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# Implementing the Project-Based Learning (PjBL) Model to Foster Conceptual Understanding of Electric Circuit House Projects in Sixth Grade Elementary Students

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**Abstract:** This study aims to analyze the conceptual understanding of sixth grade students at SDIT Gameel Akhlaq through an electric circuit house project using the Project-Based Learning (PjBL) model. The research employed a qualitative descriptive approach, with data collected through interviews, documentation, and observation. The research subjects consisted of 10 sixth grade students and one science teacher. Data analysis was based on five indicators of conceptual understanding as proposed by Murtiyasa & Sari (2022): restating concepts, classifying objects, representing concepts, connecting concepts, and applying concepts in daily life. The findings indicate that the implementation of PjBL through the electric circuit house project significantly improved students' conceptual understanding. Students were not only able to explain electrical concepts in their own words, but also demonstrated the ability to connect and apply these concepts in real-life contexts.

**Keyword:** Conceptual Understanding, Project-Based Learning (PjBL), Electric Circuit, Elementary School

## INTRODUCTION

Learning is an interactive process between students and teachers that involves reciprocal communication within an educational setting, with the aim of achieving the intended learning outcomes. According to Meri & Mustika (2022), the teacher's role in the learning process is crucial, as the teacher not only serves as an instructor but also as a guide, motivator, and facilitator. The importance of the teacher's role in education is regulated in Law Number 14 of 2005 concerning Teachers and Lecturers, which mandates that teachers must possess pedagogical, professional, social, and personal competencies to ensure the quality of education (Law No. 14 of 2005).

Conceptual understanding is one of the primary goals in science (IPA) education at the elementary school level. Electricity material is categorized as abstract content that requires students not only to recall information but also to relate it to everyday phenomena. SDIT Gameel Akhlaq, as an integrated Islamic school, faces challenges in delivering science content

contextually due to the dominance of conventional approaches that focus more on religious instruction and memorization.

Science education is an essential component of the elementary school curriculum, aiming to develop students' understanding of natural and technological phenomena. This aligns with the National Education System Law No. 20 of 2003 Article 37 Paragraph 1, which states that the basic and secondary education curriculum must include science (Law No. 20 of 2003). At SDIT Gameel Akhlaq, science instruction encounters difficulties in enhancing students' comprehension of scientific concepts, particularly regarding electric circuits. As a private integrated Islamic school, SDIT Gameel Akhlaq has a unique characteristic: its emphasis on religious values and Qur'an memorization. This focus leads to a predominantly conventional instructional approach, making science learning less interactive and less applicable to real-life situations (Law No. 20 of 2003). As a result, many students struggle to grasp the abstract concepts of electricity, which require more complex analytical skills. The lack of hands-on practice further contributes to low student interest and understanding in this area.

One of the solutions implemented by the science teacher is the use of the Project-Based Learning (PjBL) model through an electric circuit house project. PjBL is a student-centered approach involving real-world projects that promote exploration, investigation, and presentation. Through this type of project, students do not merely memorize concepts but construct knowledge through direct experience. As stated by Kelana & Wardani (2021), science learning should not be limited to knowledge acquisition, but should also be a process of discovery involving students' active participation.

This study aims to analyze the extent to which students' conceptual understanding of electric circuits can be improved through an electric circuit house project using the PjBL approach.

## METHOD

This study employed a qualitative research method. According to Sugiyono (2021), qualitative research is often referred to as a naturalistic method because it is conducted in a natural setting to explain phenomena through inductive or qualitative data analysis, emphasizing meaning over hypothesis testing. The research was conducted at SDIT Gameel Akhlaq, an Islamic integrated elementary school established by the Al-Amin Bina Insani Foundation, focusing specifically on sixth grade students.

Students involved in the project were interviewed to explore their perspectives and experiences regarding conceptual understanding after completing the electric house project using the PjBL model. In addition to students, the science teacher also served as an informant in this study. The research subjects consisted of sixth grade students at SDIT Gameel Akhlaq who participated in science learning through the Project-Based Learning model. These students were selected as the research subjects because they directly experienced the PjBL-based learning process, and their conceptual understanding was the primary focus of this study.

**Tabel 1. Informan**

| No. | Informan | Jumlah |
|---|---|---|
| 1. | Guru IPA kelas VI | 1 |
| 2. | Siswa Kelas VI | 10 |

The data collection techniques in this study included interviews, documentation, and observation (field notes). This research employed qualitative data analysis techniques. According to Miles and Huberman (in Sugiyono, 2021).

## RESULTS AND DISCUSSION

This study reveals how the application of the Project-Based Learning (PjBL) model through an electric circuit house project can enhance sixth grade students' conceptual understanding at SDIT Gameel Akhlaq. Data were obtained through triangulated techniques interviews, observations, and documentation with 10 students and one science teacher as participants.

The science teacher reported that a contextual approach was implemented from the beginning by introducing familiar electrical tools such as switches and bulbs. This strategy helped students understand basic electricity concepts through direct experience, such as connecting wires and observing the bulb light up. The electric house project was designed to encourage students to understand the function of each electrical component while also developing their skills in drawing circuit diagrams, classifying components, and presenting their understanding through various means.

Interviews showed that most students were enthusiastic and enjoyed the project-making process. They found it easier to understand how electric current works by seeing the outcome of their own circuit constructions. The moment when the bulb lit up was particularly memorable for many students.

From the teacher's perspective, PjBL encouraged active participation and student independence. Despite challenges such as limited time and tools, the learning experience was more meaningful. Classroom presentations added value by improving communication and self-confidence, even though some students initially felt nervous.

Documentation of student learning outcomes supported these findings. In terms of knowledge assessment, most students could answer questions integrating diagrams and real-life contexts, such as applying parallel circuits in household settings. Students' average scores ranged between 80–90. Attitudinal assessments showed high levels of engagement and responsibility throughout the project. Skills assessments, including assembling circuits, also scored good to excellent. Social-emotional competencies indicated collaborative and independent work habits.

During individual practice presentations, students were able to explain the names and functions of components such as batteries, wires, switches, and bulbs. Successfully lighting the bulb was an indicator of both theoretical understanding and practical application. Some students faced technical difficulties such as loose wires or dead batteries, but these became learning moments that developed critical thinking and problem solving skills.

The aesthetic quality of the projects also reflected students' creativity and neatness. Simpler projects were still appreciated as part of the learning process, especially when students could independently explain the steps they followed. Teachers also questioned students' level of involvement to ensure originality and instill the value of integrity.

Interview data were categorized thematically, and student quotes were presented as representative of similar responses. The analysis referred to five indicators of conceptual understanding by Murtiyasa & Sari (2022): which are (1) restating the concept in one's own words, (2) classifying objects according to their concepts, (3) representing the concept in various forms, (4) connecting different concepts, and (5) applying the concept to solve everyday problems.

1. Restating the Concept

Most students demonstrated the ability to restate the concept of electricity in their own words. During interviews and presentations, they explained the function of wires, batteries, switches, and bulbs by relating them to the projects they created. The use of concrete tools was effective in supporting this understanding. Documentation of individual practice showed that students who independently explained their projects received high scores. These findings are consistent with Saputri and Wulandari (2023) and Fitriyani et al. (Fitriyani, 2022), who stated that PjBL

enhances conceptual understanding and 21st-century skills. Qalbina et al. (2023) also emphasized that PjBL improves students' ability to articulate science concepts independently.

2. Classifying Objects

Most students were able to group objects based on characteristics, such as distinguishing between conductors and insulators. They also categorized components based on their position in the circuit and distinguished between open and closed circuits. This showed an understanding of the relationship between material properties and conductivity. Rasidah et al. (2022) found that PjBL significantly enhances scientific concept mastery, including analytical thinking skills like classification as per Bloom's taxonomy. This is also supported by Cahyani and Pratiwi (2021) who argued that student engagement in physical projects promotes active classificatory understanding.

3. Representing Concepts

Students represented electrical concepts in tangible form through their electric house projects. They assembled circuits using wires, batteries, switches, and bulbs inside miniature houses they created. They explained the flow of electricity during project presentations and drew circuit diagrams. This indicated their ability to visualize and concretely express learned concepts, both verbally and non-verbally. These findings align with the study by Safitri and Handayani (2022), who emphasized the importance of PjBL strategies in overcoming abstract concepts in electricity through visualization and real projects.

4. Connecting Concepts

Students were able to link different concepts they had learned. For instance, they understood the relationship between closed circuits and lighting the bulb, as well as how component changes or damage affected circuit functionality. When facing project challenges, they could identify and resolve errors, showing comprehension of theoretical and practical integration. This is consistent with the findings of Putri and Astuti (2020) and Murtiyasa & Sari (2022), who stated that students with strong understanding can synthesize and connect concepts systematically.

5. Applying Concepts in Daily Life

Students connected electrical concepts to real-life situations, such as using switches and lights at home. Documentation revealed that students could explain project applications logically and respond to practical questions from the teacher. PjBL supports knowledge transfer from the classroom to real-life contexts, consistent with Bloom's taxonomy in the application domain. Zuani and Purwowidodo (2024) confirmed that contextual projects help students apply science concepts meaningfully and concretely.

Overall, the findings of this study indicate that the implementation of the Project-Based Learning (PjBL) model in science instruction on electric circuits in Grade VI at SDIT Gameel Akhlaq has successfully facilitated the achievement of the five indicators of conceptual understanding referenced in Bloom's taxonomy, namely: restating the concept in one's own words, classifying objects based on their concepts, representing concepts in various forms, connecting different concepts, and applying concepts to solve everyday problems.

Through the activities of designing, assembling, and presenting the electric circuit house project, students were given the opportunity to directly experience electricity concepts that were previously taught only in theory. They were able to explain the functions of electrical components in their own words, demonstrating that their understanding was personal and constructed rather than based on rote memorization. Moreover, students were able to distinguish and classify components such as energy sources, conductors, switches, and loads based on their functions and roles within a circuit system. This highlights that classification skills, as part of mid-level thinking abilities, were well developed.

Furthermore, students were not only able to name the components but also represent the concepts concretely through physical demonstrations and visual explanations during their

presentations. These activities strengthened their understanding of conceptual connections, such as the flow of electrical energy from the source to the load, and how each component interacts to form a complete and functional electrical system. Finally, their ability to apply the concepts to explain real-life occurrences at home or in their environment affirms that PjBL effectively facilitates the transfer of knowledge into real-world contexts. As emphasized by Mulyadi and Suryani (2021), the practice of PjBL provides authentic learning experiences that enhance concept retention and application in practical settings.

This research aligns with the findings of Rasidah et al. (2022) in Jurnal Pendidikan MIPA, which concluded that the PjBL model has a significant impact on students' mastery of science concepts by actively involving them in project development directly related to the subject matter. That study emphasized that project-based learning reinforces understanding through concrete and collaborative activities, making it easier for students to remember, comprehend, and apply concepts logically and systematically. Nugraha and Suryana (2023) also demonstrated that environmentally-based PjBL helps students grasp science concepts in a more contextual and applicable way. In addition, Saputri and Wulandari (2023) revealed that the direct application of PjBL in elementary-level electricity projects significantly enhances students' conceptual understanding and reduces misconceptions. In conclusion, PjBL is an effective instructional approach to holistically improve students' conceptual understanding, particularly in science subjects at the elementary school level.

## CONCLUSION

This study focused on analyzing students' conceptual understanding of electric circuits after participating in a Project-Based Learning (PjBL) activity through an electric circuit house project in Grade VI at SDIT Gameel Akhlaq. The primary objective was to determine the extent to which the implementation of the PjBL model could develop and strengthen students' conceptual understanding based on five indicators: restating the concept in one's own words, classifying objects according to their concepts, representing the concept in various forms, connecting concepts, and applying the concept to solve everyday problems.

The results showed that most students demonstrated a solid understanding across all five indicators. Students were able to identify and explain the components of electric circuits in their own words, categorize components based on their functions, and convey their understanding through hands-on practice, presentations, and direct demonstrations. The PjBL model proved effective in encouraging active engagement, critical thinking, and concept construction through experiential learning.

This instructional approach aligns with the Merdeka Curriculum applied at SDIT Gameel Akhlaq, where the subject of IPAS (Integrated Science and Social Studies) is separated into Science and Social Studies, with a greater emphasis on Science. Although IPAS is still recorded as a single subject on report cards, the assessment ratio between Science and Social Studies is 70:30, reflecting the weekly instructional time allocation. These findings are further supported by the study of Rahmah and Lestari (2022), which revealed that PjBL significantly enhances elementary students' conceptual understanding in science and their thinking skills. Additionally, this approach aligns with the findings of Suarna and Mertasari (2021), who emphasized that the implementation of locally-based PjBL can enrich students' comprehension of electricity topics through meaningful, concrete experiences.

## REFERENCES


Abdurahman, A., Ruhyadi, S. G. S. A., & Binasdevi, M. (2022). Implementasi model project based learning (PJBL) dalam penerapan kurikulum merdeka belajar di kelas tinggi MI/SD. Al-Ibanah, 7 (2), 1–9. https://doi.org/10.54801/ibanah.v7i2.107

Anjaeni, N. D., & Waluyo, M. (2025). Analysis of mathematical reasoning ability as seen from students' understanding of concepts in solving PISA. Jurnal Pendidikan dan Kebudayaan, 9 (2), 292–310.

Cahyani, A. L., & Pratiwi, A. (2021). The effect of project based learning to improve elementary students' science process skills. Jurnal Pendidikan IPA Indonesia, 10 (4), 587–595. https://doi.org/10.15294/jpii.v10i4.31526

Fitriyani, T. M., Listiana, I. R., & Mustika, T. (2022). Implementasi project based learning dalam pembelajaran IPA sekolah dasar untuk meningkatkan pemahaman konsep dan keterampilan abad 21. Jurnal Basicedu, 6 (6), 9332–9340. https://doi.org/10.31004/basicedu.v6i6.4063

Kelana, J. B., & Wardani, D. S. (2021). Model pembelajaran IPA SD. Edurimedia Indonesia.

Meri, E. G., & Mustika, D. (2022). Peran guru dalam pembelajaran di kelas V sekolah dasar. Jurnal Pendidikan dan Konseling, 4 (4), 200–208.

Mulyadi, Y., & Suryani, I. (2021). Praktik project based learning untuk meningkatkan kompetensi IPA di sekolah dasar. Jurnal Cakrawala Pendidikan, 40 (2), 389–400. https://doi.org/10.21831/cp.v40i2.40234

Murtiyasa, B., & Sari, N. K. P. M. (2022). Analisis kemampuan pemahaman konsep pada materi bilangan berdasarkan taksonomi Bloom. Aksioma: Jurnal Program Studi Pendidikan Matematika, 11 (3), 2059. https://doi.org/10.24127/ajpm.v11i3.5737

Nugraha, A., & Suryana, D. (2023). Penerapan PjBL dalam meningkatkan kinerja belajar IPA berbasis lingkungan. Jurnal Pendidikan Sains Indonesia, 11 (1), 55–63. https://doi.org/10.24815/jpsi.v11i1.27500

Putri, N., & Astuti, W. (2020). Eksperimen project based learning untuk memahami listrik dinamis di sekolah dasar. Jurnal Ilmiah Pendidikan Fisika Al-Biruni, 9 (1), 77–85. https://doi.org/10.24042/jipfalbiruni.v9i1.6390

Qalbina. (2023). Penggunaan model pembelajaran project based learning untuk memotivasi belajar bahasa Indonesia siswa kelas IV UPT SD Negeri 220 Gresik. Inventa: Jurnal Pendidikan Guru Sekolah Dasar, 8 (1), 1–13.

Rahmah, N. F., & Lestari, R. S. (2022). Pengaruh model project based learning terhadap pemahaman konsep IPA siswa sekolah dasar. Jurnal Ilmiah Sekolah Dasar, 6 (4), 578–584. https://doi.org/10.23887/jisd.v6i4.44779

Rasidah, W., Wahyuningsih, T., Suhartini, E., Dwiyono, Y., & Arafah, A. A. (2022). Pengaruh penggunaan model pembelajaran project based learning terhadap penguasaan materi IPA pada siswa. Jurnal Pendidikan MIPA, 12 (4), 1072–1078. https://doi.org/10.37630/jpm.v12i4.730

Rizkasari, E., Rahman, I. H., Aji, P. T., Slamet, U., Surakarta, R., & Purwokerto, U. M. (2022). Penerapan model pembelajaran project based learning untuk meningkatkan hasil belajar dan kreativitas peserta didik. Jurnal Pendidikan Tambusai, 6 (20), 14514–14520.

Safitri, R., & Handayani, S. (2022). Strategi PjBL mengatasi kesulitan konsep abstrak listrik di SD. Jurnal Pendidikan dan Pembelajaran Khatulistiwa, 11 (3), 129–137. https://doi.org/10.26418/jppk.v11i3.56342

Saputri, R. A., & Wulandari, F. (2023). Implementasi project based learning untuk meningkatkan pemahaman konsep listrik di sekolah dasar. Jurnal Pendidikan Fisika Indonesia, 19 (2), 115–123. https://doi.org/10.15294/jpfi.v19i2.65432

Suarna, I. W., & Mertasari, I. G. A. E. (2021). Project-based learning berbasis kearifan lokal untuk meningkatkan pemahaman konsep IPA siswa SD. Jurnal Pendidikan dan Pengajaran, 54 (2), 202–213. https://doi.org/10.23887/jpp.v54i2.39861

Sugiyono. (2021). Metode penelitian kualitatif dan metode penelitian kuantitatif.

Zuani, M. I. P., & Purwowidodo, A. (2024). Penerapan model project based learning (PJBL) untuk meningkatkan kemampuan berpikir kreatif dalam mata pelajaran IPA pada siswa kelas 3 di SD Muhammadiyah 4 Kota Malang. Al Madrasah: Jurnal Pendidikan Madrasah Ibtidaiyah, 8 (3), 1294. https://doi.org/10.35931/am.v8i3.3579