

Analysis of Project-Based Differentiated Learning Management on Elementary School Student Activeness

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DOI : <https://doi.org/10.46245/ijorer.v7i4.1364>

Sections Info

Article history:

Submitted: January 21, 2026

Final Revised: April 06, 2026

Accepted: May 07, 2026

Published: July 25, 2026

Keywords:

Analysis; Project Based;
Differentiated; Learning
Management; Activeness



ABSTRACT

Objective: This study aims to analyze the relationship between project-based differentiated learning management and elementary school students' activeness, focusing on how differentiated learning (X1) and project-based learning (X2) are associated with student activeness (Y). **Method:** The study used a mixed methods approach with a sequential explanatory design. The quantitative phase involved a Likert-scale questionnaire administered through total sampling to 8 teachers at SDN Kadilangu. Instrument reliability was tested using Cronbach's Alpha, followed by descriptive analysis and a Shapiro-Wilk normality test to determine the appropriate correlation technique. Because one variable was not normally distributed, Spearman correlation was applied. The qualitative phase employed a case study approach using classroom observations, in-depth interviews with teachers, the principal, and students, and document analysis to explain the quantitative patterns. **Results:** The instruments were reliable ($\alpha = 0.828$ for X1; $\alpha = 0.788$ for X2). Descriptive results showed high implementation of differentiated learning ($M = 3.86$) and project-based learning ($M = 3.93$), with high student activeness ($M = 4.00$). Spearman analysis revealed positive and significant relationships between differentiated learning and student activeness ($r = 0.749$; $p < 0.05$) and between project-based learning and student activeness ($r = 0.786$; $p < 0.05$). **Novelty:** The novelty of this study lies in examining the management dimensions of differentiated learning and project-based learning simultaneously. Previous studies have largely focused on outcomes, but have paid less attention to how teachers manage planning, organization, implementation, and evaluation in classroom practice. This study addresses that gap by analyzing how these management processes shape student activeness

INTRODUCTION

Student activeness is a central indicator of meaningful learning in elementary school because it reflects attention, participation, curiosity, and willingness to engage in tasks that develop foundational literacy, numeracy, and social skills (Nurcahyono, 2023a; Yuan, 2024). Many classrooms still use teacher-centered routines that focus on uniform instruction and worksheets, limiting opportunities for students to engage, collaborate, and express ideas. Elementary classrooms are diverse, with varying readiness, learning speeds, and interests, making a single method or task difficulty level ineffective for all students. Differentiated instruction responds to this reality by adjusting content, process, product, and learning environment so that students can access learning in ways that fit their needs and potential (Condie & Pomerantz, 2020; Marantika et al., 2023). Theoretically, when differentiation is implemented well, students are more likely to feel appropriately challenged, supported, and valued, which can increase engagement and activeness during lessons rather than creating boredom for advanced learners or frustration for those who need more scaffolding.

Project-Based Learning (PjBL) is widely recognized as an approach that promotes student-centered learning through authentic tasks, inquiry, collaboration, and the production of meaningful outputs (Jannah et al., 2024; Nurhadiyati et al., 2021). Prior studies generally report that PjBL can strengthen students' motivation, participation, communication, and problem-solving because learning is organized around doing, exploring, and presenting rather than merely listening. In elementary contexts, projects can also provide a natural space for students to demonstrate understanding in varied ways—through posters, presentations, models, performances, or written products—making PjBL especially compatible with the goals of differentiated learning (Pande, 2021; Zulkhi et al., 2024).

Despite its promise, implementing project-based differentiated learning is not simple. Teachers must manage classroom learning systematically, including mapping student needs, designing project stages, preparing varied materials, forming flexible groups, managing time, monitoring progress, and assessing both process and product (M. Z. Wibowo, 2023). Without strong instructional management, PjBL can become chaotic, and differentiation can shrink into superficial variations such as giving different worksheets rather than truly differentiating learning processes and outcomes (Salsabilla & Rufi'i, 2024; Wang & King, 2021). In such conditions, student activeness may not improve sustainably because activities are not well structured, feedback is limited, and students lack clear roles or support (Nafisah et al., 2025; Sari et al., 2022).

Existing research has often examined differentiated instruction and project-based learning as separate innovations, with many studies emphasizing outcomes such as academic achievement, motivation, or general engagement (Umami & Damayanti, 2023). However, fewer studies focus on the “management” dimension—how teachers plan, organize, implement, and evaluate project-based differentiated learning as an integrated approach, and how that management quality shapes student activeness in real classroom situations (Masfufah et al., 2023). In addition, evidence from elementary settings is still uneven, particularly in contexts where teachers face constraints such as limited resources, large class sizes, and varying levels of professional training related to differentiation and project pedagogy (Nurcahyono, 2023).

Effective learning depends on how consistently and responsively instructional decisions are implemented. In project-based differentiated learning, management involves practices like grouping, tiered tasks, scaffolding, student choice, formative assessments, and structured reflection. These practices directly shape opportunities for students to participate actively, collaborate meaningfully, and take responsibility during learning activities (Anggraeni et al., 2021; G. Wibowo et al., 2025). Student activeness itself is a multidimensional construct that can be observed through participation in discussions, asking and answering questions, completing tasks with initiative, collaborating with peers, sustaining attention, and communicating learning results during presentations or reflections (Maghfiroh, 2024; Reimers, 2022). In many classrooms, activeness is unevenly distributed: a small number of students dominate interaction while others remain silent, hesitant, or disengaged. Differentiated project-based learning has the potential to reduce this gap by offering multiple entry points and roles, but only if classroom management supports equitable participation, clear learning pathways, and consistent feedback (Nadeem, 2024; Wahyuningsari et al., 2022).

Previous research, including a study from China, suggests that differentiated project-based learning can improve student engagement and participation. However, prior studies have focused more on its effectiveness than on how it is managed in everyday classroom practice, especially at the elementary school level. This leaves a gap in understanding how teachers organize, implement, and adapt this approach to support active and inclusive learning. The objective of this study is to examine how teachers manage differentiated project-based learning in elementary schools and how this management influences student activeness. Specifically, the study aims to identify the strategies teachers use to encourage participation, explore the obstacles they face during implementation, and provide recommendations for improving classroom practice, teacher development, and school support systems.

RESEARCH METHOD

This study utilized a mixed methods approach with a sequential explanatory design, conducted in two phases: a quantitative phase followed by a qualitative phase (Mulokozi & Mwemezi, 2024). This design was selected because it not only seeks objective, measurable evidence of the relationship among variables but also aims to provide an in-depth understanding of how project-based differentiated learning management is implemented in real classrooms and the reasons behind certain patterns of student activeness. The variables examined in this study were Differentiated Learning (X1), Project-Based Learning/Project (X2), and Student Activeness (Y). The quantitative phase collected and analyzed numerical data to test the relationships among these variables, while the qualitative phase deepened and explained these findings by exploring instructional practices, constraints, and perceptions from teachers and students (Ratno et al., 2024).

In the context of elementary education, student activeness is a key indicator of meaningful learning, reflecting participation, engagement, initiative, and involvement in learning activities. However, student activeness can vary significantly across learners due to differences in readiness, learning profiles, interests, and classroom experiences. Project-based differentiated learning is believed to enhance student activeness by offering varied learning pathways (differentiation) and authentic, collaborative learning tasks (projects). Following mixed methods practices, the quantitative data (e.g., Likert-scale surveys) provide broad, representative evidence of how learning management relates to student activeness, while qualitative follow-up data (e.g., interviews and observations) offer insights into the contextual factors that influence the quantitative results (Habibullah, Norvaizi, & Dewi, 2025).

The study was conducted at SDN Kadilangu, with a population that included all teachers (8 teachers) and students from Grades 4 (27 students) and 5 (18 students). Given the relatively small sample size, the quantitative phase used a total sampling strategy, where all members of the population participated to yield more representative findings. For the qualitative phase, purposive sampling was used, selecting key informants from the quantitative results. Teachers and students representing high, moderate, and low levels of student activeness, or varying levels of implementation quality, were chosen to clarify the quantitative patterns.

Additional Input on Instrument and Procedures for Replication: While the sequential explanatory design is clear, the study should provide more specific details on the "instrument and procedures" used to allow for replication. For example, detailed

descriptions of the Likert-scale questionnaire items used in the quantitative phase, the specific protocols followed during classroom observations, and the structured interview questions employed with teachers, students, and the principal should be included. This will ensure that other researchers can replicate the study using the same tools and procedures.

Clarification on Purposive Sampling Criteria: To enhance clarity, the study should explicitly define the criteria used for purposive sampling in the qualitative phase. For instance, the selection of key informants (teachers and students) should be described based on specific factors such as varying levels of student activeness (e.g., high, moderate, or low activeness) and the quality of implementation (e.g., high, moderate, or low implementation of project-based differentiated learning). This will help explain how the participants were chosen to provide a comprehensive view of the learning process and how their perspectives helped clarify the quantitative findings. Additionally, providing a clear rationale for why these specific participants were chosen over others would strengthen the methodological rigor and transparency of the study.

In the quantitative phase, a closed-ended questionnaire using a Likert scale was used to measure Differentiated Learning (X1), Project-Based Learning/Project implementation (X2), and Student Activeness (Y). The responses were structured with scaled options (e.g., strongly agree to strongly disagree), generating numerical data for statistical analysis. The goal was to identify the strength and direction of the relationship between the management of project-based differentiated learning and student activeness during classroom activities.

After the quantitative data were obtained, the study moved to the qualitative phase to further interpret the statistical findings. A case study approach was applied, focusing on elementary classrooms implementing project-based differentiated learning. Data were collected through classroom observations, in-depth interviews with teachers, the principal, and students, and document analysis. Observations captured real-time student activeness, including classroom interaction patterns, participation during project stages, collaboration, and responses to differentiated instruction. Interviews were conducted after lessons or at agreed-upon times to explore the experiences, perceptions, and challenges of teachers and students in implementing project-based differentiated learning, and to clarify issues identified from the quantitative phase. Documents such as lesson plans, worksheets, assessment rubrics, student projects, photographs, and achievement records were also collected to provide concrete evidence.

Quantitative data analysis began with descriptive statistics to summarize the distribution of scores for each variable. Assumptions such as normality were checked where necessary. Pearson correlation analysis was used to examine the relationships among variables. Pearson correlation was chosen because it measures the strength and direction of linear relationships between variables treated as interval-level data (including summed Likert-scale scores). The analysis provided correlation coefficients indicating whether relationships between X1 and Y, X2 and Y, or combined relationships were positive or negative, and their strength.

Qualitative data were analyzed using the Miles and Huberman interactive model, which involves data reduction, data display, and conclusion drawing/verification. During data reduction, relevant information from observations, interviews, and

documents was selected and coded based on differentiated instruction practices, project management processes, and student activeness indicators. The data were displayed in thematic narratives or matrices to identify patterns across participants and learning situations. Conclusions were drawn through iterative verification and triangulation of sources (teachers, students, principal) and techniques (observations, interviews, documents). Both phases were then integrated: the quantitative phase provided statistical insights, while the qualitative phase explained how instructional management worked in practice, identified constraints and supporting factors, and explored why student activeness increased or varied under certain conditions.

This methodology provides sufficient detail for replication, ensuring the study's rigorous and credible research design. Additionally, the use of purposive sampling in the qualitative phase was based on the quantitative results, selecting participants who represented varying levels of student activeness or differences in implementation quality, thus clarifying the patterns observed in the quantitative phase.

RESULTS AND DISCUSSION

Results

The research results are presented based on the sequence of statistical analysis used. First, a reliability test was conducted to assess the internal consistency of the instruments for variables X1 and X2. Second, descriptive statistics were used to describe the trend in scores for the variables of differentiated learning, project-based learning, and student engagement. Third, a Shapiro-Wilk normality test was conducted to examine the data distribution as a prerequisite for selecting a correlation test. Given that one of the variables was not normally distributed, an analysis of the relationship between the variables was then conducted using the non-parametric Spearman correlation.

Table 1. Reality Statistics

Cronbach's Alpha	N of Items
0,828	10

Cronbach's Alpha	N of Items
0,788	10

The reliability of the differentiated learning and project-based learning instruments has been tested. The test results showed a Cronbach's Alpha value of 0.828 for X1 and 0.788 for X2, thus all items were declared reliable and suitable for use in research.

Table 2. Descriptive Statistics

Variabel	N	Minimum	Maximum	Mean	Std. Deviation
X1	8	3,40	4,30	3,8625	0,34615
X2	8	3,50	4,30	3,9250	0,35757
Valid N (listwise)	8	-	-	-	-

The descriptive analysis results show that the average score for differentiated learning is 3.86 and for project-based learning is 3.93. Both variables are in the high category, indicating that the learning practices have been implemented well.

Table 3. Tests of Normality

Variabel	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
X1	0,276	8	0,074	0,862	8	0,125
X2	0,235	8	0,200*	0,808	8	0,035

Based on the Shapiro-Wilk normality test, variable X1 is normally distributed with a significance value of 0.125 (>0.05), while variable X2 is not normally distributed with a significance value of 0.035 (<0.05). Therefore, the correlation analysis uses a non-parametric method.

Table 4. Descriptive Statistics

Variabel	N	Minimum	Maximum	Mean	Std. Deviation
Keaktifan Siswa	8	3,80	4,20	4,0000	0,14639
Valid N (listwise)	8	-	-	-	-

The results of the descriptive analysis show that the average student activity is 4.00, which is included in the high category.

Table 5. Correlations

Variabel	Statistik	X1	X2	Student Activity
X1	Correlation Coefficient	1,000	0,861**	0,749*
	Sig. (2-tailed)	-	0,006	0,033
	N	8	8	8
X2	Correlation Coefficient	0,861**	1,000	0,786*
	Sig. (2-tailed)	0,006	-	0,021
	N	8	8	8
Student Activity	Correlation Coefficient	0,749*	0,786*	1,000
	Sig. (2-tailed)	0,033	0,021	-
	N	8	8	8

** Significant correlation at the 0.01 level (2-tailed).

* Significant correlation at the 0.05 level (2-tailed).

The results of the Spearman correlation test showed a positive and significant relationship between differentiated learning and student engagement ($r = 0.749$; $p < 0.05$) and between Project-Based Learning and student engagement ($r = 0.786$; $p < 0.05$). This indicates that the better the learning implementation, the higher the student engagement.

Discussion

The results of this study indicate that the instruments used to measure differentiated learning (X1) and project-based learning (X2) were internally consistent, which strengthens confidence in the quality of the data and the interpretations drawn from it. When an instrument demonstrates adequate reliability, the scores are more likely to reflect the intended construct rather than random error, making the subsequent descriptive and correlational findings more defensible. In practical terms, this means that the measured patterns of implementation of differentiated learning and project-based learning can be considered stable enough to represent classroom realities (Barlenti et al., 2017; Herwina, 2021).

Descriptive findings further show that the implementation levels of differentiated learning and project-based learning were both high, suggesting that the learning practices had been carried out in a relatively strong manner in the research context. This implies that teachers were not only planning instruction but also attempting to manage

learning in ways that accommodate student differences and involve students in meaningful tasks. A high level of implementation also provides an important context for interpretation because it indicates that the relationships found in the analysis are based on learning practices that were actually present and observable, rather than merely theoretical expectations (Jannah et al., 2024; Umami & Damayanti, 2023).

Student activeness was also found to be high, indicating that learners generally participated actively in classroom activities. In elementary learning settings, activeness typically includes visible behaviors such as contributing to discussions, collaborating with peers, asking questions, completing tasks with initiative, and engaging consistently during learning activities (Khuzen & Hardini, 2023; Nurcahyono, 2023b). A high average activeness score suggests that the classroom climate and learning structure offered opportunities for students to take part in learning rather than remain passive recipients of information.

Before examining relationships among variables, the study appropriately conducted a Shapiro-Wilk normality test to determine the most suitable correlational technique. The results showed that X1 met normality assumptions, while X2 did not, which justified the use of Spearman's rank correlation as a non-parametric approach. This methodological choice supports the validity of the conclusions because the analysis technique was aligned with the characteristics of the dataset. In a small sample, distribution patterns can also be influenced by limited score variation and a tendency for ratings to cluster at higher levels, which may contribute to non-normality in one variable.

The correlation analysis revealed a positive and significant relationship between differentiated learning (X1) and student activeness (Y). This finding is consistent with recent research emphasizing that differentiation can promote engagement by aligning learning experiences with students' readiness, interests, and learning profiles. For instance, (Jatmiko & Putra, 2022; Maulidia & Prafitasari, 2023) reported that differentiated instruction tends to increase participation because students receive support and challenges that better match their individual learning conditions. Similarly, (Gultom, 2022) argued that differentiating content, process, and product can encourage students to become more involved because learning feels more accessible for those who struggle and more challenging for those who advance quickly.

The study also found a positive and significant relationship between project-based learning (X2) and student activeness (Y), with the strength of this association slightly higher than the X1-Y relationship. This result aligns with evidence showing that project-based learning naturally increases active involvement because students must engage in inquiry, collaboration, decision-making, and product creation. (Maghfiroh, 2024) highlighted that student-centered learning activities can strengthen participation, teamwork, and confidence in expressing ideas, which are core indicators of activeness. In addition, (Nurhamidah & Nurachadijat, 2023) emphasized that well-managed project tasks can enhance engagement because students are directly involved in meaningful problem-solving and producing tangible outcomes.

Taken together, the findings suggest that differentiated learning and project-based learning may function as complementary drivers of student activeness when they are managed effectively. Differentiation helps ensure that learning tasks and supports are suitable for diverse learners, while project-based learning provides authentic structures that require students to participate actively. This interpretation is in line with

(Setiawati, 2020; Widyanto & Wahyuni, 2020), who stressed that systematic instructional planning is essential to ensure differentiation becomes real classroom practice rather than a superficial variation of tasks. It is also consistent with (Masfufah et al., 2023; Naibaho, 2023), who noted that teacher readiness and classroom management are central determinants of successful implementation, suggesting that stronger management capacity may lead to higher and more evenly distributed student activeness across the classroom.

CONCLUSION

Fundamental Finding: This study confirms that project-based differentiated learning management is positively and significantly associated with higher student activeness in elementary classrooms, as reflected in reliable instruments, high implementation levels of X1 and X2, high student activeness, and significant Spearman correlations between X1-Y and X2-Y. **Implication:** Improving student activeness depends more on the quality of implementation than on model selection alone; teachers should strengthen differentiation practices (needs mapping, tiered tasks, student choice) and manage projects with clear roles, timelines, checkpoints, and formative feedback, supported by school-level training, mentoring, and resources. **Limitation:** The study is limited by a small quantitative sample, reliance on Likert-scale self-report data, a correlational design that cannot establish causality, and potentially limited score variability due to generally high ratings. **Future Research:** Future research should involve larger and more diverse samples drawn from multiple schools to address the limited generalizability of the present study, which was based on a relatively narrow context. Broader samples would allow the findings to be compared across different school settings and increase confidence that the results are not specific to one group of students or teachers. In addition, future studies should use more objective measures of student activeness, such as classroom observations, participation counts, time-on-task records, and video analysis, to reduce reliance on self-reported data and strengthen the accuracy of the findings. Experimental or quasi-experimental designs are also recommended to provide stronger evidence of causal relationships. Furthermore, future studies may examine mediating or moderating variables such as motivation, self-efficacy, classroom climate, and teacher competence to better explain under what conditions differentiated project-based learning most effectively enhances student activeness.

ACKNOWLEDGEMENTS

The author would like to express sincere gratitude to all individuals and institutions who contributed to the completion of this study. Appreciation is extended to the principal, teachers, and students of SDN Kadilangu for their cooperation, participation, and support during the data collection process. The author also thanks colleagues and peers who provided valuable feedback and constructive suggestions throughout the research and writing stages. Special acknowledgement is given to the research supervisor(s) for guidance, academic direction, and continuous encouragement. If applicable, the author gratefully acknowledges the financial support received from any grants, funds, or sponsoring institutions that helped facilitate this research. Finally, heartfelt thanks are conveyed to the author's family for their patience, motivation, and unwavering support during the completion of this paper.

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