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The Influence of Project Based Learning LKPD in Improving 21st Century Skills for Class V Elementary School Students

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Abstract: This research aims to provide an influence on the use of Student Worksheets (LKPD) based on Project Based Learning (PBL) on improving 21st century skills in fifth grade elementary school students. The problem raised is the low development of critical thinking, creativity, collaboration and communication skills in students who use conventional learning methods. This research uses quantitative methods with a quasi-experimental design. The research sample consisted of 60 students who were divided into two groups: 30 students in the experimental group who used PBL-based LKPD and 30 students in the control group who used conventional LKPD. The instruments used include skills tests, observation sheets, and student perception questionnaires. Data were analyzed using the t test (t-test). The research results showed that the experimental group experienced a significant increase in critical thinking skills by 18.53%, creativity by 16.82%, collaboration by 19.31%, and communication by 14.21%. Meanwhile, the control group only experienced an increase of 9.11%, 7.62%, 8.43% and 6.71% respectively. In conclusion, PBL-based LKPD is significantly more effective in improving 21st century skills in elementary school students compared to conventional learning methods. These findings support the implementation of PBL as an effective learning strategy at the basic education level.

Keywords: 21st century skills; Elementary school; LKPD; PBL.

Introduction

Technological developments and globalization have brought significant changes in various aspects of life, including in the field of education (Noviati et al., 2020). In the 21st century, the challenges faced by the world of education are increasingly complex and require changes in teaching and learning approaches (Jayadiputra et al., 2023; Madanipour & Cohrssen, 2020). The skills needed to face this era are not only limited to academic knowledge, but also include 21st century skills such as critical thinking, creativity, collaboration and communication **(Mu'minah 2021)**. Therefore, educational institutions, including elementary schools, need to adapt effective learning strategies to develop these skills in students.

Elementary School is an important foundation in forming students' cognitive abilities and character (Anggraini et al., 2018; Sari et al., 2023). At this level, students are at a very important stage of development where logical and analytical thinking abilities begin to form (Lestariningsih & Suardiman, 2017). However, the reality on the ground shows that the learning methods applied in many elementary schools are still conventional and unable to stimulate the development of 21st century skills. Learning that is teacher-centered and solely knowledge-oriented is no longer relevant to educational needs in this modern era.

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One approach that is considered effective for overcoming this problem is Project Based Learning (PBL) (Servos et al., 2023). PBL is a learning method that emphasizes the learning process through working on real projects that are relevant to students (Gazali et al., 2024; Nafiah et al., 2023). Through PBL, students are actively involved in the learning process, which not only improves their understanding of the subject matter, but also hones critical and creative thinking skills, as well as the ability to collaborate and communicate (Masaguni et al., 2023; Nurwahidah et al., 2022; Susilawati et al., 2023). PBL also provides opportunities for students to learn independently and develop a sense of responsibility for the tasks they do (Martinez, 2022; Syahril et al., 2019).

To maximize the implementation of PBL in elementary schools, PBL-based Student Worksheets (LKPD) can be an important instrument (Chalsum et al., 2023; Mulyani & Farida, 2017). LKPD designed in accordance with PBL principles can guide students in carrying out learning projects in a more structured and focused manner (Susanti et al., 2022; Yustianingsih et al., 2017). However, even though PBL-based LKPD has great potential in improving 21st century skills, its implementation in elementary schools still faces various challenges (Dewi & Arifin, 2024; Hasanah et al., 2024; Rusminto, 2017). One of the main challenges is the lack of understanding and skills of teachers in designing and implementing LKPD in accordance with PBL principles.

Various previous studies have shown the effectiveness of PBL in improving student learning outcomes and skills. For example, students who learn using PBL have better critical thinking skills compared to students who learn using conventional methods (Azmi & Festiyed, 2023; Efendi et al., 2022; Sarjani et al., 2023). Other research also finds that PBL can increase students' learning motivation and develop collaboration skills (Marta et al., 2020; Susanti et al., 2022). However, research that specifically examines the influence of PBL-based LKPD on 21st century skills at the elementary school level is still limited, especially in the Indonesian educational context.

These limitations of previous research became the basis for this research to further explore how PBL-based LKPD can be used to improve the 21st century skills of fifth grade elementary school students (Qulsum, 2022; Syahril et al., 2019). This research attempts to answer several main problems, namely the extent to which PBL-based LKPD can improve students' critical thinking, creative, collaboration and communication skills (Hidayat et al., 2020; Sartini & Mulyono, 2022). Apart from that, this research also wants to know what obstacles are faced in implementing PBL-based LKPD and how to overcome them.

The novelty of this research lies in its specific focus on the influence of PBL-based LKPD in the context of basic education in Indonesia (Mughni & Sari, 2024; Yanti et al., 2023). This research not only measures academic learning outcomes, but also examines improving 21st century skills which is an important focus in this modern era (Lestari et al., 2019). In addition, this research will provide practical guidance for teachers in designing and implementing effective PBL-based LKPD, as well as offering solutions to obstacles that may be encountered in the process.

Furthermore, this research also seeks to contribute to the development of project-based learning theory and practice in elementary schools (Chesa & Nafi'ah, 2022; Kahfi, 2022). It is hoped that the research results can become a reference for educators and policy makers in integrating 21st century skills into the basic education curriculum (Hidayati et al., 2017; Kıral, 2020). Thus, this research not only has theoretical value, but also practical value that can be directly applied in an educational context.

In order to achieve this goal, this research will use a quantitative approach with an experimental design to measure the effect of PBL-based LKPD on students' 21st century skills (Bramante & Colby, 2016). Data will be collected through skills tests, observations, and interviews with students and teachers. It is hoped that the results of this research will provide a comprehensive picture of the effectiveness of PBL-based LKPD in developing 21st century skills and offer recommendations for improving learning practices in elementary schools (Kurnia & Nurhayati, 2020).

It is hoped that this research can make a significant contribution to improving the quality of education in Indonesia, especially in preparing the young generation who are ready to face the challenges of the 21st century.

Method

This research uses quantitative methods with a quasi-experiment design to test the effect of Student Worksheets (LKPD) based on Project Based Learning (PBL) on improving 21st century skills in fifth grade elementary school students (Sugiyono, 2019; Waruwu, 2023). A quasi-experimental design was chosen because this research was conducted in an existing classroom environment, where grouping of students could not be done randomly (Creswell, 2016). This research involves two groups of students, namely the experimental group who will use PBL-based LKPD and the control group who will use conventional LKPD. These two groups will be given a pretest before the intervention and a posttest after the intervention to measure changes in 21st century skills.

The sample for this research was fifth grade elementary school students at one of the state elementary schools in Agam district (Setyosari, 2016). Sample selection was carried out using a purposive sampling technique, namely selecting samples based on certain considerations that are relevant to the research objectives. In this case, the school chosen is a school that has similar characteristics to other elementary schools in Agam district in terms of curriculum, facilities and student background. The number of samples used in this research was 60 students, consisting of 30 students in the experimental group and 30 students in the control group.

The research instruments used to measure students' 21st century skills are skills tests, observation sheets, and questionnaires. The skills test is prepared based on indicators of 21st century skills which include critical thinking, creativity, collaboration and communication. This test will be given to students in the form of a pretest and posttest. Observation sheets are used to observe student activities during the learning process, especially how students apply 21st century skills in completing projects. A questionnaire was used to collect data about students' perceptions of the use of PBL-based LKPD, which includes aspects of motivation, involvement and ease of use.

Data obtained from the pretest and posttest results will be analyzed using the t test (t-test) to test the hypothesis about the existence of significant differences between the experimental group and the control group in terms of improving 21st century skills. Before carrying out the t test, the data will be tested for normality using the Kolmogorov test -Smirnov and homogeneity using Levene's test. If the data does not meet the assumptions of normality and homogeneity, the non-parametric Mann-Whitney test will be used as an alternative.

Data from the observation sheet will be analyzed descriptively to describe the patterns of 21st century skills that emerge during the learning process in the experimental class. Meanwhile, data from the questionnaire will be analyzed using quantitative descriptive analysis techniques to see the distribution of students' answers regarding their perceptions of PBL-based LKPD.

It is hoped that comprehensive data analysis can provide a clear picture of the influence of PBL-based LKPD on the 21st century skills of fifth grade elementary school students, as well as the factors that influence the success of implementing PBL in the elementary school environment.

Result and Discussion

This research reveals the significant influence of using Project Based Learning (PBL)-based Student Worksheets (LKPD) on improving the 21st century skills of fifth grade elementary school students. Based on the results of the t-test on pretest and posttest scores, it was found that the experimental group that used PBL-based LKPD experienced a greater increase in 21st century skills compared to the control group that used conventional LKPD. The average posttest score of the experimental group showed a significant increase in critical thinking, creative, collaboration and communication skills. The following are the pretest and posttest scores for 21st century skills in Table 1.

Table 1. Pretest and posttest scores for 21st century skills

Class	Pretest	Posttest	Improvement
Experiment	65.2	82.4	17.2
Control	64.8	72.6	7.8

Table 1 displays a comparison between the average pretest and posttest scores for 21st century skills for fifth grade elementary school students who are members of two groups: the experimental group and the control group. The Experimental Group that used Student Worksheets (LKPD) based on Project Based Learning (PBL) showed a significant increase in the average score of 21st century skills. The average pretest score for this group was 65.2, while the average posttest score increased to 82.4, resulting in an average increase of 17.2 points. The control group that used conventional LKPD also experienced an increase in the average score of 21st century skills, but the increase was lower compared to the experimental group. The control group's average pretest score was 64.8, with a posttest average score of 72.6, resulting in an average increase of 7.8 points.

From this table, it can be seen that the use of PBL-based LKPD is more effective in improving students' 21st century skills compared to conventional learning methods. Next, a t test will be carried out for the differences between the experimental and control class groups. The results of the t test can be seen in Table 2.

Table 2. T test

Test statistics	Mark
T test	4.25
Significance	0.00 <0.05
Interpretation	There are significant differences

Table 2 above shows the results of the statistical analysis of the t test (t-test) which was carried out to determine the difference in improving 21st century skills between the experimental group and the control group. The t value of 4.25 indicates that there is a fairly large

difference between the two groups in terms of increasing 21st century skills. This t value shows the strength of the relationship between the treatment (PBL-based LKPD) and the observed results (increasing 21st century skills). A p value of 0.000 ($p < 0.05$) indicates that this result is highly statistically significant. A p value smaller than 0.05 means that the probability of this result occurring by chance is very small, so we can confidently state that the observed differences between the experimental and control groups are not coincidental.

The interpretation of these results is that there is a significant difference between the experimental group that used PBL-based LKPD and the control group that used conventional LKPD in terms of improving 21st century skills. This means that the use of PBL-based LKPD is significantly more effective in improving students' 21st century skills than with conventional learning methods.

After carrying out the independent t-test, the distribution of skill improvement based on aspects of 21st century skills can be seen. The following can be seen in Table 3.

Table 3. Comparison of 21st Century Skills Values

Skills	Experimental (%)	Control (%)
Critical Thinking	18.53	9.11
Creativity	16.82	7.62
Collaboration	19.31	8.43
Communication	14.21	6.71

Table 3 shows the average increase in 21st century skills obtained by students in four main aspects: critical thinking, creativity, collaboration and communication. This data was obtained by comparing the results between the experimental group and the control group. The critical thinking skills aspect of the experimental group experienced an average increase of 18.53%, while the control group only increased by 9.11%. This shows that the PBL method is more effective in developing students' critical thinking abilities.

The average increase in the creativity aspect in the experimental group reached 16.82%, much higher compared to the control group which only increased by 7.62%. This shows that PBL helps students become more creative in solving problems and developing ideas. The collaboration aspect in the experimental group experienced the largest increase in the collaboration aspect, namely 19.31%, compared to 8.43% in the control group. This indicates that PBL, which encourages group work, is very effective in improving collaboration skills.

The communication aspect experienced an average increase in communication skills which was also higher in the experimental group (14.21%) compared to the control group (6.71%). This shows that students involved in PBL are more trained in expressing ideas and communicating with classmates.

Overall, this table shows that the use of PBL-based LKPD has a more significant impact in improving students' 21st century skills compared to conventional LKPD. After seeing the comparison of the values of 21st century skills, the next step is to compare the results of student perceptions through the perception questionnaire given to students. The results of these student perceptions can be seen in Table 4.

Table 4. Comparison of Student Perception Results

Perception Aspect	Experimental	Control
Motivation to learn	4.4	3.8
Active Learning	4.5	3.7
Ease of Using LKPD	4.3	4.0

Table 4 displays the results of a questionnaire measuring students' perceptions of PBL-based LKPD and conventional LKPD in three main aspects: learning motivation, involvement in learning, and ease of use of LKPD. Learning Motivation: Students in the experimental group gave an average score of 4.4 in the aspect of learning motivation, which was higher compared to the control group which only gave an average score of 3.8. This shows that PBL-based LKPD is more effective in increasing students' learning motivation.

Engagement in Learning: In the aspect of engagement in learning, the experimental group gave the highest average score, namely 4.5, compared to 3.7 given by the control group. This shows that PBL-based LKPD has succeeded in increasing student involvement more actively in the learning process. Ease of Use of LKPD: The aspect of ease of use of LKPD also shows that PBL-based LKPD is rated quite highly by students with an average score of 4.3, although it is not too different from conventional LKPD which gets an average score of 4.0. This indicates that even though the PBL-based LKPD is slightly more complex, students still feel that the LKPD is easy to use. Overall, this table shows that students' perceptions of PBL-based LKPD are more positive compared to conventional LKPD, especially in terms of learning motivation and engagement in learning.

This research aims to evaluate the effect of using Student Worksheets (LKPD) based on Project Based Learning (PBL) on improving 21st century skills in fifth grade elementary school students. The research results showed that PBL-based LKPD significantly improved students' critical thinking, creativity, collaboration and communication skills compared to conventional LKPD. These findings are in line with various previous studies which confirm the effectiveness of PBL in improving

higher order thinking skills and student engagement in learning.

Research suggests that PBL provides a learning environment that allows students to develop critical thinking skills better than traditional learning methods (Gulay, 2015; Hidayat et al., 2020). The results of this study support these findings, by showing that the experimental group experienced an increase in critical thinking skills of 18.5%, much higher than the control group which only increased by 9.1%. This increase shows that PBL encourages students to analyze problems more deeply and produce more complex solutions, in accordance with previous findings by (Masaguni et al., 2023; Servos et al., 2023).

In addition, students' creativity also increased significantly in the experimental group. This is consistent with research conducted by Alaagib et al. (2019). The increase in creativity in this study was 16.8% in the experimental group compared to 7.6% in the control group, indicating that PBL encourages students to think out-of-the-box, which may not be encouraged in traditional learning approaches.

Collaboration skills also improved more significantly in the experimental group, with an increase of 19.3%, compared to only 8.4% in the control group. This is in accordance with research which states that PBL creates a learning environment that is very conducive to collaboration between students (Azmi et al., 2018; Ruzadiana & Ertikanto, 2018)

The communication aspect also experienced a significant improvement in the experimental group. This study found an increase of 14.2% in the experimental group compared to 6.7% in the control group. These results support research conducted by Martinez (2022), which shows that PBL encourages students to hone their communication skills through project presentations and group discussions (Wang, 2021). This research confirms the importance of communication in the success of PBL, where students not only learn to communicate their ideas clearly but also to listen and respond to the contributions of their peers.

However, although many studies support the effectiveness of PBL, this research adds a new dimension by using PBL-based worksheet in elementary school settings. Most previous research examining PBL focuses on secondary and higher education levels, while this research shows that PBL is also very effective at the elementary level (Ediyanto et al., 2020). These results broaden the scope of PBL application and show that 21st century skills can be developed early through appropriate learning strategies.

On the other hand, challenges in implementing PBL-based LKPD were also revealed in this research (Sudrajat, 2017). For example, observations during the learning process show that students take longer to complete assignments compared to conventional learning. This is consistent with research findings by (Rahmadani et al., 2021), which states that PBL requires more careful time planning and greater support from teachers to ensure students stay on the right track. However, even though it takes longer, the increased skills gained through PBL show that the time invested provides comparable results.

This research also contributes to developing effective LKPD for project-based learning in elementary schools. Previously, research by Ruzadiana & Ertikanto (2018) showed that the quality of LKPD greatly influences the success of PBL. This research supports this view and adds that well-designed worksheets not only facilitate project learning but also help students develop important skills needed in the 21st century.

Overall, this research adds new knowledge by showing that PBL-based LKPD is effective in improving 21st century skills in elementary school students, something that has not been widely explored in previous research. The novelty of this research lies in its focus on the basic education level and the use of LKPD as the main tool for implementing PBL. The results of this research fill a gap in the existing literature and provide practical guidance for educators in designing and implementing PBL in elementary schools.

This research concludes that PBL-based LKPD can be a very effective tool in developing 21st century skills in fifth grade elementary school students. These findings support and expand the results of previous research on PBL, while highlighting the importance of developing appropriate learning instruments to support the implementation of PBL at the basic education level. Thus, it is hoped that this research can become a reference for developing learning methods that are more innovative and relevant to the demands of education in the 21st century.

Conclusion

The conclusion of this research shows that the use of Student Worksheets (LKPD) based on Project Based Learning (PBL) significantly improves 21st century skills in fifth grade elementary school students. The results of the analysis show that the experimental group that used PBL-based LKPD experienced an increase in critical thinking skills by 18.53%, creativity by 16.82%, collaboration by 19.31%, and communication by 14.21%. These figures are much higher compared to the control group which only experienced an increase of 9.11%, 7.62%, 8.43% and 6.71% respectively. These results confirm that PBL-based LKPD is more effective than conventional LKPD in facilitating the development of

skills that are very important for student success in this modern era.

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In this writing, there are several roles, including: "Conceptualization, Rina Marlina. and Yavelma Miaz.; methodology, Rina Marlina.; software, Rina Marlina.; validation, Farida.; formal analysis, Ardipal.; investigation, Rina Marlina.; resources, Ardipal.; data curation, Yavelma Miaz.; writing—preparation of the original draft, Rina Marlina.; writing—review and editing, Rina Marlina.

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Conflicts of Interest
The authors declare no conflict of interest.

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