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EXPLORING THE IMPACT OF LEARNING MOTIVATION INTERACTIONS ON PROBLEM SOLVING SKILLS IN SOCIAL STUDIES LEARNING

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ABSTRACT

This study aims to investigate the influence of the interaction between learning motivation and problem-solving skills in IPS education at SMP FK Bina Muda Cicalengka. Utilizing a quantitative approach and experimental design with a factorial model of 2^3, this research involved two groups: an experimental group (31 students) and a control group (32 students). Data collection methods included observation, documentation, tests (Pretest and Posttest), and questionnaires. Data analysis was conducted using descriptive statistics and inferential statistics with multivariate analysis methods using One-Way ANOVA tests and supported by SPSS 26.0 software. The research findings indicate a significant improvement in problem-solving skills in the experimental group using Problem-Based Learning (PBL) compared to the control group using Project-Based Learning (PjBL), particularly in the context of learning motivation interaction. Descriptive statistics show a higher average normalized improvement score in the experimental group (0.8424) compared to the control group (0.7092), demonstrating the superior efficacy of Problem-Based Learning (PBL) in enhancing problem-solving skills. The comparison of One-Way ANOVA tests for Problem-Based Learning and Project-Based Learning in enhancing students' problem-solving skills shows significant differences. The One-Way ANOVA test results for PBL indicate (Frequency=42.232, sig<0.000). On the other hand, the One-Way ANOVA test for PjBL shows (Frequency=4.911, sig<0.014). This suggests that both PBL and PjBL have significant impacts on improving students' problem-solving skills, but the effects vary depending on students' learning motivation levels. Furthermore, the interaction effect test shows results (Frequency = 4.415, sig= 0.016<0.05), indicating an interaction effect between PBL and PjBL influenced by learning motivation levels. This emphasizes the efficacy of PBL in engaging learners and improving problem-solving skills, as well as the importance of considering teaching methods and students' motivational factors in lesson planning.

Keywords: Learning motivation Interaction, problem-solving skills, Social Studies

ABSTRAK

Penelitian ini bertujuan untuk menyelidiki pengaruh interaksi antara motivasi belajar dan keterampilan pemecahan masalah dalam pendidikan IPS di SMP FK Bina Muda Cicalengka. Menggunakan pendekatan kuantitatif dan desain eksperimental serta model factorial 2^3, penelitian ini melibatkan dua kelompok: kelompok eksperimen (31 siswa) dan kelompok kontrol (32 siswa). Metode pengumpulan data meliputi observasi, dokumentasi, tes (Pretest dan Posttest), dan

kuesioner. Analisis data menggunakan statistik deskriptif dan statistic inferensial dengan metode analisis multivariate menggunakan uji ANOVA OneWay dan dibantukan perangkat lunak SPSS 26.0. Hasil penelitian menunjukkan peningkatan signifikan dalam keterampilan pemecahan masalah pada kelompok eksperimen yang menggunakan pembelajaran berbasis masalah (PBL) dibandingkan dengan kelompok kontrol yang menggunakan pembelajaran berbasis proyek (PjBL), terutama dalam konteks interaksi motivasi belajar. Statistik deskriptif menunjukkan skor peningkatan normalisasi rata-rata yang lebih tinggi dalam kelompok eksperimen (0,8424) dibandingkan dengan kelompok kontrol (0,7092), menunjukkan efikasi superior pembelajaran berbasis masalah (PBL) dalam meningkatkan keterampilan pemecahan masalah. Perbandingan Uji One-Way ANOVA untuk Problem-Based Learning dan Project-Based Learning dalam meningkatkan keterampilan pemecahan masalah siswa menunjukkan perbedaan yang signifikan. Hasil uji One-Way ANOVA untuk PBL menunjukkan (Frekuensi=42.232, sig<0.000). Di sisi lain, uji One-Way ANOVA untuk PjBL menunjukan (Frekuensi=4.911, sig<0.014). Hal ini menunjukkan bahwa baik PBL maupun PjBL memiliki dampak yang signifikan dalam meningkatkan keterampilan pemecahan masalah siswa, namun efeknya berbeda-beda tergantung pada tingkat motivasi belajar siswa. Selain itu, uji efek interaksi menunjukkan hasil (Frekuensi = 4,415, sig= 0,016<0,05), Hal ini menunjukkan adanya efek interaksi antara PBL dan PjBL yang dipengaruhi oleh tingkat motivasi belajar. Penelitian ini menekankan efikasi PBL dalam melibatkan pembelajar dan meningkatkan keterampilan pemecahan masalah serta pentingnya mempertimbangkan metode pembelajaran dan faktor motivasi siswa dalam perencanaan pembelajaran.

Kata kunci: *Interaksi motivasi belajar, keterampilan memecahkan masalah, Ilmu Pengetahuan Sosial.*

A. INTRODUCTION

Education essentially serves as a vital pathway to cultivate critical thinking skills, urging policymakers to formulate new frameworks for assessing and enhancing students' critical thinking abilities (Geng et al., 2019; Carneiro et al., 2015 Niu et al., 2014; Rotherham, n.d.,2010). Considering the significant and strategic position of education, it also contributes to preparing skilled human resources capable of addressing and effectively resolving existing social issues (H. Liu, 2023; X. Liu, 2024). This leads to strengthening problem-solving abilities (Jacobs & Castek., 2018; Rosen & Vanek., 2017; van Laar et al., 2017). Specifically in Indonesia, this is reinforced by the understanding of education outlined in the National Education System Law No. 20 of 2003, which describes education as a conscious, planned, and organized effort to create learning situations and conditions, as well as active learning processes that enable learners to develop their potentials, interests, and talents to have spiritual and religious strength, self-control, personality, intelligence, noble character, and the skills needed for their own lives as members of society, the nation, and the state. To realize education as described in the National Education System Law, quality education is required. Quality education cannot be

separated from planned efforts to shape conducive learning processes, thus providing deeper motivation to enhance students' learning processes (Dunn, 2019). Therefore, the role of teachers as individuals responsible during the teaching and learning process in schools must involve innovative teaching approaches to assist students in their learning activities(A. Tsai, 2023; Almaiah, 2022; Aristika, 2021; Hornstra, 2021; Tsai, 2020)

However, the reality on the ground indicates that the low quality of education in Indonesia is a major problem in the education sector. It is undeniable that academic achievement in Indonesia still lags far behind other countries. For example, the creative thinking ability of most Indonesian students is still low according to the Trends in International Mathematics and Science Study (TIMSS) reports in 2011 and 2015, as well as the results of the Program for International Student Assessment (PISA) in 2015 and 2018. The collaboration skills of students in Indonesia are also not optimal. Additionally, students' learning motivation in Indonesia is relatively low(Center for Education Statistics, n.d.; Fadila, 2019; PISA 2015, 2018).

These facts indicate that to achieve quality education, it must begin in the classroom by establishing good quality learning (Zhan, 2022). It is the teacher's task to build good quality and conducive learning. Quality learning is a hope for teachers, thus there are several indicators mentioning the success of learning, including effective, efficient, and engaging learning. In shaping good quality and conducive learning, teachers need to plan learning designs that suit the needs of students. Learning design here means the working method that will be used during teaching and learning activities to produce the expected outcomes. This situation also demands that teachers can transform with the spirit of the times. The transition from traditional teaching styles that focus on delivering information from textbooks to students needs to be reoriented to solve real-world problems. In traditional methods, teachers are considered as learning provocateurs, focusing on lecture-based teaching as the center of instruction, emphasizing program and concept delivery. Teachers must be adaptive, as the development of the times also offers various innovative learning methodologies to meet evolving educational demands and potentially improve the education system. This aims to prepare students with strong problem-solving skills and intrinsic motivation to create a resilient and adaptive generation. Problem-solving skills are considered one of the most critical components in teaching and learning at all levels worldwide. It involves mental processes to identify, analyze, and solve problems, requiring broad thinking processes. Critical thinking involves various aspects such as conceptualization, logical reasoning, application of strategies, analytical thinking, decision-making, and synthesis to solve problems. Similarly, in modern educational practices, it has been proven to enhance learning motivation and intellectual capacity in children, providing meaningful learning opportunities for students to enhance their engagement and enthusiasm in learning(Butler, 2012).

Problem-solving skills are one of the goals in the learning process. These problem-solving skills can be integrated through social studies (IPS) learning. Problem-solving activities in social studies learning in schools are outlined in the Minister of National Education Regulation No. 22 of 2006 concerning content standards, which stipulates that IPS aims to enable students to have basic competencies in logical and critical thinking, curiosity, research, problem-solving, and social skills. This is reinforced by the objectives of teaching social studies subjects according to Minister of National Education Regulations No. 22, 23, and 24 of 2006, which stipulate that IPS is one of the subjects taught from the elementary school level to junior high school. Social studies learning at each level of

education is present to train students to see and be sensitive to all existing social issues and to solve them with the best solutions, considering that social science is the study of events, facts, concepts, and generalizations related to social issues. (Wiradimaja, 2021). The importance of problem-solving skills in IPS learning is also explained by James Banks (1997), stating that "the main purpose of social studies should help students develop the ability to make reflective decisions so they can solve personal problems and shape public policy by participating in intelligent social action." From this explanation, it can be understood that the main goal of IPS learning is to help students develop their skills, including problem-solving skills, so that they can solve personal and social problems in their environment and actively participate in intelligent social activities. In line with this, Muhson et al. (2008) suggest that problem-solving skills are one of the learning activities that can be done to train students to face various problems, both individual and group problems, which are then solved individually or collectively. Sudjimat (Donni, 2017) states that problem-solving learning is basically learning to think or learn to think, which is to think or formulate various new problems that have never been faced before. Therefore, PBL is designed to encourage students to use their conscious thinking to solve problems (Forsgren, Christensen, & Hedemalm, 2014; Suyono, 2015). PBL is also considered as a participatory teaching-learning method that ultimately facilitates reflective learning for students, helping them hone their problem-solving skills (Gulluhan, 2021; Suryani, 2020)

Problem-solving skills are a fundamental ability for someone to solve problems involving critical, logical, and systematic thinking (Eldy, 2023a, 2023b; Mahanal, 2022; Rojas, 2021). In this regard, the ability to solve problems can train students to think critically when faced with various problems, both individual and group. Students learn to identify causes and alternatives to find solutions to existing problems. According to Alipandie (Jauhar, 2017), problem-solving skills can train students to deal with various problems that can be solved individually or collectively. Problem-solving is a learning skill focused on teaching and skills (Sekali, 2018; Siwi, 2020). Based on the above definition, problem-solving is a skill that includes the ability to identify problems with the aim of finding information, analyzing situations, generating alternatives, and determining actions to make decisions in accordance with the set targets. The current problem is the learning conditions in the classroom. Based on the definition above, problem-solving is a skill that encompasses the ability to identify problems with the goal of finding information, analyzing situations, generating alternatives, and determining actions to achieve decisions according to set targets. The current issue is the classroom learning conditions that do not support the development of problem-solving skills. (Dewi et al., 2019) mentioned that in learning, teachers have not been able to use models to empower students to be more active in developing problem-solving skills, so learning activities are often dominated by teacher-centered activities. This will hinder the growth of students' problem-solving skills because they are not trained or minimally involved in the learning process. (Dewi., 2021). This was evident after a pre-research study conducted in IPS learning in class VIII-H at SMP Fk Bina Muda, which faced constraints when viewed from the students' perspective, with students' activities and creativity in the learning process being very low on average, and there was a tendency for students to become mere spectators when teachers presented learning materials. This resulted in average learning outcomes obtained in daily tests conducted at the beginning of the odd semester of the academic year 2023/2024, which only reached 70.87 with a classical learning pass rate of 44.83%. The average test results and classical

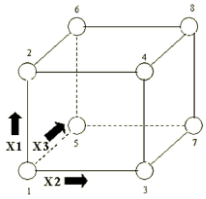
pass rates obtained, when measured by the minimum completeness criteria (KKTP) for IPS subjects in school, are still classified as incomplete because the KKTP is 70.

Based on these findings, it is clear that students' educational achievements are still inadequate, in part because of their ability or competence in understanding the presented materials. Students express difficulties with the complexity of the IPS curriculum. Teacher evaluations indicate that traditional teaching methods are still ineffective. So far, learning approaches have focused more on simple case studies and problem-solving techniques derived from provided textbooks, limiting students' exploration of alternative solutions. However, real-world social issues are much more complex and require stronger problem-solving skills. The limited problem-solving abilities of students can be caused by various factors, including external and internal influences from students and teachers. According to Wina Sanjaya (2010), the learning motivation process plays a key role in academic performance. Often, underperforming students are not inherently lacking in abilities but rather experience difficulties due to a lack of motivation to fully engage in the learning process, resulting in the underutilization of their abilities. According to McDonald in Kompri (2016), motivation is a change in energy within an individual characterized by the emergence of affective reactions (feelings) and actions to achieve goals. Additionally, according to Winarsih (2009), motivation has three functions: to encourage, determine direction, and choose actions. These issues have shown a lack of problem-solving skills among students. From the explanations above, it is apparent that teachers have not been able to use learning models that can stimulate the learning process for students to actively participate in IPS learning activities. Richard E. Gross et al. (1978) explained that the challenge for IPS teachers today is that students are more modern than the students they dealt with in the past. Today's students are young people who have lives that are much more complex and complicated with all the life issues that often extend beyond the boundaries of school or their immediate environment. Common problems in IPS learning include how to deliver IPS learning and concept presentations well according to current conditions so that students can actively engage in the learning process because they are presented with materials that are close to their lives and even make experiences part of the learning process without forgetting the goals of IPS learning itself. So far, there has been no research showing to what extent students at SMP Fk Bina Muda interact with learning motivation regarding problem-solving skills in IPS learning in class VIII at SMP Fk Bina Muda.

The novelty of this research lies in the emphasis on the importance of learning problem-solving skills in the context of education in Indonesia, especially through the Social Sciences (IPS) subject. The author presents strong arguments about how education plays a role in developing students' critical thinking skills and problem-solving abilities. Furthermore, this research also highlights the role of teachers as agents of change in creating conducive and innovative learning environments, which is also an interesting aspect. The use of more adaptive and responsive learning approaches to the development of the times and students' needs is emphasized in this paper. Additionally, student involvement in the learning process, especially in the development of problem-solving skills, is still limited. This limited student involvement can be caused by various factors, including a lack of learning motivation and a lack of learning models that stimulate student participation. Overall, this paper provides a comprehensive overview of the challenges and opportunities in improving the quality of education in Indonesia, especially in the development of students' problem-solving skills through IPS learning.

B. RESEARCH METHOD

This study adopts a quantitative approach employing an experimental design with factorial design, as described by Sugiyono (2010; 2013). Factorial design, a modification of true experimental design, is chosen to accommodate potential moderator variables that may affect the relationship between independent variables (treatment) and dependent variables (outcomes). This methodological approach allows for the examination of various variables' impacts on study outcomes within a controlled setting. The study focuses on students enrolled in Social Studies classes at SMP FK Bina Muda Cicalengka, dividing them into experimental and control groups. A total of 63 students participate, with 31 in the experimental group and 32 in the control group, randomly selected from the population. The research will span one academic semester to ensure consistency and control over external factors, providing ample time for interventions, data collection, and analysis. Data analysis will involve statistical techniques, including descriptive statistics such as mean and standard deviation to summarize sample characteristics, and inferential statistics such as t-tests or analysis of variance (ANOVA) to assess differences between the experimental and control groups. Research procedures include random group selection, pre-testing to assess basic problem-solving skills, intervention with problem-based learning for the experimental group and project-based learning for the control group, post-testing to evaluate instructional effectiveness, and subsequent data collection and analysis to determine the impact of instructional approaches on problem-solving skills, while considering potential interactions with learning motivation. Specifically, the research employs a full factorial design with two levels for three factors, resulting in the 2^3 factorial design and comprising eight experimental trials. Each trial represents a unique combination of high and low levels of the three factors. This design can be visually represented by a cube (see Figure 1), where each corner denotes a combination of high, moderate, and low levels of the three factors, numbered 1 to 8 to indicate the standard sequence of experiments. Additionally, arrows indicate the direction pf increase for each factor



Source: https://shorturl.at/dxPQ8

Figure 1. Representation of 2^3 factorial design

In this research, a full factorial design 2^3 is employed to explore the interaction between learning motivation and problem-solving skills, considering the following factors and levels: (1) learning motivation with levels low, moderate, high; (2) initial problem-solving skills of students with levels low, moderate, high; and (3) types of treatment employed include Problem-Based Learning for the experimental group and Project-Based

Learning for the control group. By combining these three factors, we have eight different experimental conditions.

C. RESULTS AND DISCUSSION

The ability of students to solve problems before and after treatment

In this research, problem-solving indicators adopted from Nurhadi et al. (Rosy & Pahlevi, 2015. pp. 163-164) serve as crucial benchmarks to assess students' problem-solving abilities. These indicators encompass a systematic approach to problem-solving, starting from the identification and formulation of the problem to the analysis of relevant data, drawing conclusions, seeking solutions, and finally evaluating and implementing the chosen solution. By utilizing these indicators, researchers can gauge students' proficiency in addressing complex issues, fostering a more comprehensive understanding of their problem-solving skills. This structured framework not only aids in evaluating students' problem-solving capabilities but also provides insights into areas for improvement within the educational context. Information on the abilities of participants in the experimental and control classes, including maximum score (Xmax) and minimum score (Xmin), average score ($\bar{x}$), and standard deviation (S), can be seen in Table 2.

Table 2. Descriptive Statistics of Pretest and Posttest Scores of Participants

Aspect of Ability	Process	Ideal Score	Experimental Class				Control Class			
			X_{maks}	X_{min}	$\bar{x}$	S	X_{maks}	X_{min}	$\bar{x}$	S
Problem Solving	Pretest	50	18	10	13,42	2,233	18	10	13,59	1,965
	Posttest	50	47	41	44,23	1,892	43	36	39,44	2,199

Source: managed by author (2024)

The comparison of average scores for problem-solving abilities between the experimental and control classes reveals no significant difference. In the pretest phase, the average score for problem-solving skills in the experimental class is 13.42 (SD = 2.233), while in the control class, it is 13.59 (SD = 1.965). The similar standard deviations suggest that the distribution of pretest data in both classes is comparable. However, during the posttest phase, the average score for problem-solving skills in the experimental class increases to 44.23 (SD = 1.892), whereas in the control class, it rises to 39.44 (SD = 2.199). Notably, the standard deviation values in the experimental and control classes indicate a variance in the spread of posttest data between the two groups.

Moreover, Table 3 presents the results of the test for the difference in mean normalized gain scores, reflecting the improvement in problem-solving abilities between the experimental and control classes. These normalized gain scores adjust for initial differences in abilities between the two groups, allowing for a more accurate assessment of improvement.

Table 3. Test of Difference in Two Mean Normalized Gain Scores for Problem-Solving Ability Improvement between Experimental and Control Classes

Skill Aspect	Experimental Class			Control Class			t-value	Sig. (2-tailed)	H_0 Acceptance
	$\bar{x}$	S	N	$\bar{x}$	S	N			

Problem Solving	0,8424	0,05023	31	0,7092	0,06064	32	9,481	0,000	Reject H_0

Source: managed by author (2024)

From the table above, it is evident that the asymptotic significance (2-tailed) of the t-test for N-gain scores on problem-solving improvement is 0.000 < 0.05, indicating that H0 is rejected. Therefore, the conclusion is that there is a difference in problem-solving improvement among students using problem-based learning and project-based learning. The average normalized gain score for problem-solving ability in the experimental class (x̄eks) = 0.8424 is greater than the average normalized gain score for problem-solving ability in the control class (x̄kntrl) = 0.7092, meaning that after the treatment, the improvement in problem-solving ability among students in the experimental class using problem-based learning is better than in the control class or project-based learning.

Learning Motivation of Experimental and Control Class Students

The data on learning motivation in this study utilized a questionnaire adjusted with learning motivation indicators, consisting of 40 items with statement categories as follows: strongly agree (SA), agree (A), neutral (N), disagree (D), and strongly disagree (SD). Scoring guidelines are as follows: a. For positive statements, the scores are strongly agreed (SA) = 5, agree (A) = 4, neutral (N) = 3, disagree (D) = 2, and strongly disagree (SD) = 1. b. For negative statements, the scores are strongly agreed (SA) = 1, agree (A) = 2, neutral (N) = 3, disagree (D) = 4, and strongly disagree (SD) = 5. Based on the administration of the learning motivation questionnaire, the scores obtained for learning motivation can be seen in the following table:

Table 4. Categories of Learning Motivation for Students

Category	Experimental Class			Control Class		
	Interval	Frequency	Persentase (%)	Interval	Frequency	Persentase (%)
High	M > 138	19	61,3%	M > 109	15	46,9%
Moderate	118 ≤ M ≤ 138	9	29,0%	87 ≤ M ≤ 109	8	25,0%
Low	M < 118	3	9,7%	M < 87	9	28,1%
Total		31	100		32	100

Source: managed by author (2024)

Based on the data presented in the table above, it is evident that the distribution of learning motivation levels differs between the experimental and control classes. In the experimental class, which consists of 31 students, the majority of students, specifically 19 individuals, are categorized as having high learning motivation. Additionally, 9 students fall into the moderate learning motivation category, while only 3 students are classified as having low learning motivation. This distribution indicates a prevalence of high learning motivation among students in the experimental class.

On the other hand, the control class comprises 32 students, with 15 students exhibiting high learning motivation, 9 students demonstrating moderate learning

motivation, and 8 students displaying low learning motivation. Thus, it can be deduced that the control class is characterized by a predominance of students with high learning motivation. In summary, while the experimental class primarily consists of students with high learning motivation, the control class is predominantly composed of individuals exhibiting high motivation levels as well.

Completion of Problem Solving in Each Category of Learning Motivation

The completion of problem-solving skills among students with varying levels of learning motivation can be observed through the posttest score results for each category. Learning motivation is organized based on several dimensions representing learning motivation, namely perseverance in learning, persistence in facing challenges, interest and sharpness in learning, achievement in learning, and independence in learning. The categorization of high, moderate, and low learning motivation is determined by the scores obtained from a questionnaire adjusted with learning motivation indicators. Students classified as having high learning motivation exhibit strong determination and persistence in learning, coupled with a keen interest and sharpness in grasping new concepts. Additionally, they demonstrate a high level of achievement in their academic pursuits and display independence in their learning endeavors. On the other hand, students categorized with moderate learning motivation display a reasonable degree of perseverance and persistence in their learning journey, albeit with occasional challenges. They maintain a moderate level of interest and sharpness in learning and achieve satisfactory results in their academic endeavors, albeit with some dependency on external support. Meanwhile, students categorized with low learning motivation exhibit minimal perseverance and persistence in their learning efforts, often succumbing to challenges easily. They may lack interest and sharpness in learning, resulting in limited academic achievement, and may heavily rely on external guidance in their learning process. Through analyzing the posttest scores within each category of learning motivation, the effectiveness of problem-solving skills enhancement can be evaluated, shedding light on the impact of motivation levels on students' ability to tackle and resolve complex problems. The following table presents the data on the completion of problem-solving in each category of learning motivation:

Table 4. Completion of Problem-Solving Skills for Students in the High, Moderate, and Low Learning Motivation Categories in the Experimental and Control Classes

Motivation to Learn	Experimental Class		Control Class	
	Maximum	Minimum	Maximum	Minimum
High	157	143	129	113
Moderate	138	119	107	87
Low	113	99	86	66

Source: managed by author (2024)

Based on the data provided, it is evident that students with high, moderate, and low levels of learning motivation achieved significantly higher problem-solving scores in the experimental class compared to the control class. Specifically, the maximum problem-solving scores of students with high learning motivation were 28 points higher in the

experimental class, those with moderate learning motivation were 31 points higher, and those with low learning motivation were 27 points higher. Similarly, the minimum problem-solving scores of students with high learning motivation were 30 points higher in the experimental class, those with moderate learning motivation were 32 points higher, and those with low learning motivation were 33 points higher in the experimental class.

Hypothesis Testing: One Way ANOVA

The One-Way ANOVA test is employed to analyze the variances among two or more groups, focusing on a single factor. In this study, the One-Way ANOVA test model is applied to assess the impact of Problem-Based Learning on the enhancement of students' problem-solving skills across varying levels of learning motivation. The results of the One-Way ANOVA test model for Problem-Based Learning are presented in the following table:

Table 5. Results of OneWay ANOVA Test Model for Problem-Based Learning

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	,057	2	,028	42,232	,000
Within Groups	,019	28	,001		
Total	,076	30			

Source: managed by author (2024)

Based on the table above, the obtained F value is 42.232, with a significance value of 0.000, indicating a significant difference between the levels of learning motivation among students who are learning using the problem-based learning model. Subsequently, the One-Way ANOVA test was conducted for Project-Based Learning to assess the improvement of problem-solving skills among students with varying levels of learning motivation. Here are the results of the One-Way ANOVA test for Project-Based Learning:

Table 6. One Way ANOVA Test Model for Project-Based Learning

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	,029	2	,015	4,911	,014
Within Groups	,085	29	,003		
Total	,144	31			

Source: managed by author (2024)

Based on the provided table, the calculated F value is 4.911, with a significance level of 0.14. This indicates a significant difference in the levels of learning motivation among students engaged in project-based learning. Consequently, a post hoc Tukey test will be conducted to thoroughly assess the differences in students' problem-solving skills across various levels of learning motivation within the framework of project-based learning.

Table 7. Post hoc Tukey test result from post-test data

Between Classes	Statistic Test	Sig	Alpha	Conclusion
PBL learning motivation high-moderate	Post hoc Tukey	0.000	0.05	Differences
PBL learning motivation high-low	Post hoc Tukey	0.000	0.05	Differences
PBL learning motivation moderate-low	Post hoc Tukey	0.033	0,05	Differences

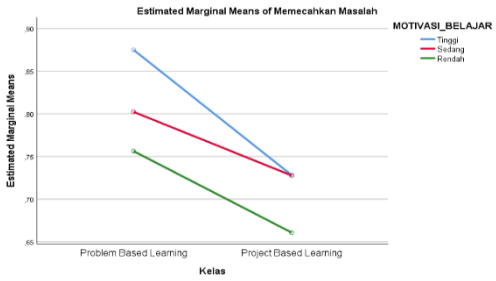
Source: managed by author (2024)

The post hoc Tukey test revealed significant differences in problem-solving abilities among students using Problem-Based Learning across different levels of learning

motivation. Specifically, there was a significant gap between problem-solving abilities at the high level of learning motivation compared to both the moderate level (p-value = 0.000) and the low level (p-value = 0.000) of learning motivation. Additionally, a significant disparity was observed in problem-solving abilities between students at the moderate level and those at the low level of learning motivation (p-value = 0.033). These findings underscore the substantial influence of Problem-Based Learning on students' problem-solving abilities, particularly when accounting for variations in their levels of learning motivation.

Hypothesis Testing: Interaction Effect

The hypothesis test results reveal an F value of 4.415 with a significance level (Sig.) of 0.016, which is less than 0.05. Therefore, the third hypothesis test is accepted, indicating the presence of an interaction effect between Problem-Based Learning and Project-Based Learning, influenced by the level of learning motivation. This interaction significantly impacts the enhancement of students' problem-solving abilities in the Social Studies subject.



Source: managed by author (2024)

Figure 1. Profile Plot Estimated Means of Problem-Solving Skill

The figure above illustrates a notable misalignment of lines, suggesting a potential interaction effect between varying levels of learning motivation and the efficacy of project-based learning. An intriguing observation from the figure is that the improvement in problem-solving skills among students utilizing problem-based learning with low levels of learning motivation closely parallels that of students employing project-based learning with high levels of learning motivation, differing only by 0.0282. This implies that students engaged in problem-based learning with low learning motivation can achieve comparable results to those with high learning motivation utilizing project-based learning. Further analysis reveals that the enhancement in problem-solving skills among students with high learning motivation using problem-based learning yielded a mean of 0.8750, surpassing the mean improvement among students with similar motivation levels but utilizing project-based learning, which stood at 0.7282. Similarly, students with moderate learning motivation experienced a greater improvement in problem-solving skills through problem-based learning, with a mean of 0.8023 compared to 0.7278 for those using project-based learning. Likewise, students with low learning motivation exhibited a higher mean

improvement in problem-solving skills with problem-based learning (0.7564) compared to project-based learning (0.6609). These findings underscore a significant disparity in the enhancement of problem-solving skills within the experimental class employing problem-based learning across varying levels of learning motivation. In summary, the data highlights a noteworthy difference in the improvement of problem-solving skills in the experimental class subjected to problem-based learning, contingent upon high, moderate, or low levels of learning motivation.

Discussion

This study aims to identify differences in problem-solving skill improvement between two learning models, Problem-Based Learning (PBL) and Project-Based Learning (PjBL), and to evaluate the influence of learning motivation on the enhancement of problem-solving skills within the contexts of both learning models. Firstly, the results of descriptive statistical analysis indicate that there is no significant difference in the average scores of problem-solving abilities between the experimental class (PBL) and the control class (PjBL) at the pretest phase. However, at the posttest phase, there is a significant increase in the average scores of problem-solving abilities in the experimental class (PBL) compared to the control class (PjBL). This suggests that PBL has a better impact on improving problem-solving skills compared to PjBL. Furthermore, the results of the test for the difference in mean normalized gain scores show that there is a significant difference in the improvement of problem-solving abilities between the experimental class (PBL) and the control class (PjBL). The average normalized gain score for problem-solving ability in the experimental class (PBL) is higher than that in the control class (PjBL), indicating that PBL effectively enhances students' problem-solving abilities compared to PjBL. Additionally, the analysis of learning motivation indicates that there are differences in the level of learning motivation between the experimental class (PBL) and the control class (PjBL). The majority of students in the experimental class have high learning motivation, while the majority of students in the control class also have high learning motivation. However, there is variation in the distribution of learning motivation levels between the two classes. Moreover, the analysis results show that there is a relationship between the level of learning motivation and the improvement of problem-solving skills. Students with high, moderate, and low learning motivation in the experimental class (PBL) show greater improvement in problem-solving skills compared to students in the control class (PjBL). This indicates that learning motivation plays a crucial role in enhancing the effectiveness of learning, especially in the context of PBL. Furthermore, the ANOVA analysis results show that there is a significant interaction between the learning model (PBL and PjBL) and the level of learning motivation on the improvement of problem-solving skills. This suggests that the effectiveness of a learning model can be influenced by the level of learning motivation of students. Additionally, the analysis results indicate that PBL has a greater impact on improving problem-solving skills across various levels of learning motivation.

In conclusion, the findings of this study indicate that PBL is more effective than PjBL in enhancing students' problem-solving skills, especially when learning motivation is high.

Moreover, learning motivation plays a crucial role in enhancing the effectiveness of learning, especially in the context of PBL. Therefore, it is recommended for educators to consider students' learning motivation factors in designing effective learning strategies, especially in the implementation of PBL.

D. CONCLUSION

This research employed a quantitative methodology with an experimental design utilizing factorial design to investigate the impact of specific variables on study outcomes within a controlled environment. It focused on students enrolled in Social Studies classes at SMP FK Bina Muda Cicalengka, randomly assigning them into experimental and control groups. The sample consisted of 63 students, with 31 in the experimental group and 32 in the control group, over the course of one academic semester to ensure consistency and control over external factors. The research involved collecting pre-test data, implementing problem-based learning for the experimental group and project-based learning for the control group, collecting post-test data, and analyzing the effects of these learning approaches on problem-solving skills, considering interactions with learning motivation. The analysis revealed significant differences in the improvement of problem-solving skills between the groups using problem-based learning and project-based learning. Problem-based learning was found to be more effective in enhancing students' problem-solving skills compared to project-based learning. Additionally, significant differences were observed in the level of learning motivation between the two groups. The study's conclusion synthesized diverse facets explored throughout the research, all intricately tied to the research objectives. An examination of pre-treatment problem-solving abilities among students in both groups revealed no significant disparity in mean scores. However, an analysis of post-test scores unveiled a noteworthy discrepancy in the enhancement of problem-solving skills between the two groups, with the experimental group demonstrating notably higher mean post-test scores. The results from descriptive statistics showed that the average normalized gain score for problem-solving ability in the experimental group (Problem Based Learning) was significantly higher (0.8424) compared to the control group (Project Based Learning) (0.7092), indicating better improvement in problem-solving skills with PBL. This trend remained consistent across different levels of learning motivation.

Further scrutiny employing One-Way ANOVA test elucidated significant disparities in the advancement of problem-solving skills between the experimental and control groups, emphasizing the superiority of problem-based learning. One-Way ANOVA tests highlighted a significant difference in learning motivation levels among students in both PBL ($F = 42.232$, $p < 0.001$) and PjBL ($F = 4.911$, $p = 0.014$), emphasizing motivation's influence on learning outcomes. The interaction effect test revealed a significant interaction between PBL and PjBL, influenced by the level of learning motivation ($F = 4.415$, $p = 0.016$). This suggests that the effectiveness of each instructional approach varies depending on students' motivation levels. Additionally, the profile plot depicted distinct patterns of

improvement in problem-solving skills across motivation levels and instructional approaches. Notably, PBL consistently outperformed PjBL across all motivation levels, with particularly significant gains among highly motivated students. Even students with low motivation showed substantial improvement with PBL, highlighting its effectiveness in engaging learners across motivational spectrums. In conclusion, the statistical analyses provide strong evidence supporting the superiority of PBL over PjBL in enhancing problem-solving skills, especially among highly motivated students. These findings underscore the importance of considering both instructional methods and students' motivational factors in educational planning.

E. REFERENCES

Abdelshiheed, M. (2020). Metacognition and Motivation: The Role of Time-Awareness in Preparation for Future Learning. *Proceedings for the 42nd Annual Meeting of the Cognitive Science Society: Developing a Mind: Learning in Humans, Animals, and Machines, CogSci 2020*, 945–951.

Alderman M.Kay. (2004). Motivation for Achievement, Possibilities for Teaching and Learning, Mahwah, New Jersey: Lawrence Erlbaum Associate Publisher.

Almaiah, M. A. (2022). Integrating Teachers' TPACK Levels and Students' Learning Motivation, Technology Innovativeness, and Optimism in an IoT Acceptance Model. *Electronics (Switzerland)*, *11*(19). https://doi.org/10.3390/electronics11193197

Aristika, A. (2021). The effectiveness of hybrid learning in improving of teacher-student relationship in terms of learning motivation. *Emerging Science Journal*, *5*(4), 443–456. https://doi.org/10.28991/esj-2021-01288

Banks, J. (1997). Strategi Mengajar Ilmu Sosial. Penyelidikan, Penilaian, dan Pengambilan keputusan. Program Studi Pendidikan Ilmu Pengetahuan Sosial Sekolah Pascasarjana Universitas Pendidikan Indonesia. Bandung: Mutiara Press.

Butler, R. (2012). Striving to connect: Extending an achievement goal approach to teacher motivation to include relational goals for teaching. *Journal of Educational Psychology*, *104*(3), 726–742. https://doi.org/10.1037/a0028613

Chen, C.-H & Liu, J.-H & Shou, W.-C. (2018). How competition in a game-based science learning environment influences students' learning achievement, flow experience, and learning behavioral patterns. Educational Technology and Society. 21. 164-176.

Center for Education Statistics, N. (n.d.). *Trends in International Mathematics and Science Study (TIMSS)*. https://nces.ed.gov/timss/countries.asp.

Dewi, H. R., Mayasari, T., & Handhika, J. (2019). Increasing Creative Thinking Skills and Understanding of Physics Concepts Through Application of Stem-Based Inquiry. *Jppipa*, *4*(1), 25–30. http://journal.unesa.ac.id/index.php/jppipa

Dewi, Ayu. (2021). Implementasi Model Pembelajaran Problem Solving untuk Meningkatkan Hasil Belajar IPS.

Donni, Juni. (2017). Pengembangan Strategi dan Model Pembelajaran; inovatif, kreatif, dan Prestatif dalam Memahami Peserta Didik. Jawa Barat: Pustaka setia.

Dunn, T. J. (2019). Technology Enhanced Learning in higher education; motivations, engagement and academic achievement. *Computers and Education*, *137*, 104–113. https://doi.org/10.1016/j.compedu.2019.04.004

Eldy, E. F. (2023a). The Effectiveness of Integrated Online Problem-Based Learning (iON-PBL) Physics Module on Pre-university Students' Motivation and Problem-Solving Skills. *Communications in Computer and Information Science*, *1830*, 164–175. https://doi.org/10.1007/978-3-031-34754-2_14

Eldy, E. F. (2023b). The Effectiveness of Integrated Online Problem-Based Learning (iON-PBL) Physics Module on Pre-university Students' Motivation and Problem-Solving Skills. *Communications in Computer and Information Science*, *1830*, 164–175. https://doi.org/10.1007/978-3-031-34754-2_14

Fadila, A. (2019). The Influence of Group Investigation Learning Implementation Judging from Learning Motivation Against Students' Mathematical Problem Solving Ability. *Journal of Physics: Conference Series*, *1155*(1). https://doi.org/10.1088/1742-6596/1155/1/012098

Forsgren, S., Christensen, T., & Hedemalm, A. (2014). Evaluation of the case method in nursing education. *Nurse education in practice*, *14*(2), 164–169. https://doi.org/10.1016/j.nepr.2013.08.003

Geng, S., Law, K. M. Y., & Niu, B. (2019). Investigating self-directed learning and technology readiness in blending learning environment. *International Journal of Educational Technology in Higher Education*, *16*(1). https://doi.org/10.1186/s41239-019-0147-0

Gulluhan, N. U. (2021). Social Problem-Solving Activities in The Life Skills Course: Do Primary School Students Have Difficulty Solving Daily Life Problems? *Egitim ve Bilim*, *46*(207), 63–84. https://doi.org/10.15390/EB.2021.9396

Hornstra, L. (2021). Profiles of teachers' need-support: How do autonomy support, structure, and involvement cohere and predict motivation and learning outcomes? *Teaching and Teacher Education*, *99*. https://doi.org/10.1016/j.tate.2020.103257

Jacobs, G. & Castek, J. (2018). Digital problem solving: The literacies of navigating life in the digital age. Journal of Adolescent and Adult Literacy, 61 (6).

Jauhar, dkk. (2017). Penerapan Model Pembelajaran Problem Solving Dalam Meningkatkan Hasil Belajar IPS Peserta didik SD. JIKAP PGSD: Jurnal Ilmiah Ilmu Kependidikan, 1 (2), 141-149.

Kompri. (2016). Motivasi Pembelajaran Perspektif Guru dan Peserta didik. Bandung: PT Rosda Karya.

Liu, H. (2023). Exploring the Balance between Computational Thinking and Learning Motivation in Elementary Programming Education: An Empirical Study with Game-Based Learning. *IEEE Transactions on Games*, *15*(1), 95–107. https://doi.org/10.1109/TG.2022.3143701

Liu, X. (2024). The impact of the design thinking model on pre-service teachers' creativity self-efficacy, inventive problem-solving skills, and technology-related motivation. *International Journal of Technology and Design Education*, *34*(1), 167–190. https://doi.org/10.1007/s10798-023-09809-x

Mahanal, S. (2022). Empowering College Students' Problem-Solving Skills through RICOSRE. *Education Sciences*, *12*(3). https://doi.org/10.3390/educsci12030196

Mudlofir, Ali. (2016). Desain Pembelajaran Inovatif dari Teori ke Praktik. Jakarta: Rajawali Pers.

Muhson, dkk. (2008). Peningkatan Minat Belajar Dan Pemahaman Mahapeserta didik Melalui Pembelajaran Problem Solving. Jurnal Social Vol V No. 1.

Niu, L., Behar-Horenstein, L., & Garvan, C. (2014). Do instructional interventions influence college students' critical thinking skills? A meta-analysis. *Educational Research Review*, *9*, 114–128. https://doi.org/10.1016/j.edurev.2012.12.002

PISA 2015. (2018). https://www.oecd.org/pisa/pisa-2015-results-in-focus.pdf

Pribadi, Benny A. (2009). Model Desain Sistem Pembelajaran. Jakarta: Dian Rakyat.

Richard E. Gross, Et.Al.,. (1978). Social Studies For Our Times, New York: John Wiley & Sons

Rojas, M. (2021). Assessing collaborative problem-solving skills among elementary school students. *Computers and Education*, *175*. https://doi.org/10.1016/j.compedu.2021.104313

Rosen, David & Vanek, Jenifer. (2017). Technology for Innovation and Change in Adult Basic Skills Education. New Directions for Adult and Continuing Education. 2017. 51-60. 10.1002/ace.20240.

RotherhamWillingham. (n.d.). (2010). "21st-Century" Skills. American Educator, 34, 17- 20.

Rosy, dkk. (2015). Penerapan Problem Based Learning Untuk Meningkatkan Kemampuan Berpikir Kritis Dan Keterampilan Memecahkan Masalah. Prosiding Seminar Nasional 9 Mei.

Sanjaya, Wina. (2010). Kurikulum Dan Pembelajaran, Teori Dan Praktek Pengembangan Kurikulum KTSP. Jakarta: Kencana.

Sekali. (2018). Implementasi Model Pembelajaran Problem Solving Dalam Meningkatkan Hasil Belajar Peserta didik Mata Pelajaran Ips Pokok Bahasan 14 Globalisasi Kelas VI Sd Negeri 047175 Desa Simacem Bekerah Tahun Pelajaran 2017/2018. Jurnal Curere, 02 (02), 122-132.

Sugiyono. (2010). Metode Penelitian Kuantitatif dan Kualitatif dan R dan D. Bandung: Alfabeta.

Sugiyono. (2013). Metodelogi Penelitian Kuantitatif, Kualitatif Dan R&D. Bandung: Alfabeta.

Suryani, I. (2020). Students' mathematics problem-solving skills through the application of Problem-Based Learning model. *Journal of Physics: Conference Series*, *1460*(1). https://doi.org/10.1088/1742-6596/1460/1/012029

Suyono, Hariyanto. (2015). Implementasi Belajar & Pembelajaran. Bandung: Remaja Rosdakarya.

Tsai, C. A. (2023). Design thinking with constructivist learning increases the learning motivation and wicked problem-solving capability—An empirical research in Taiwan. *Thinking Skills and Creativity*, *50*. https://doi.org/10.1016/j.tsc.2023.101385

Tsai, C. C. (2020). The effects of augmented reality to motivation and performance in EFL vocabulary learning. *International Journal of Instruction*, *13*(4), 987–1000. https://doi.org/10.29333/iji.2020.13460a

Undang-Undang Republik Indonesia Nomoe 20 tahun 2003 tentang Sistem Pendidikan Nasional. Jakarta : Dharma Bhakti

Utaminingtyas, Siwi. (2020). Implementasi Problem Solving Berorientasi Higher Order Thinking Skill (Hots) Pada Pembelajaran Ips Sekolah Dasar. Jurnal Ilmiah Pendidikan Dasar, VII (2), 84-98.

van Laar, E., van Deursen, A. J. A. M., van Dijk, J. A. G. M., & de Haan, J. (2017). The relation between 21st-century skills and digital skills: A systematic literature review. *Computers in human behavior*, *72*, 577-588. https://doi.org/10.1016/j.chb.2017.03.010

Vincent-Lancrin, S., et al. (2019), *Measuring Innovation in Education 2019: What Has Changed in the Classroom?*, Educational Research and Innovation, OECD Publishing, Paris, https://doi.org/10.1787/9789264311671-en.

Winarsih, Varia. (2009). Psikologi Pendidikan. Medan: Latansa Pers.

Wiradimadja, A. (2021). *Konsep Dasar IPS Dengan Konsep CLIL*. Jagat Lentera

Zhan, Z. (2022). Effect of groups size on students' learning achievement, motivation, cognitive load, collaborative problem-solving quality, and in-class interaction in an introductory AI course. *Journal of Computer Assisted Learning*, *38*(6), 1807–1818. https://doi.org/10.1111/jcal.12722