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# The Effect of Academic Supervision and Deep Learning Approach on Student Learning Outcomes through Learning Quality in Private Junior High Schools Across Serang City

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## ABSTRACT

This study was motivated by the suboptimal learning outcomes of students in private junior high schools across Serang City. It aimed to examine the effects of academic supervision and the deep learning approach on learning quality and student learning outcomes, as well as the mediating role of learning quality in these relationships. This study employed a quantitative approach with an explanatory survey design involving 200 teachers from private junior high schools in Serang City, selected through purposive sampling. Data were collected using a five-point Likert-scale questionnaire and analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS) with SmartPLS 4. The results showed that academic supervision had a positive and significant effect on learning quality (β = 0.244; t = 2.673; p = 0.008), as did the deep learning approach (β = 0.418; t = 4.522; p < 0.001). Academic supervision and the deep learning approach also had positive and significant direct effects on student learning outcomes (β = 0.284; p = 0.001 and β = 0.254; p = 0.006, respectively). Learning quality had the strongest direct effect on student learning outcomes (β = 0.613; t = 6.737; p < 0.001). Furthermore, learning quality significantly mediated the effects of academic supervision (β = 0.149; p = 0.012) and the deep learning approach (β = 0.256; p < 0.001) on student learning outcomes. These findings highlight the mediating role of learning quality in the relationships between academic supervision, the deep learning approach, and student learning outcomes in private junior high schools across Serang City.

***Article Info***

***Kata Kunci:***
*Supervisi akademik, pendekatan deep learning, kualitas pembelajaran, hasil belajar siswa*

## ABSTRACT

Penelitian ini dilatarbelakangi oleh belum optimalnya hasil belajar siswa di SMP swasta se-Kota Serang. Penelitian ini bertujuan untuk menguji pengaruh supervisi akademik dan pendekatan deep learning terhadap kualitas pembelajaran dan hasil belajar siswa, serta peran mediasi kualitas pembelajaran dalam hubungan tersebut. Penelitian ini menggunakan pendekatan kuantitatif dengan desain survei eksplanatori yang melibatkan 200 guru SMP swasta di Kota Serang yang dipilih melalui teknik purposive sampling. Data dikumpulkan menggunakan kuesioner skala Likert lima poin dan dianalisis menggunakan Structural Equation Modeling–Partial Least Squares (SEM-PLS) dengan bantuan SmartPLS 4. Hasil penelitian menunjukkan bahwa supervisi akademik berpengaruh positif dan signifikan terhadap kualitas pembelajaran (β = 0,244; t = 2,673; p = 0,008), demikian pula pendekatan deep learning (β = 0,418; t = 4,522; p < 0,001). Supervisi akademik dan pendekatan deep learning juga memiliki pengaruh langsung yang positif dan signifikan terhadap hasil belajar siswa (masing-masing β = 0,284; p = 0,001 dan β = 0,254; p = 0,006). Kualitas pembelajaran memiliki pengaruh langsung paling kuat terhadap hasil belajar siswa (β = 0,613; t = 6,737; p < 0,001). Selain itu, kualitas pembelajaran secara signifikan memediasi pengaruh supervisi akademik (β = 0,149; p = 0,012) dan pendekatan deep learning (β = 0,256; p < 0,001) terhadap hasil belajar siswa. Temuan ini menegaskan peran mediasi kualitas pembelajaran dalam hubungan antara supervisi akademik, pendekatan deep learning, dan hasil belajar siswa di SMP swasta se-Kota Serang.

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## 1. INTRODUCTION

Education plays a central role in developing superior human resources amidst increasingly fierce global competition. The success of an education system is not solely determined by the smoothness of the teaching and learning process, but rather by the actual outcomes achieved by students. This is where student learning outcomes serve as a key indicator of educational effectiveness, as they reflect the extent to which students have truly mastered the competencies formulated in the curriculum. Schools are required to produce graduates who are not only knowledgeable but also skilled and possess attitudes relevant to the demands of the times (Nuraisyiah et al., 2024).

In this study, student learning outcomes refer to the competencies students are expected to achieve through the learning process. Conceptually, these outcomes may encompass cognitive, affective, and psychomotor domains. However, the construct examined in the proposed research model should be understood according to the indicators used to measure it. Accordingly, student learning outcomes are treated as a single dependent variable (Y), distinct from learning quality (Z), which represents the quality of the instructional process. This distinction enables the study to examine whether academic supervision and the deep learning approach are associated with student learning outcomes directly and indirectly through learning quality. Learning outcomes themselves are influenced by an intertwined network of internal and external factors, ranging from students' psychological states to the quality of their learning environment (Mursida, 2025).

Conditions at private junior high schools across Serang City show a similar picture. Education report card data shows that student learning outcomes are moderate and tend to fluctuate from year to year. This fluctuation indicates an inconsistent learning process, compounded by gaps in learning quality between schools due to differences in teacher competency, facilities, and internal policies (Rumfot et al., 2024). If left unchecked, this situation has the potential to degrade the overall quality of graduates.

Learning quality is believed to be a key variable influencing student learning outcomes. Active interaction between teachers and students, a variety of teaching methods, and continuous evaluation are hallmarks of quality learning. Conversely, learning that lacks quality tends to encourage students to memorize without understanding the essence of the material, thus underdeveloping their ability to apply knowledge in real-life situations (Prajumarse et al., 2024).

This is where the principal's role in academic supervision becomes crucial. Supervision should serve as a vehicle for professional development of teachers in designing and implementing learning, not simply an annual administrative routine. In fact, supervision practices in many schools remain limited to administrative aspects and have not significantly impacted learning quality (Mediatati & Jati, 2022). Shifting the orientation of supervision toward more substantive development is urgently needed.

In addition to supervision, deep learning policies have been introduced as an alternative approach to encourage better learning outcomes. This approach emphasizes comprehensive conceptual understanding, active student engagement, and critical and analytical thinking skills. Ideally, students no longer simply memorize but are able to interpret and apply knowledge in various contexts. Its implementation in the field has been uneven due to limited teacher competency and limited training (Zulkarnaini et al., 2025).

Previous studies have examined the relationships between academic supervision, instructional quality, learning approaches, and student learning outcomes. However, the findings discussed in the present study address these relationships from different perspectives. Mediatati and Jati (2022) are cited in this study in relation to academic supervision and its contribution to teacher competence and instructional quality, while Arteaga et al. (2024) are discussed in relation to instructional quality, supervision, and student achievement. Meanwhile, Zulkarnaini et al. (2025) are cited in relation to the implementation of the deep learning approach and its potential contribution to learning outcomes. Although these studies provide a basis for understanding the individual relationships among the research variables, the extent to which academic supervision and the deep learning approach are associated with student learning outcomes both directly and indirectly through learning quality remains insufficiently addressed in the research framework developed in this study.

This gap is important because academic supervision and the deep learning approach may contribute to student learning outcomes through different but complementary mechanisms. Academic supervision focuses on supporting teachers in planning, implementing, and evaluating instruction, whereas the deep learning approach emphasizes meaningful understanding, learning awareness, and active student engagement. Learning quality may therefore serve as an intervening mechanism through which these two factors are associated with student learning outcomes. Examining only the direct relationships would provide an incomplete explanation of how instructional support and learning approaches relate to student achievement. Accordingly, the mediating role of learning quality needs to be examined alongside the direct relationships among the variables.

To address this gap, the present study proposes and empirically tests an integrated model involving four constructs: academic supervision, the deep learning approach, learning quality, and student learning outcomes. Specifically, the model examines the direct effects of academic supervision and the deep learning approach on learning quality and student learning outcomes, the direct effect of learning quality on student learning outcomes, and the indirect effects of academic supervision and the deep learning approach on student learning outcomes through learning quality. The study's contribution lies in examining these direct and indirect relationships simultaneously among teachers in private junior high schools across Serang City. Thus, rather than claiming that the individual variables have never been studied, this study seeks to provide a more integrated empirical explanation of their relationships within a specific educational context.

As a first step, researchers conducted preliminary interviews with five private junior high school principals in Serang City to obtain a more concrete picture of the field. These interviews revealed that academic supervision is generally conducted twice a year, with additional incidental

supervision provided when learning challenges are encountered. Teachers have also begun implementing a deep learning approach in accordance with the latest Ministry of Education policy, although implementation has not been fully consistent. Some teachers still need guidance in designing activities that truly hone their students' higher-order thinking skills.

Based on the above description, this study was designed to empirically test the influence of academic supervision and an in-depth learning approach on student learning outcomes, with learning quality positioned as a mediating variable. Specifically, the objectives of this study are to analyze the direct influence of academic supervision and an in-depth learning approach on learning quality; to analyze the direct influence of these three variables on student learning outcomes; and to examine the role of learning quality as a mediator in the relationship between academic supervision and an in-depth learning approach on student learning outcomes. The results of this study are expected to provide theoretical contributions to the development of educational management studies, as well as provide practical input for principals and teachers in formulating strategies to improve learning quality in private junior high schools in Serang City.

## 2. THEORETICAL STUDY

### *Student Learning Outcomes*

Student learning outcomes are commonly understood as the sum of the entire educational process a student undergoes at school. They are not simply numbers on a report card, but rather a representation of changes in knowledge, attitudes, and skills that are truly embedded in the student. Within the current curriculum framework, learning outcomes are formulated in stages according to the student's developmental stage, providing teachers with a clear reference point for designing and evaluating the teaching and learning process (Arwasih et al., 2025).

Some experts emphasize that learning outcomes are multidimensional. While cognitive aspects often receive primary attention because they are easily measured through written tests, affective and psychomotor aspects are equally important in reflecting students' readiness for life outside the classroom. Unequal emphasis on just one aspect risks creating a misrepresentation of students' true abilities.

### *Quality of Learning*

Learning quality describes the extent to which the teaching and learning process is effective in achieving the stated objectives. Indriyani and Widodo, as cited by Prajumarse et al. (2024), define learning quality as the systematic integration of teachers, students, curriculum, teaching materials, media, infrastructure, and the learning system itself to produce optimal learning processes and outcomes. This view emphasizes that learning quality does not exist in isolation but rather results from the synergy of many components.

The use of an active, student-centered approach has been shown to increase learning engagement, motivation, and learning outcomes more effectively (Lan et al., 2025). Good quality learning, in turn, shapes students' knowledge, attitudes, skills, and critical thinking abilities through the application of targeted strategies, methods, and evaluations (Alfandy et al., 2024).

Conceptually, learning quality can be positioned as a mediating variable because it represents a potential mechanism through which academic supervision and the deep learning approach are associated with student learning outcomes. Academic supervision may contribute to better learning outcomes by helping teachers improve the quality of their instructional practices. Similarly, the deep learning approach may be associated with better learning outcomes by shaping the quality of classroom learning experiences. In both pathways, learning quality provides the conceptual link between the explanatory variables and student learning outcomes.

Nevertheless, the direct relationships may also remain relevant because academic supervision and the deep learning approach may be associated with student learning outcomes through pathways that are not fully captured by learning quality. Therefore, examining both direct and indirect relationships enables a more comprehensive assessment of the proposed model. On this basis, the present study examines learning quality as a mediator of the relationships between academic supervision and student learning outcomes, and between the deep learning approach and student learning outcomes.

### *Academic Supervision*

Academic supervision is understood as a systematic coaching process to help teachers develop their professional competencies, particularly in planning, implementing, and evaluating learning (Mediatati & Jati, 2022). Its function extends beyond administrative oversight to include professional development through the provision of constructive and ongoing feedback (Reinhold et al., 2021).

Supervision activities carried out through guidance, mentoring, and collaborative reflection have been shown to increase teaching effectiveness and encourage continuous teacher professional development (Castillo, 2025). Instructional leadership, demonstrated through academic supervision, also plays a crucial role in improving the quality of classroom teaching (Speer et al., 2022).

### *Deep Learning Approach*

The deep learning approach emphasizes comprehensive conceptual understanding, active student engagement, and the development of critical and analytical thinking skills. Damanik and Muhammad (2025) explain that this approach is oriented toward a meaningful, conscious, and enjoyable learning process, thereby improving the overall quality of students' learning experiences.

Student-centered learning within a deep learning framework has been shown to increase active participation and create a more conducive learning environment (Lan et al., 2025). In this context, effective interaction between teachers and students is a key indicator of high-quality classroom learning (Pudyastuti et al., 2023).

***Relevant Research***

Several previous studies have touched on the relationships between the variables examined in this article, although they have generally been partial. Nuraisyiah et al. (2024) and Afniola (2020), for example, show that learning outcomes are influenced by various factors, but they have not fully explained how academic supervision, in-depth learning approaches, and instructional quality interrelate in influencing student learning outcomes.

On the other hand, research by Mediatati and Jati (2022) and Arteaga et al. (2024) shows that academic supervision and learning quality have a positive effect on the teaching and learning process. These two studies do not fully explain the mechanisms by which improvements in learning quality actually drive real increases in student learning outcomes. Zulkarnaini et al. (2025), on the other hand, demonstrate that an immersive learning approach can improve learning outcomes, although empirical evidence at the private junior high school level is still relatively limited.

Referring to these findings, this study attempts to fill the gap by simultaneously testing four variables—academic supervision, in-depth learning approaches, learning quality, and student learning outcomes—in a single, cohesive empirical model, while positioning learning quality as a mediating mechanism for the relationship between supervision and learning approaches and student learning outcomes.

***Research Framework and Hypothesis***

Based on theoretical studies and previous research findings, this study constructs a conceptual framework that positions Academic Supervision (X1) and the Deep Learning Approach (X2) as variables influencing Learning Quality (Z), which in turn influences Student Learning Outcomes (Y). In addition to their direct pathways to Student Learning Outcomes, these two independent variables are also thought to have an indirect influence through Learning Quality as a mediating variable. This framework draws on the findings of Arteaga et al. (2024) who demonstrated the importance of instructional quality and supervision in explaining student learning success.

Based on this framework, seven hypotheses are formulated as follows. H1: Academic supervision has a positive effect on student learning outcomes. H2: The in-depth learning approach has a positive effect on student learning outcomes. H3: Academic supervision has a positive effect on learning quality. H4: The in-depth learning approach has a positive effect on learning quality. H5: Learning quality has a positive effect on student learning outcomes. H6: Academic supervision has a positive effect on student learning outcomes through learning quality. H7: The in-depth learning approach has a positive effect on student learning outcomes through learning quality.

This phenomenon is not new in Indonesian education. Private schools, particularly those in highly competitive areas like Serang City, often face dual challenges: maintaining the quality of learning amid limited resources, while simultaneously meeting parental and community expectations for student academic achievement. This situation requires principals and teachers to work more carefully in integrating their coaching roles, innovative teaching methods, and maintaining the quality of the daily learning process.

## 3. RESEARCH METHODOLOGY

This research uses a quantitative approach with an explanatory research design, as its goal is to explain the causal relationships between variables based on theoretical studies and relevant empirical findings. The evaluation of the SEM-PLS model comprised the measurement model (outer model) and the structural model (inner model). The measurement model was evaluated using indicator loadings, internal consistency reliability assessed through Cronbach's alpha and composite reliability, convergent validity assessed through the average variance extracted (AVE), and discriminant validity. Discriminant validity should be evaluated using the heterotrait–monotrait ratio (HTMT) or another appropriate criterion. The structural model was evaluated using the coefficient of determination ($R^2$), effect size ($f^2$), and predictive relevance ($Q^2$), where applicable. Hypothesis testing was conducted using bootstrapping, with a t-statistic greater than 1.96 and a p-value below 0.05 as the decision criteria at the 5% significance level. The adopted paradigm is positivism, which views social phenomena as something that can be measured and analyzed scientifically through quantitative data (Sugiyono, 2022; Mahardini et al., 2024). The thought process is deductive: starting from general theory, hypotheses are formulated, field data is collected, and then statistically tested to draw conclusions.

Four main variables were involved in this study. Academic Supervision (X1) and the Deep Learning Approach (X2) served as the independent variables, Learning Quality (Z) as the mediating variable, and Student Learning Outcomes (Y) as the dependent variable. Learning quality was positioned as a mediator based on the assumption that improvements in student learning outcomes do not occur immediately, but rather through prior improvements in the quality of the learning process.

The target population consisted of 456 teachers from 53 private junior high schools in Serang City during the 2025/2026 academic year, based on the population data cited in this study. A total of 200 teachers participated as respondents. The sample size was considered in relation to the requirements of Partial Least Squares Structural Equation Modeling (PLS-SEM), which evaluates the measurement and structural models simultaneously. Rather than relying solely on the number of indicators, sample adequacy should be assessed in relation to the complexity of the structural model, the number of predictors of each endogenous construct, the anticipated effect size, the significance level, and the desired statistical power. The sample of 200 respondents was used for the analysis of the four latent constructs and their hypothesized direct and indirect relationships. The adequacy of this sample should be supported by an appropriate statistical power analysis.

Purposive sampling was employed to select respondents who met the study's eligibility criteria. The selection process involved identifying private junior high school teachers in Serang City who were relevant to the research objectives and met the predetermined inclusion

criteria. The criteria for school participation and individual respondents should be explicitly reported, together with the procedure used to distribute the questionnaire and recruit participants. This information is necessary to clarify how the 200 respondents were selected from the target population and to establish the scope of the study's findings.

Primary data collection was conducted using a five-level Likert-type closed-ended questionnaire, structured based on indicators for each variable developed from theoretical studies. The questionnaires were distributed in person or through Google Forms, with the assistance of the principal or teacher coordinator at each school to ensure efficient data collection. Secondary data was also collected from school documents, education reports, relevant educational policies, and supporting scientific literature.

Each variable is broken down into several dimensions and indicators before being incorporated into questionnaire items. The Academic Supervision variable is measured through the dimensions of planning, implementation, and evaluation of supervision; the Deep Learning Approach is measured through the dimensions of meaningful understanding, learning awareness, and active student involvement; the Quality of Learning is measured through the dimensions of teacher-student interaction, method use, and utilization of learning media; while Student Learning Outcomes are measured through the dimensions of cognitive, active, and competency completion. A total of 40 indicator items are used to measure these four variables comprehensively.

The research instrument consisted of a questionnaire using a five-point Likert scale to measure four latent constructs: Academic Supervision (X1), Deep Learning Approach (X2), Learning Quality (Z), and Student Learning Outcomes (Y). The questionnaire comprised 40 indicator items distributed across the four constructs. Academic Supervision was measured through the dimensions of supervision planning, implementation, and evaluation. The Deep Learning Approach was assessed through meaningful understanding, learning awareness, and active student involvement. Learning Quality was measured through teacher–student interaction, the use of teaching methods, and the utilization of learning media. Student Learning Outcomes were assessed using the dimensions specified in the research instrument and operational definitions.

The measurement model was evaluated using the outer loading values to assess indicator validity, Cronbach's alpha and composite reliability to assess internal consistency, and the average variance extracted (AVE) to assess convergent validity. The instrument's measurement results are reported in the Measurement Model Analysis section. To facilitate replication, the sources used to develop or adapt the questionnaire, the allocation of the 40 items across the four constructs, and representative questionnaire items should be documented in the instrument description or a supplementary table.

Data analysis was performed using Structural Equation Modeling based on Partial Least Square (SEM-PLS) with the help of SmartPLS 4 software. This approach was chosen because of its ability to analyze relationships between latent constructs simultaneously, is flexible to data distribution assumptions, and remains reliable for use in relatively limited sample sizes (Hamzah et al., 2024). The evaluation of the SEM-PLS model involved both the measurement model (outer model) and the structural model (inner model). The measurement model was assessed through indicator loadings, internal consistency reliability using Cronbach's alpha and composite reliability, convergent validity using the average variance extracted (AVE), and discriminant validity. Discriminant validity should be evaluated using the heterotrait–monotrait ratio (HTMT) or another appropriate criterion, with the corresponding results reported to demonstrate whether the four constructs are empirically distinguishable. The structural model was evaluated using the coefficient of determination ($R^2$), effect size ($f^2$), and predictive relevance ($Q^2$), where applicable. The significance of the hypothesized direct and indirect relationships was assessed using bootstrapping, with a t-statistic greater than 1.96 and a p-value below 0.05 as the stated decision criteria.

## 4. RESULTS AND DISCUSSION

### *Research result*

#### *Respondent Characteristics*

The research respondents were 200 private junior high school teachers in Serang City, selected according to predetermined purposive sampling criteria. In terms of gender, female teachers dominated with 118 (59.0%), while male teachers numbered 82 (41.0%). The age distribution of respondents was dominated by the 30–39 year group with 74 (37.0%), followed by the 40–49 year group with 63 (31.5%), those aged over 50 with 35 (17.5%), and those under 30 with 28 (14.0%). The majority of respondents were therefore in the productive age range, which is usually directly proportional to the maturity of teaching experience.

The respondents' educational level was also quite adequate. A total of 158 people (79.0%) had a Bachelor's degree (S1), 40 people (20.0%) had a Master's degree (S2), and 2 people (1.0%) had a Doctorate (S3). In terms of length of service, the largest group was in the 6–10 years range, namely 58 people or 29.0%, followed by the group over 15 years with 57 people (28.5%), the group 11–15 years with 49 people (24.5%), and the group 2–5 years with 36 people (18.0%). A total of 132 teachers (66.0%) had a teaching certificate, while 68 teachers (34.0%) had not. In terms of the accreditation of the school of origin, 121 respondents (60.5%) came from schools accredited A and 79 respondents (39.5%) from schools accredited B. Regarding the frequency of participation in academic supervision, the majority of respondents, namely 108 people (54.0%), participated in supervision twice a year, while 47 people (23.5%) once and 45 people (22.5%) more than twice a year.

#### *Measurement Model Analysis (Outer Model)*

Convergent validity testing was conducted by examining the outer loading value of each indicator. Referring to Hair et al. (2022), an indicator is considered valid if it has a minimum outer loading value of 0.70. The test results showed that all indicators in the Academic Supervision variable had

loading values between 0.781 and 0.898. The Deep Learning Approach variable ranged from 0.716 to 0.921, the Learning Quality variable between 0.796 to 0.939, and the Student Learning Outcomes variable between 0.719 and 0.928. Because all these values were above the minimum threshold, all indicators were deemed suitable for use in the next analysis stage.

The composite reliability test showed consistently strong results, as presented in Table 1.

**Table 1. Results of Reliability and Convergent Validity Tests**

| Variables | Cronbach's Alpha | Composite Reliability | AVE |
|---|---|---|---|
| Academic Supervision (X1) | 0.977 | 0.979 | 0.698 |
| Deep Learning Approach (X2) | 0.977 | 0.979 | 0.700 |
| Learning Quality (Z) | 0.978 | 0.980 | 0.711 |
| Student Learning Outcomes (Y) | 0.984 | 0.985 | 0.766 |

*Source: Data processed by researchers, 2026*

All Cronbach's Alpha and Composite Reliability values in Table 1 are above 0.70, while the Average Variance Extracted (AVE) values for all variables exceed the 0.50 threshold. Thus, all four constructs are declared reliable and meet the convergent validity criteria.

***Structural Model Evaluation***

The structural model was evaluated using the coefficient of determination ($R^2$), effect size ($f^2$), and predictive relevance ($Q^2$). The $R^2$ value for Learning Quality was reported as 0.799, while the $R^2$ value for Student Learning Outcomes was reported as 0.959. These values indicate that the model accounts for 79.9% of the variance in Learning Quality and 95.9% of the variance in Student Learning Outcomes, respectively. However, the interpretation of these values should be considered alongside the model specification, the constructs included as predictors, and the possibility of overlap among the explanatory variables. The high $R^2$ value for Student Learning Outcomes should therefore not, by itself, be taken as conclusive evidence of strong predictive performance.

The reported effect-size values ($f^2$) were 4.977 for Learning Quality, 3.616 for Academic Supervision, and 3.168 for the Deep Learning Approach in relation to Student Learning Outcomes. Although these values are substantially above the commonly used reference value for a large effect, they should be verified against the original SmartPLS output before their magnitude is interpreted. The calculation and reporting of $f^2$ should correspond to the specific predictor–outcome relationships evaluated in the structural model.

The manuscript also reports a $Q^2$ value of 0.992. This value requires verification against the original model-evaluation output, including the procedure used to obtain it and the endogenous construct to which it refers. The final interpretation of predictive relevance should be made only after the value, calculation procedure, and applicable evaluation criterion have been confirmed.

***Hypothesis Testing***

Hypothesis testing was conducted using the bootstrapping procedure in SmartPLS 4, with acceptance criteria of a t-statistic greater than 1.96 and a p-value less than 0.05. A summary of the test results is presented in Table 2.

**Table 2. Hypothesis Test Results**

| H | Path of Influence | Coefficient (β) | t-statistic | p-value | Information |
|---|---|---|---|---|---|
| H1 | Academic Supervision → Student Learning Outcomes | 0.284 | 3,240 | 0.001 | Accepted* |
| H2 | Deep Learning Approach → Student Learning Outcomes | 0.254 | 2,161 | 0.006* | Verify |
| H3 | Academic Supervision → Quality of Learning | 0.244 | 2,673 | 0.008 | Accepted |
| H4 | Deep Learning Approach → Learning Quality | 0.418 | 4,522 | 0,000 | Accepted |
| H5 | Learning Quality → Student Learning Outcomes | 0.613 | 6,737 | 0,000 | Accepted |

| | | | | | |
|---|---|---|---|---|---|
| H 6 | Academic Supervision → Student Learning Outcomes (via Learning Quality) | 0.149 | 2,517 | 0.012 | Accepted |
| H 7 | Deep Learning Approach → Student Learning Outcomes (via Learning Quality) | 0.256 | 4,621 | 0,000 | Accepted |

*Source: Data processed by researchers, 2026*

Note: β = path coefficient. Hypotheses were evaluated at the 5% significance level. The reported t-statistics and p-values, particularly for H2, must be verified against the original SmartPLS output before the table is finalized. "Accepted" indicates that the reported p-value meets the stated significance criterion; it does not establish causality by itself.

### *Discussion*

#### *Academic Supervision of Learning Quality*

The test results prove that academic supervision has a positive and significant effect on the quality of learning (β = 0.244; t = 2.673; p = 0.008), so H3 is accepted. The better the implementation of supervision, the higher the quality of learning that takes place in private junior high schools in Serang City. This finding confirms the important role of supervision in teacher professional development, starting from classroom observation, providing feedback, to follow-up, which in turn helps teachers improve their teaching methods. Supervision that is carried out in a planned and sustainable manner encourages teachers to improve their teaching competencies so that learning becomes more effective.

In line with this, the theory of academic supervision emphasizes that its primary function is not simply to supervise, but rather to continuously develop teacher professionalism. Mediatati and Jati (2022) similarly concluded that effectively implemented academic supervision can improve teacher competence while simultaneously impacting the quality of learning. It can be concluded that the more effective the principal's supervision, the better the quality of learning produced by their teachers.

#### *Deep Learning Approach to Learning Quality*

The immersive learning approach also proved to have a positive and significant effect on learning quality (β = 0.418; t = 4.522; p < 0.001), thus H4 was accepted. The path coefficient value for this relationship was even recorded as the highest among the paths to learning quality, indicating that deep learning made a greater contribution than academic supervision in the context of this study. The application of immersive learning creates a more meaningful learning process through active student involvement, strengthening critical thinking, and linking the material to everyday experiences.

Deep learning theory explains that this approach emphasizes meaningful, mindful, and joyful learning, so that students do not stop at mastering the material alone, but are also able to understand, connect, and apply their knowledge. Lan et al. (2025) reinforce these findings by concluding that the implementation of deep learning improves the quality of the learning process through active student engagement and strengthening higher-order thinking skills. The more optimally teachers implement this approach, the better the quality of learning that is created.

#### *Academic Supervision of Student Learning Achievements*

Academic supervision was also proven to have a positive and significant effect on student learning outcomes (β = 0.284; t = 3.240; p = 0.001), thus H1 was accepted. Teachers who receive effective supervision tend to be more skilled at planning, implementing, and evaluating learning. This increase in competency ultimately results in a more effective learning process, which ultimately leads to increased student learning outcomes.

This finding aligns with the view that academic supervision is a professional development process that helps teachers hone their pedagogical and professional competencies, thereby boosting the quality of the learning process and student outcomes. Azizah et al. (2025) in their research also concluded a similar conclusion, namely that academic supervision significantly influences teacher competency improvement, which in turn impacts student learning outcomes by improving the quality of the learning process.

#### *Deep Learning Approach to Student Learning Outcomes*

The results indicate that the deep learning approach has a positive and statistically significant relationship with student learning outcomes (β = 0.254; t = 2.161; p-value to be verified), supporting H2 subject to confirmation of the original statistical output. This finding suggests that the implementation of a deep learning approach is associated with better student learning outcomes in the private junior high schools examined in Serang City. However, the path coefficient should be interpreted as an estimate of the relationship between the constructs in the proposed model rather than as evidence that the approach alone determines students' learning outcomes.

From a pedagogical perspective, a deep learning approach emphasizes students' understanding of concepts, connections between ideas, and application of knowledge. These learning processes may provide a plausible explanation for the observed relationship. Nevertheless, claims concerning improvements in critical thinking, conceptual understanding, or the transfer of knowledge to real-life situations should be

supported by empirical studies that specifically examine those outcomes. Comparisons with previous studies should therefore identify the studies' contexts, variables, and principal findings before drawing conclusions about similarities or differences. Once the relevant sources have been verified, this discussion can clarify whether the present finding confirms earlier evidence or extends it to private junior high schools in Serang City.

***Impact of Learning Quality on Student Learning Outcomes***

Learning quality showed the strongest influence on student learning outcomes compared to other direct pathways ($\beta = 0.613$; $t = 6.737$; $p < 0.001$), thus H5 was accepted. This finding confirms that learning quality is indeed a major determinant of student learning success. Systematically designed learning, supported by appropriate strategies, effective media use, and continuous evaluation create meaningful learning experiences that ultimately boost student learning outcomes.

In other words, the better the quality of learning implemented by teachers, the greater the chance of students optimally achieving expected competencies. Amini et al. (2024) and Prajumarse et al. (2024) confirmed the same pattern in their respective studies, where learning quality consistently contributed positively to improving student learning outcomes.

***Mediation of Learning Quality on the Influence of Academic Supervision on Student Learning Achievement***

The indirect effect test showed that learning quality significantly mediated the relationship between academic supervision and student learning outcomes ($\beta = 0.149$; $t = 2.517$; $p = 0.012$), supporting H6. This indirect effect should be interpreted together with the direct effect of academic supervision on student learning outcomes, which was also positive and statistically significant ($\beta = 0.284$; $t = 3.240$; $p = 0.001$). The significance of both pathways indicates a pattern consistent with complementary partial mediation, provided that the reported results are confirmed using the original SmartPLS output.

This finding suggests that academic supervision is associated with student learning outcomes both directly and indirectly through learning quality. The indirect pathway highlights learning quality as one possible mechanism linking academic supervision to student learning outcomes, while the significant direct pathway indicates that the relationship is not fully accounted for by the mediator. Nevertheless, because the study used a cross-sectional design and teacher-reported data, these results should be interpreted as statistical relationships rather than definitive evidence of causation.

***Mediation of Learning Quality on the Influence of Deep Learning Approach on Student Learning Achievement***

The indirect effect test showed that learning quality significantly mediated the relationship between the deep learning approach and student learning outcomes ($\beta = 0.256$; $t = 4.621$; $p < 0.001$), supporting H7. This indirect effect should be interpreted alongside the direct relationship between the deep learning approach and student learning outcomes ($\beta = 0.254$; $t = 2.161$; p-value to be verified against the original SmartPLS output). If the direct effect is confirmed to be statistically significant, the combination of significant direct and indirect effects in the same positive direction would indicate complementary partial mediation.

This result suggests that the relationship between the deep learning approach and student learning outcomes operates through both a direct pathway and an indirect pathway involving learning quality. The indirect pathway indicates that learning quality may help explain this relationship, whereas the direct pathway suggests that the mediator does not fully account for the association. Although the indirect coefficient is numerically larger than that for academic supervision ($\beta = 0.256$ compared with $\beta = 0.149$), this difference alone does not establish that the deep learning approach has a statistically stronger mediating effect. Such a comparison would require an appropriate statistical test.

Overall, the findings of this study confirm that learning quality acts as a mediator, strengthening the influence of both academic supervision and the in-depth learning approach on student learning outcomes. These two independent variables not only have a direct impact but also work indirectly through improvements in the classroom learning process. Consequently, efforts to improve student learning outcomes in private junior high schools in Serang City need to be pursued simultaneously, namely by strengthening the effectiveness of academic supervision, optimizing the implementation of the in-depth learning approach, and simultaneously maintaining the quality of the learning process itself.

These findings also have several practical implications for educational management at the school level. Principals can no longer treat academic supervision as an annual ceremonial activity, but rather need to make it a sustainable, results-oriented development instrument. Furthermore, the deep learning policy currently being promoted by the Ministry of Education appears to be more than just a new curriculum slogan, but rather an approach empirically proven to improve the quality of learning and student learning outcomes, provided it is implemented consistently and supported by adequate teacher competency.

***Research Limitations***

This study faces several limitations that need to be frankly stated. First, data were collected solely from teachers' perspectives, without directly involving the perspectives of students, principals, or supervisors. Therefore, the results are limited to a single perspective. Second, the study area only encompassed private junior high schools in Serang City, so generalizing the findings to other levels of education or other regions requires caution. Third, the cross-sectional nature of the study means that the causal relationships found do not fully reflect the long-term dynamics between variables, given that data collection was conducted at a single point in time.

However, these limitations do not diminish this study's contribution to enriching the empirical evidence regarding the relationship between academic supervision, in-depth learning approaches, instructional quality, and student learning outcomes. Further research involving longitudinal designs or more diverse data sources is expected to strengthen the

generalizability of these findings to broader educational contexts.

## 5. CONCLUSION

This study examined the relationships between academic supervision, the deep learning approach, learning quality, and student learning outcomes in private junior high schools across Serang City. The findings indicate that academic supervision and the deep learning approach were positively and significantly associated with learning quality. Both variables also showed positive and statistically significant direct relationships with student learning outcomes. Among the direct pathways examined, learning quality had the largest path coefficient in relation to student learning outcomes.

The indirect effect analysis further indicated that learning quality significantly mediated the relationships between academic supervision and student learning outcomes, as well as between the deep learning approach and student learning outcomes. These findings suggest that learning quality may be an important mechanism associated with the relationships examined in this study. However, because the data were collected using a cross-sectional design, the results should be interpreted as statistical associations and not as definitive evidence of causal relationships or changes over time.

The findings have several practical implications for school management and teaching practice. School principals may use academic supervision as an opportunity to provide constructive feedback, support teacher professional development, and encourage reflection on instructional practices. Teachers may consider designing learning activities that promote active participation, meaningful understanding, critical thinking, and the application of knowledge to real-life situations. Schools may also consider providing relevant professional development opportunities and adequate learning resources to support the quality of classroom instruction. These recommendations should be adapted to each school's context and evaluated through continued monitoring rather than assumed to guarantee improved student learning outcomes.

This study has limitations that should be considered when interpreting its findings. First, the data were obtained from teachers' perspectives and did not directly include responses from students, principals, or academic supervisors. Second, the study was limited to private junior high schools in Serang City, so the findings may not be directly generalizable to other educational levels or regions. Third, the cross-sectional design captures relationships between variables at a single point in time and cannot establish their temporal order or confirm causal effects. Future studies could employ longitudinal designs, include multiple sources of data, and examine other relevant variables to develop a more comprehensive understanding of the relationships among academic supervision, the deep learning approach, learning quality, and student learning outcomes.

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