

The Effect of the Problem Based Learning (PBL) Model Assisted by Quizizz Media on IPAS Learning Outcomes of Grade IV Elementary School Students in Sanggau Regency

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ABSTRACT

Background: Social Science and Natural Science (IPAS) learning in elementary schools faces significant challenges, particularly in teaching the topic of social and cultural diversity in Indonesia. Conventional, teacher-centered approaches have failed to stimulate students' critical thinking skills and active engagement, especially in the multi-ethnic context of Sanggau Regency, West Kalimantan.

Objectives: This study aims to: (1) test the significant effect of the Problem Based Learning (PBL) model assisted by Quizizz media on IPAS learning outcomes of Grade IV students; (2) describe the effectiveness of Quizizz in improving motivation and cognitive learning outcomes on the social and cultural diversity topic through PBL; and (3) analyze differences in learning outcomes between students taught using PBL assisted by Quizizz and those taught using conventional methods at SD Negeri in Sanggau Regency.

Methods: This study employs a quantitative approach with a Quasi-Experimental Research method using a Non-Equivalent Control Group Design. The study population comprises 45 Grade IV students across three SD Negeri in Sanggau Regency: SD Negeri 01 Sanggau (experimental), SD Negeri 02 Balai Karang (experimental), and SD Negeri 14 Sekumpai (control). Samples were selected using purposive sampling. Data collection instruments include direct observation sheets, teacher performance observation sheets, a learning achievement test (20 multiple-choice items via Quizizz), and interview guidelines. Data were analyzed using descriptive statistics, normality test (Kolmogorov-Smirnov/Shapiro-Wilk), homogeneity test (Levene's test), Independent Sample t-Test, and N-Gain score.

Expected Findings: Based on the theoretical framework and relevant prior research, it is hypothesized that the PBL model assisted by Quizizz media will have a significant positive effect on IPAS learning outcomes, demonstrate greater effectiveness in increasing motivation and cognitive learning outcomes compared to conventional methods, and produce a statistically significant difference in post-test scores between the experimental and control groups.

Conclusion: The PBL model assisted by Quizizz media is projected to be a contextually relevant, effective, and innovative approach to improving IPAS learning outcomes in the local cultural context of Sanggau Regency, providing empirical evidence to support its broader adoption in elementary social and science education in Indonesia.

KEYWORDS: problem based learning, Quizizz, IPAS learning outcomes, social and cultural diversity, elementary school, Sanggau Regency

INTRODUCTION

Education plays a strategic and fundamental role in shaping quality human resources who are adaptive, critical, and capable of competing constructively in a global era characterized by social complexity, technological advancement, and cultural diversity (UNESCO, 2021; Dewey, 2023). In the context of Indonesia's national education system, Social and Natural Science (IPAS) learning at the elementary school level holds a vital position as mandated by the Merdeka Curriculum (Freedom to Learn Curriculum), which is comprehensively designed to equip students with conceptual knowledge, positive social attitudes, and practical skills for life in society (Kemendikbudristek, 2022).

At the Grade IV level, the topic of social and cultural diversity in Indonesia is particularly essential. The scope of this learning encompasses three main aspects: (1) Ethnic diversity in Indonesia, (2) Religious diversity in Indonesia, and (3) Cultural diversity in Indonesia. Indonesia is one of the world's most diverse nations, comprising more than 1,340 ethnic groups with various

languages, customs, and belief systems (Badan Pusat Statistik, 2023). A deep understanding of cultural diversity is not merely about memorizing names of ethnic groups or traditional houses, but rather serves as a foundation for building multicultural awareness, inter-group tolerance, and national unity (Banks & Banks, 2019). In a diverse region such as Sanggau Regency, this understanding is particularly relevant for fostering inter-ethnic harmony from an early age.

Normatively (*das sollen*), IPAS learning should develop students' Higher Order Thinking Skills (HOTS) and active participation. In line with the demands of the 21st century—known as the 4C skills: Critical Thinking, Communication, Collaboration, and Creativity—students are expected not only to be passive recipients of information, but active subjects capable of critically analyzing cultural information. High learning activity, characterized by active involvement and independent initiative, is a fundamental prerequisite for achieving optimal learning outcomes (Sardiman, 2020).

In reality, however, IPAS learning—particularly on Chapter 7 regarding Social and Cultural Diversity in Indonesia—still faces significant challenges. Based on field observations, students tend to experience difficulty internalizing the meaning of diversity. The primary problems appear in three crucial aspects. First, regarding ethnic diversity, students often merely memorize ethnic group names without understanding the challenges of preservation. Evidence shows that younger generations are beginning to lose interest in local identities, as observed among the Dayak community in Sanggau Regency, where traditional ceremonies are increasingly disregarded by students as irrelevant to modern life. Second, in terms of religious diversity, students' understanding remains at the level of administrative formality, with insufficient interactive media to help students visualize how tolerance and religious moderation are practiced in daily life. Third, regarding cultural diversity, there is a significant gap between theoretical knowledge and actual behavior, with students lacking critical thinking training to develop solutions for maintaining local cultural existence amid the currents of globalization.

This situation is exacerbated by the continued use of conventional, teacher-centered learning models. The broad material covering Indonesian ethnic groups, religions, and cultures is delivered primarily through lecture methods, failing to stimulate students' critical thinking. Therefore, the implementation of the Problem Based Learning (PBL) model—which confronts students directly with real-world diversity problems—is needed. To support its effectiveness, Quizizz media is expected to enhance students' active engagement and learning outcomes through a more interactive and enjoyable presentation of problems (Kurniawan & Rahmawati, 2020).

This study aims to: (1) test the significant effect of the PBL model assisted by Quizizz media on IPAS learning outcomes of Grade IV SD Negeri students in Sanggau Regency; (2) describe the effectiveness of Quizizz in improving motivation and cognitive learning outcomes on the social and cultural diversity topic through PBL; and (3) analyze differences in IPAS learning outcomes between students taught using PBL assisted by Quizizz and those taught using conventional methods.

MATERIALS AND METHODS

Research Design

This study employs a quantitative approach with Quasi-Experimental Research method. This method is used to examine the causal relationship between the use of the PBL model assisted by Quizizz media (independent variable) and students' learning outcomes (dependent variable). The quasi-experimental method was chosen because it allows the researcher to test causal relationships in a real classroom setting without randomizing research subjects, thereby preserving the natural integrity of the learning environment.

The research form applied is the Non-Equivalent Control Group Design. In this design, there is an experimental group and a control group that are not randomly selected. The design is presented in Table 1 below.

Table 1. Non-Equivalent Control Group Design

Group	Pre-test	Treatment	Post-test
E (Experimental)	O1	X	O2
K (Control)	O3	–	O4

Notes: E = Experimental group (PBL with Quizizz); K = Control group (conventional learning); O1, O3 = Pre-test; O2, O4 = Post-test; X = Treatment; – = No treatment.



Population and Sample

The study population consists of 45 Grade IV students across three SD Negeri in Sanggau Regency for the 2025/2026 academic year, with 15 students per school. The three schools are: SD Negeri 01 Sanggau, SD Negeri 02 Balai Karangany, and SD Negeri 14 Sekumpai. The selection of these schools is based on their representativeness of the Dayak and Malay ethnic communities, which form the focus of the learning material, as well as their location in highly populated areas within Sanggau Regency characterized by high population mobility and social heterogeneity.

Sampling was conducted using purposive sampling based on specific criteria: schools with similar characteristics, the same accreditation level (Accreditation B), and the same grade level of students. SD Negeri 01 Sanggau and SD Negeri 02 Balai Karangany serve as the experimental groups, while SD Negeri 14 Sekumpai serves as the control group. The use of two experimental schools and one control school aims to increase data validity, allowing the research findings to be more representative of the broader population in the region.

Research Variables

Three variables were operationalized in this study. The independent variable (X) is the Problem Based Learning (PBL) model assisted by Quizizz media, measured through indicators of PBL syntax implementation—comprising problem orientation, learning organization, investigation, result development, and evaluation—integrated with Quizizz gamification features at each phase. The dependent variable (Y) is IPAS learning outcomes, measured by scores obtained by students on the post-test covering the cognitive domain of social and cultural diversity material. Control variables include curriculum consistency (Merdeka Curriculum, Chapter 7), homogeneous student characteristics (same grade and similar background), and the same teacher for both experimental and control groups to prevent teaching style bias.

Data Collection Instruments

Data were collected using four instruments. First, a Teacher Performance Observation Sheet was used to document and assess the quality of teaching performance during the learning process, covering three phases: preliminary activities (opening, apperception, goal delivery), core activities (all five PBL phases including Quizizz integration), and closing activities (conclusion, reflection, feedback). Second, a Student Learning Activity Observation Sheet was used to record levels of student activeness, participation, and behavior during learning, comprising 15 activity indicators scored on a 1–4 scale, encompassing cognitive activities (attending, reading, analyzing), affective activities (questioning, expressing opinions, listening), and psychomotor activities (writing, completing worksheets, participating in Quizizz). Third, an IPAS Learning Achievement Test was developed as a 20-item multiple-choice instrument administered via the Quizizz platform, based on the Chapter 7 competency indicators (Social and Cultural Diversity in Indonesia), distributed across Bloom's Taxonomy Revised cognitive levels: Remembering/C1 (3 items), Understanding/C2 (3 items), Applying/C3 (2 items), Analyzing/C4 (7 items), Evaluating/C5 (3 items), and Creating/C6 (2 items). Fourth, an Interview Guide was used as a supporting instrument to explore teachers' and students' perceptions of the implemented learning model.

Before use, all instruments were validated in terms of content by relevant experts and tested for reliability. The learning achievement test was also subjected to item validity testing using Pearson product-moment correlation and reliability testing using Cronbach's Alpha coefficient.

Research Procedure

The study was conducted over approximately four effective weeks, encompassing three main stages. In the Preparation Stage, preliminary observations were conducted, followed by the development of teaching modules (PBL-based lesson plans), Quizizz quiz preparation aligned with material objectives, and instrument validation by experts and through trial testing. In the Implementation Stage, pre-tests were administered to both groups, followed by PBL treatment assisted by Quizizz in the experimental group—following the five PBL phases: problem orientation, learning organization, investigation, result development, and evaluation—while the control group received conventional learning. Post-tests were then administered to both groups. In the Final Stage, data from pre-tests, post-tests, and observation sheets were processed and analyzed.

Data Analysis Technique

Data analysis was conducted in three stages. Descriptive statistical analysis was used to describe mean values, standard deviations, and frequency distributions from pre-test and post-test data for both groups. Prerequisite analysis tests included the



Normality Test using Kolmogorov-Smirnov or Shapiro-Wilk to ensure data were normally distributed, and the Homogeneity Test using Levene's Test to ensure variance equality between groups. Hypothesis testing employed the Independent Sample t-Test to examine significant differences in mean post-test scores between the experimental and control groups, and the N-Gain Score to measure the degree of effectiveness or improvement in learning outcomes before and after treatment. If data were not normally distributed, the non-parametric Mann-Whitney test would be used as an alternative.

THEORETICAL FRAMEWORK

1. IPAS Learning

Learning is a process of teaching students by integrating educational principles and learning theories that serve as key determinants of educational success. IPAS (Natural and Social Sciences) is an integrated subject in the elementary education curriculum that combines natural science and social science. The IPAS subject is a blend of various scientific disciplines discussing events, facts, concepts, and generalizations of social issues and natural phenomena (Setiawati et al., 2019). This integrated approach equips students with the ability to live in society and address social problems in daily life.

Within the Merdeka Curriculum framework, IPAS learning aims to: (1) teach basic sociological, geographical, economic, historical, and natural science concepts through pedagogical and psychological approaches; (2) build commitment and awareness toward social, humanitarian, and environmental values; and (3) enhance the ability to cooperate and compete in a pluralistic society, both nationally and globally. Learning that is student-centered, contextually relevant, and connected to students' social and cultural realities is proven to significantly increase active engagement and meaningful learning (Nugraheni, 2021).

2. Problem Based Learning (PBL) Model

Problem Based Learning (PBL) is a learning model that places students at the center of the learning process through the resolution of authentic, real-world problems. PBL is grounded in constructivist theory, which holds that knowledge is actively constructed by students through experience and interaction with their environment. According to Fathurrohman (2015), the operational steps (syntax) of PBL consist of five main phases, as presented in Table 2.

Table 2. PBL Syntax According to Fathurrohman (2015)

Phase	Teacher Activities	Student Activities
Phase 1	Orienting students to the problem	Receiving authentic problems and formulating initial hypotheses
Phase 2	Organizing students for learning	Identifying needed information and planning tasks
Phase 3	Guiding individual/group investigation	Collecting data, conducting experiments, and investigating
Phase 4	Developing and presenting results	Compiling reports, presenting results, and testing solutions
Phase 5	Analyzing and evaluating problem-solving process	Evaluating the investigation process and outcomes

3. Quizizz Learning Media

Quizizz is an online game-based learning platform that enables teachers to create interactive quizzes accessible to students across various devices. This media offers instant feedback, detailed result reporting, and gamification elements such as points, leaderboards, and avatars that have been proven to increase student motivation and engagement (Kurniawan & Rahmawati, 2020). In the context of PBL integration, Quizizz is utilized primarily in the evaluation phase (Phase 5), where it serves as a formative assessment tool to measure students' conceptual understanding after completing the problem-solving process. The interactive and

competitive features of Quizizz transform the evaluation process from a stressful activity into an enjoyable and motivating learning experience.

4. IPAS Learning Outcomes

Learning outcomes refer to behavioral changes encompassing cognitive, affective, and psychomotor domains that indicate the success of the learning process. These outcomes are evaluated using various assessment methods including daily assessments. The Revised Bloom's Taxonomy consists of two dimensions—cognitive process dimension and knowledge dimension—formulated across six levels: remembering, understanding, applying, analyzing, evaluating, and creating (Anderson & Krathwohl, 2001). In this study, learning outcomes are focused on the cognitive domain, specifically the mastery of Chapter 7 material on Social and Cultural Diversity in Indonesia, covering all six cognitive levels with particular emphasis on higher-order thinking (C4–C6) that comprises 60% of the test items.

RELEVANT RESEARCH

Several prior studies demonstrate the relevance and effectiveness of PBL and digital media in IPAS learning. Research on PBL and critical thinking conducted by Amir (2018) found that PBL significantly improves students' critical thinking skills in IPAS subjects, as PBL encourages students to analyze problems, find solutions, and evaluate information. Research on Quizizz and learning outcomes by Kurniawan and Rahmawati (2020) showed that Quizizz is effective in improving student motivation and learning outcomes, with gamification elements proven to stimulate participation and student activeness. Research on PBL and technology integration by Widiastuti and Santoso (2022) concluded that PBL combined with digital media is more effective in improving learning activity and learning outcomes compared to conventional learning.

The current study seeks to fill the research gap by testing the simultaneous effect of PBL assisted by Quizizz media on IPAS learning outcomes in a single comprehensive study, with emphasis on the authentic local context of the Dayak ethnic community in Sanggau Regency—a context rarely focused upon in experimental educational research. This novelty provides both theoretical contribution to constructivist-based learning theory and practical contribution for teachers seeking culturally-grounded, technology-enhanced pedagogical strategies.

CONCEPTUAL FRAMEWORK AND HYPOTHESES

The conceptual framework of this study begins with the empirical problem of low learning activity and IPAS learning outcomes among Grade IV SD Negeri students in Sanggau Regency, particularly on the Social and Cultural Diversity material. This condition is assumed to be caused by conventional learning that tends to be passive and teacher-centered, failing to develop students' critical thinking and motivation to understand the cultural richness of their local environment.

The proposed solution involves the implementation of the PBL model assisted by Quizizz media as an innovative, contextual, and student-centered approach. In the PBL framework, students are directed to face authentic problems related to social and cultural diversity in their local context—especially the diversity of the Dayak and Malay communities in Sanggau Regency. This approach is expected to stimulate critical analysis, collaborative discussion, and creative thinking in students. Quizizz serves as an interactive and motivating evaluation medium that not only measures learning outcomes but also reinforces understanding through immediate feedback and engaging gamification elements.

Based on the theoretical framework and relevant prior research, the research hypotheses are formulated as follows: (H1) There is a significant effect of the PBL model assisted by Quizizz media on IPAS learning outcomes of Grade IV SD Negeri students in Sanggau Regency; (H2) Quizizz media is effective in improving motivation and cognitive learning outcomes on the social and cultural diversity topic through the PBL model; and (H3) There is a significant difference in IPAS learning outcomes between students taught using PBL assisted by Quizizz and those taught using conventional methods.

DISCUSSION

Theoretical Justification for PBL Implementation in IPAS Learning

The implementation of the PBL model in IPAS learning is grounded in constructivist theory (Vygotsky, 1978; Piaget, 1972), which posits that students actively build their own knowledge through experience, social interaction, and reflection. When confronted with authentic problems about social and cultural diversity—such as the threat of erosion of Dayak cultural identity in



Sanggau Regency due to globalization—students are motivated to investigate, analyze, and propose solutions that are contextually relevant to their lives. This process of active knowledge construction is far more effective than passive reception of information through lectures, as it develops not only cognitive understanding but also critical thinking skills and problem-solving competencies essential for 21st-century citizens.

The selection of social and cultural diversity as the content focus is particularly strategic for Sanggau Regency, where the Dayak and Malay communities coexist with their rich cultural traditions. PBL's emphasis on authentic, real-world problems ensures that learning is not abstract but directly connected to students' lived experiences—for example, investigating why young people are losing interest in traditional ceremonies or how to preserve the Betang house (a traditional Dayak communal dwelling) in the digital age. This contextual grounding creates what Ausubel (1968) termed 'meaningful learning,' where new information is connected to existing knowledge structures, resulting in deeper understanding and longer retention.

Role of Quizizz in Enhancing Learning Motivation and Outcomes

Quizizz functions as a powerful motivational and evaluative tool within the PBL framework, particularly in Phase 5 (Evaluating and Analyzing the Problem-Solving Process). The platform's gamification elements—including competitive leaderboards, instant feedback, avatar customization, and point systems—activate intrinsic motivation through what Self-Determination Theory (Deci & Ryan, 1985) identifies as competence, autonomy, and relatedness. Students experience competence when they answer questions correctly and receive immediate confirmation, autonomy in choosing their pace and receiving personalized feedback, and relatedness through the social comparison and team features that foster a sense of community.

Furthermore, Quizizz's immediate feedback mechanism aligns with the principles of formative assessment, allowing both teachers and students to identify gaps in understanding in real-time and adjust learning strategies accordingly. The detailed reporting features enable teachers to pinpoint specific content areas where students struggle—whether in understanding the geographic distribution of ethnic groups, the principles of religious tolerance, or the mechanisms of cultural preservation—and provide targeted remediation. This data-driven approach to instruction represents a significant advancement over conventional assessment methods that typically provide feedback only after tests are graded and returned.

Expected Impact on Learning Outcomes Across Cognitive Levels

The distribution of test items across Bloom's Taxonomy Revised levels—with 40% at lower-order thinking (C1–C3) and 60% at higher-order thinking (C4–C6)—reflects the study's commitment to measuring comprehensive cognitive development rather than mere factual recall. The PBL model is particularly well-suited to developing higher-order thinking skills, as the problem-solving process inherently requires students to analyze complex situations (C4: analyzing the factors causing ethnic diversity), evaluate alternative solutions (C5: evaluating appropriate behaviors for cultural preservation), and create innovative responses (C6: designing technology-based solutions for preserving Dayak cultural heritage).

Research by Amir (2018) and Widiastuti and Santoso (2022) consistently demonstrates that PBL produces significantly higher scores on higher-order thinking assessments compared to conventional methods. The addition of Quizizz as an evaluation medium amplifies this effect by providing multiple opportunities for students to practice applying their knowledge in an engaging, low-stakes environment before formal assessment—a pedagogical strategy known as retrieval practice, which has been shown to significantly enhance long-term retention and transfer of learning (Roediger & Butler, 2011).

Supporting and Anticipated Challenging Factors

Several factors are expected to support the effective implementation of PBL assisted by Quizizz in the research schools. The availability of devices (smartphones or tablets) and internet connectivity at the research locations enables Quizizz access. The multicultural composition of students at SD Negeri in Sanggau Regency, comprising Dayak and Malay students alongside other ethnic groups, provides a rich, authentic context for diversity-related problem scenarios. The competence and enthusiasm of teachers who have been involved in curriculum development under the Merdeka Curriculum framework ensures quality implementation of the PBL syntax.

Potential challenging factors include variability in students' digital literacy and device access, which may create inequities in Quizizz engagement. Time constraints within the standard 4-week research period may limit the depth of investigation possible in each PBL cycle. Additionally, some students may initially lack confidence in the presentation phase (Phase 4), particularly those from more reserved cultural backgrounds. These challenges will be addressed through preparatory orientation sessions, ensuring



device availability, and creating a supportive, non-judgmental classroom atmosphere that encourages risk-taking in intellectual discourse.

CONCLUSION

This study proposes the implementation of the Problem Based Learning (PBL) model assisted by Quizizz media as an innovative, contextual, and effective approach to improving IPAS learning outcomes among Grade IV students at SD Negeri in Sanggau Regency, with a focus on the topic of Social and Cultural Diversity in Indonesia. The quasi-experimental Non-Equivalent Control Group Design will enable rigorous testing of causal relationships between the PBL-Quizizz intervention and learning outcomes, while the purposive selection of schools ensures contextual relevance to the Dayak and Malay cultural environment of Sanggau Regency.

The theoretical framework—grounded in constructivism, PBL syntax according to Fathurrohman (2015), and the gamification principles of Quizizz—predicts that the integrated model will significantly outperform conventional learning in producing higher cognitive learning outcomes, particularly at the higher-order thinking levels (C4–C6) of Bloom's Taxonomy Revised. The comprehensive assessment approach, combining a 20-item Quizizz-based test with observation instruments and N-Gain analysis, will provide multi-dimensional evidence of the intervention's effectiveness.

The findings of this study are expected to make significant contributions at multiple levels: theoretically, by providing empirical evidence for constructivist-based, technology-enhanced learning in the specific cultural context of Kalimantan Barat; practically, by offering teachers a concrete, replicable model for integrating digital media with problem-based approaches in elementary social and science education; and institutionally, by informing school and district-level curriculum development decisions regarding the adoption of innovative pedagogical strategies within the Merdeka Curriculum framework. Future research is recommended to extend the intervention period, explore the longitudinal retention of learning outcomes, and investigate the differential effects of PBL-Quizizz across varying levels of prior academic achievement and digital literacy.

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