berpikir Kreatif Siswa Pada Pemecahan Masalah Fisika. *Jurnal Pendidikan Fisika Dan Keilmuan (JPFK)*, 3(1), 1–12.
- Wajidi, F. (2017). Implementasi Project Based Learning (Pbl) Dan Penilaian Autentik Dalam Pembelajaran Drama Indonesia. *Jurnal Pendidikan Bahasa Dan Sastra*, 17(1), 81–97.
- Wijanarko, A. G., Supardi, K. I., & Marwoto, P. (2017). Keefektifan Model Project Based Learning Terbimbing untuk Meningkatkan Keterampilan Proses Sains dan Hasil Belajar IPA. *Journal of Primary Education*, 6(2), 120–125.
- Wijaya, E. Y., Sudjimat, D. A., & Nyoto, A. (2016). Transformasi Pendidikan Abad 21 Sebagai Tuntutan. *Jurnal Pendidikan*, 1, 263–278.
- Yunitasari, R., & Hanifah, U. (2020). Pengaruh Pembelajaran Daring terhadap Minat Belajar Siswa pada Masa COVID 19. *Edukatif: Jurnal Ilmu Pendidikan*, 2(3), 232–243.
- Yusrizal, Y., Lubis, B. S., Fatmawati, F., & Muzdalifah, D. (2012). Pengaruh Metode Visit Home dan Pola Bimbingan Orang Tua Terhadap Motivasi belajar Siswa Sekolah dasar di Era Pandemi Covid-19. *Jurnal Tematik*, 10(3), 129–135.