The Impact of Teachers' Competence in Managing Instructional Models and Learning Media on Students' Learning Outcomes: Evidence from Indonesian Senior High Schools

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ABSTRACT

This study investigates the impact of teachers' competence in managing instructional models and learning media on students' learning outcomes in a senior high school context. Employing a quantitative ex post facto design, the study involved 83 students selected through simple random sampling from a population of 483 students. Data on teachers' competence in managing instructional models and learning media were collected using Likert-scale questionnaires, while students' learning outcomes were obtained from academic report scores. Data were analyzed using multiple linear regression, preceded by classical assumption tests including normality, multicollinearity, and heteroscedasticity tests. The findings reveal that: (1) teachers' competence in managing instructional models has a positive and significant effect on students' learning outcomes ($t = 6.179$, $p < 0.05$); (2) competence in managing learning media also shows a positive and significant effect ($t = 8.147$, $p < 0.05$); and (3) both variables simultaneously influence learning outcomes significantly ($F = 33.032$, $p < 0.05$). The coefficient of determination ($R^2 = 0.452$) indicates that 45.2% of the variance in students' learning outcomes is explained by these two variables. The study highlights the critical role of teachers' pedagogical competence, particularly in instructional design and media integration, in improving student achievement. These findings suggest the need for continuous professional development programs focusing on innovative teaching models and effective use of learning media to enhance educational quality.

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INTRODUCTION

Education is widely acknowledged as a strategic instrument for fostering human capital development and sustaining national competitiveness in the global knowledge economy. In contemporary educational discourse, the quality of learning outcomes has become a central indicator of educational effectiveness, particularly at the secondary education level where students are expected to develop not only foundational knowledge but also higher-order thinking skills, adaptability, and lifelong learning capacities. However, achieving these outcomes remains a persistent challenge, especially in developing countries where disparities in instructional quality and teacher competence continue to influence educational performance. Within this context, teachers occupy a pivotal position as the primary agents of instructional delivery and facilitators of student learning. The effectiveness of classroom instruction is largely contingent upon teachers' professional competence, particularly their pedagogical capacity to design, implement, and evaluate meaningful learning experiences. Despite extensive policy efforts aimed at improving teacher quality, empirical evidence suggests that instructional practices in many classrooms remain predominantly teacher-centered, characterized by limited variation in teaching strategies and minimal integration of learning media. Such conditions often result in passive learning environments that constrain students' engagement and hinder the development of critical and analytical skills. The issue of suboptimal learning outcomes is not merely a reflection of students' abilities but is deeply intertwined with the quality of instructional processes. In many cases, the persistence of conventional teaching approaches—such as lecture-dominated instruction—fails to accommodate diverse learning needs and does not align with contemporary pedagogical paradigms that emphasize student-centered learning. This misalignment underscores a critical gap between the intended curriculum and the enacted curriculum, where the latter is heavily influenced by teachers' competence in managing instructional practices. A key dimension of pedagogical competence lies in the ability to effectively manage instructional models. Instructional models serve as systematic frameworks that guide the organization of teaching and learning activities, encompassing specific syntax, social systems, and instructional principles. The selection and implementation of appropriate instructional models are crucial in shaping students' learning experiences. For instance, constructivist-oriented models such as problem-based learning, project-based learning, and inquiry-based learning emphasize active student participation, collaborative problem-solving, and knowledge construction through authentic experiences. These models have been shown to foster deeper understanding and improve learning outcomes when implemented effectively.

However, the adoption of such models in practice is often constrained by teachers' limited competence in instructional design and classroom management. Many teachers lack sufficient understanding of the theoretical foundations and practical applications of diverse instructional models, leading to a reliance on routine and less effective teaching methods. This limitation not only reduces the potential impact of innovative pedagogies but also perpetuates traditional learning environments that may not adequately support student development in the 21st century. In addition to instructional models, the effective use of learning media represents another critical component of pedagogical competence. Learning media function as essential tools for facilitating communication, enhancing conceptual understanding, and creating engaging learning environments. The integration of visual, auditory, and interactive media can significantly enrich the learning process by making abstract concepts more concrete and accessible to students. From

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the perspective of dual coding theory, the combination of verbal and visual information enhances cognitive processing and retention, while cognitive load theory emphasizes the importance of designing instructional materials that optimize mental effort and minimize extraneous cognitive burden. Despite the recognized benefits of learning media, their utilization in many educational settings remains suboptimal. Teachers often underutilize available resources due to limited technological literacy, insufficient training, or a lack of institutional support. Even when digital tools are available, they are not always integrated effectively into instructional practices, resulting in superficial or fragmented use that does not contribute meaningfully to learning outcomes. This situation reflects a broader issue of technological-pedagogical misalignment, where the presence of technology does not necessarily translate into improved instructional quality. The interplay between instructional models and learning media is particularly important in determining the overall effectiveness of teaching and learning processes. Instructional models provide the structural framework for organizing learning activities, while learning media serve as instruments that enhance the delivery and comprehension of content within that framework. When these two components are aligned and effectively managed, they create synergistic effects that can significantly enhance student engagement, motivation, and academic achievement. Conversely, the absence of such alignment may result in fragmented instructional practices that fail to optimize learning outcomes. In the Indonesian educational context, improving teacher competence has been a longstanding priority, as reflected in various national policies and professional development initiatives. Programs aimed at enhancing teachers' pedagogical and technological skills have been widely implemented, yet their impact on classroom practices remains uneven. This discrepancy suggests that improving teacher competence requires not only formal training but also sustained support, reflective practice, and contextual adaptation. Moreover, there is a need for empirical studies that examine how specific dimensions of teacher competence influence learning outcomes in real classroom settings.

The case of SMA Negeri 1 Tompaso provides a relevant context for investigating these issues. Preliminary observations indicate that students' learning outcomes in several subjects have not reached the expected levels, with average scores showing limited improvement over time. This condition raises critical questions about the effectiveness of instructional practices, particularly in relation to teachers' competence in managing instructional models and learning media. The persistence of such challenges suggests that there may be underlying issues in how teaching and learning processes are designed and implemented. Existing studies have demonstrated that both instructional models and learning media independently contribute to learning outcomes. However, there is a growing recognition that these factors should not be examined in isolation. Instead, a more integrated approach is needed to understand how their combined influence shapes educational outcomes. In particular, the extent to which teachers can simultaneously manage instructional strategies and media integration remains an underexplored area in educational research, especially within the Indonesian context. Furthermore, much of the existing literature tends to focus on experimental or intervention-based studies, which may not fully capture the complexity of real-world classroom conditions. There is a need for ex post facto research that examines naturally occurring variations in teacher competence and their impact on student outcomes. Such an approach allows for a more nuanced understanding of how instructional practices operate in authentic educational settings, where multiple variables interact dynamically. This study seeks to address these gaps by examining the influence of teachers' competence in managing instructional models and learning media on students' learning outcomes. By employing

a quantitative ex post facto design, the study aims to provide empirical evidence on the extent to which these competencies contribute to academic achievement. The focus on both individual and combined effects of the independent variables offers a comprehensive perspective on their role in shaping learning outcomes. From a theoretical standpoint, this study is grounded in constructivist learning theory, which emphasizes the active role of learners in constructing knowledge through interaction and experience. It also draws on cognitive theories that highlight the importance of information processing and the role of instructional design in facilitating learning. By integrating these theoretical perspectives, the study provides a conceptual framework for understanding how teacher competence influences the effectiveness of instructional practices. In addition to its theoretical contributions, this study has significant practical implications. For educators, the findings underscore the importance of developing competencies in both instructional design and media integration. For school leaders, the results highlight the need for targeted professional development programs that address specific areas of teacher competence. For policymakers, the study provides evidence-based insights that can inform strategies for improving educational quality at a systemic level. Ultimately, improving students' learning outcomes requires a holistic approach that considers the complex interplay of various factors, including teacher competence, instructional strategies, and learning resources. By focusing on the role of teachers in managing instructional models and learning media, this study contributes to a deeper understanding of one of the key determinants of educational success. The findings are expected to inform efforts to enhance teaching effectiveness and promote more meaningful and impactful learning experiences for students.

LITERATURE REVIEW

Student Learning Outcomes in Contemporary Educational Discourse

Student learning outcomes constitute a central construct in educational research, reflecting the extent to which learners achieve intended educational objectives across cognitive, affective, and psychomotor domains. In contemporary scholarship, learning outcomes are no longer viewed merely as the accumulation of knowledge but as multidimensional indicators encompassing higher-order thinking skills, problem-solving abilities, and the capacity for knowledge transfer. This shift aligns with global educational reforms emphasizing 21st-century competencies, where students are expected to demonstrate critical thinking, creativity, collaboration, and communication skills. From a theoretical standpoint, the conceptualization of learning outcomes is strongly influenced by Bloom's taxonomy and its subsequent revisions, which categorize learning into hierarchical levels ranging from basic recall to complex cognitive processes such as analysis, evaluation, and creation. However, recent critiques argue that traditional taxonomies may not fully capture the dynamic and contextual nature of learning, particularly in technology-enhanced environments. As a result, contemporary frameworks increasingly emphasize authentic assessment and performance-based evaluation as more valid representations of student learning. Empirical studies consistently indicate that learning outcomes are shaped by a complex interplay of internal and external factors. Internal factors include students' cognitive abilities, motivation, prior knowledge, and learning strategies, while external factors encompass instructional quality, classroom environment, and socio-economic conditions. Among these, instructional quality, particularly teacher competence, has been identified as one of the most significant determinants of student achievement. This

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recognition underscores the need to examine how specific dimensions of teacher competence influence learning outcomes in diverse educational contexts.

Teacher Competence as a Determinant of Instructional Quality

Teacher competence has long been recognized as a critical factor in determining the effectiveness of educational systems. It encompasses a range of knowledge, skills, and dispositions that enable teachers to facilitate learning effectively. In the literature, teacher competence is often conceptualized through multiple dimensions, including pedagogical competence, content knowledge, professional skills, and technological proficiency. The concept of Pedagogical Content Knowledge (PCK) introduced by Shulman provides a foundational framework for understanding teacher competence. PCK emphasizes the integration of subject matter knowledge with pedagogical strategies, enabling teachers to transform complex content into forms that are accessible to learners. Building on this, the Technological Pedagogical Content Knowledge (TPACK) framework incorporates the role of technology, highlighting the need for teachers to integrate technological tools into pedagogical practices effectively. Despite the widespread acceptance of these frameworks, their implementation in practice remains uneven. Studies have shown that many teachers struggle to integrate pedagogical, content, and technological knowledge in a coherent manner. This gap is particularly evident in contexts where professional development opportunities are limited or where institutional support for innovation is lacking. Consequently, understanding the specific components of teacher competence—such as the ability to manage instructional models and learning media—becomes essential for improving instructional quality.

Competence in Managing Instructional Models: Conceptual Foundations

Instructional models represent structured approaches to organizing teaching and learning processes. They provide systematic guidelines for designing instructional activities, including the sequencing of content, interaction patterns, and assessment strategies. The literature identifies a wide range of instructional models, each grounded in specific learning theories. For instance, behaviorist models emphasize reinforcement and practice, cognitivist models focus on information processing, and constructivist models prioritize active learning and knowledge construction. Among these, constructivist-oriented models have gained prominence in recent decades due to their alignment with contemporary educational goals. Models such as problem-based learning (PBL), project-based learning (PjBL), inquiry-based learning, and cooperative learning are widely recognized for their ability to promote student engagement and deeper understanding. These models encourage learners to actively participate in the learning process, collaborate with peers, and apply knowledge to real-world problems.

Empirical Evidence and Critical Perspectives

A substantial body of empirical research supports the effectiveness of innovative instructional models in improving learning outcomes. Studies have shown that students exposed to student-centered instructional approaches demonstrate higher levels of engagement, critical thinking, and academic achievement compared to those in traditional lecture-based classrooms. However, the effectiveness of these models is highly dependent on the teacher's competence in implementing them. One critical issue identified in the literature is the "implementation gap," where teachers adopt the terminology of innovative models without fully understanding their underlying principles. This superficial adoption often results in fragmented or ineffective practices that fail to

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achieve the intended learning outcomes. For example, problem-based learning may be reduced to simple group work without meaningful problem-solving components, thereby undermining its pedagogical value. Furthermore, the successful implementation of instructional models requires not only technical knowledge but also adaptive expertise. Teachers must be able to modify and integrate models based on contextual factors such as student characteristics, subject matter, and classroom dynamics. This requirement highlights the complexity of instructional competence and the need for continuous professional development.

Competence in Managing Learning Media: Theoretical Perspectives

Learning media play a crucial role in facilitating communication and enhancing the effectiveness of instruction. They encompass a wide range of tools, from traditional materials such as textbooks and visual aids to advanced digital technologies such as multimedia presentations, simulations, and online learning platforms. Theoretical frameworks such as Dale's Cone of Experience, dual coding theory, and cognitive load theory provide insights into how media influence learning processes. Dale's Cone of Experience suggests that learners retain information more effectively when they engage with concrete experiences rather than abstract representations. Dual coding theory posits that information processed through both verbal and visual channels is more likely to be retained. Meanwhile, cognitive load theory emphasizes the importance of designing instructional materials that optimize cognitive processing by reducing unnecessary mental effort. These theories collectively highlight the potential of learning media to enhance comprehension, retention, and engagement. However, they also underscore the importance of careful design and implementation, as poorly designed media can increase cognitive load and hinder learning.

Challenges in Practice

Despite the theoretical advantages of learning media, their practical implementation often falls short of expectations. One of the main challenges is the lack of technological competence among teachers. Many educators are not adequately trained to use digital tools effectively, leading to underutilization or misuse of available resources. Additionally, the rapid pace of technological change creates a continuous need for updating skills, which may not be adequately addressed by existing professional development programs. Another challenge is the tendency to focus on the technological aspects of media rather than their pedagogical integration. The mere presence of technology in the classroom does not guarantee improved learning outcomes. Instead, the effectiveness of learning media depends on how well they are aligned with instructional objectives and integrated into the overall teaching strategy.

The Synergistic Relationship Between Instructional Models and Learning Media

The literature increasingly recognizes that instructional models and learning media should not be treated as independent variables but as interrelated components of a cohesive instructional system. Instructional models provide the structural framework for organizing learning activities, while learning media enhance the delivery and representation of content within that framework. The alignment between these components is crucial for creating effective learning environments. From a systems perspective, effective instruction requires the integration of multiple elements, including objectives, content, methods, and media. Misalignment among these elements can lead to inefficiencies and reduced learning outcomes. For example, the use of interactive digital media

within a teacher-centered instructional model may limit the potential benefits of the technology, as students are not given sufficient opportunities to engage actively with the content. Empirical studies have shown that the combined use of innovative instructional models and appropriate learning media can produce synergistic effects, leading to higher levels of student engagement and achievement. However, achieving such integration requires a high level of teacher competence, as well as institutional support and adequate resources.

Empirical Studies on Teacher Competence and Learning Outcomes

A growing body of research has examined the relationship between teacher competence and student learning outcomes. These studies generally confirm that teacher competence is a strong predictor of academic achievement. However, they also reveal variations in the relative importance of different competency dimensions. For instance, some studies highlight the dominant role of pedagogical competence, particularly in managing classroom interactions and instructional strategies. Others emphasize the importance of technological competence in the context of digital learning environments. Additionally, research has shown that the impact of teacher competence may be mediated by factors such as student motivation, classroom climate, and school leadership. One notable trend in recent research is the shift towards examining the combined effects of multiple competencies. This approach reflects a more holistic understanding of teaching, where different competencies interact to influence learning outcomes. However, there is still a need for more context-specific studies that explore these relationships in diverse educational settings.

Research Gap and Conceptual Framework

Despite the extensive literature on teacher competence and learning outcomes, several gaps remain. First, many studies focus on individual components of teacher competence without considering their combined effects. Second, there is limited research on the integration of instructional models and learning media, particularly in the context of secondary education in developing countries. Third, existing studies often rely on experimental designs that may not fully capture the complexity of real-world classroom practices. This study addresses these gaps by examining the influence of teachers' competence in managing instructional models and learning media both individually and simultaneously. By adopting an ex post facto design, the study provides insights into how these competencies operate in authentic educational settings. The conceptual framework of the study is grounded in constructivist and cognitive learning theories, emphasizing the role of active learning and effective information processing in achieving optimal learning outcomes.

Synthesis and Implications

The literature reviewed in this section highlights the central role of teacher competence in shaping instructional quality and student learning outcomes. While instructional models and learning media have been extensively studied, their integration remains a critical challenge in educational practice. The effectiveness of these components depends not only on their theoretical soundness but also on teachers' ability to implement them effectively in diverse classroom contexts. The findings of previous studies suggest that improving teacher competence requires a multifaceted approach, including professional development, institutional support, and continuous reflection.

Moreover, there is a need to move beyond fragmented approaches to teaching and towards more integrated and holistic instructional practices. In conclusion, the literature underscores the importance of examining the combined influence of instructional models and learning media as key dimensions of teacher competence. By addressing this area, the present study contributes to a more comprehensive understanding of the factors influencing student learning outcomes and provides a basis for improving educational practice and policy.

METHOD

Research Design

This study employed a quantitative approach using an ex post facto research design to examine the influence of teachers' competence in managing instructional models and learning media on students' learning outcomes. The ex post facto design was selected because the variables under investigation had already occurred and could not be manipulated by the researcher. This design is particularly appropriate for educational research where ethical and practical constraints limit experimental intervention, allowing researchers to analyze causal relationships based on naturally existing conditions. Unlike experimental studies, which involve controlled manipulation of independent variables, ex post facto research focuses on identifying associations and potential causal inferences from observed data. In this study, teachers' competence in managing instructional models and learning media were treated as independent variables, while students' learning outcomes were considered the dependent variable. The design enables the investigation of both partial and simultaneous effects of these variables within an authentic classroom context.

Research Setting and Context

The study was conducted at a public senior high school in Indonesia, specifically SMA Negeri 1 Tompaso, located in Minahasa Regency, North Sulawesi. This school represents a typical secondary education institution in a semi-urban setting, where access to educational resources and instructional practices reflects broader trends in Indonesian education. The research was carried out during the 2025/2026 academic year, providing a contemporary context for examining instructional practices and learning outcomes. The selection of this site was based on preliminary observations indicating variability in student achievement and instructional practices, making it a relevant context for investigating the research problem.

Population and Sampling

The population of this study comprised all students enrolled at SMA Negeri 1 Tompaso during the 2025/2026 academic year, totaling 483 students. This population was considered appropriate as students are the direct recipients of instructional practices and can provide valid perceptions regarding teachers' competence. A simple random sampling technique was employed to ensure that each member of the population had an equal probability of being selected. This technique minimizes sampling bias and enhances the representativeness of the sample. The sample size was determined using the Slovin formula, which is commonly used in social science research to estimate sample size based on a known population and a specified margin of error. With an acceptable error tolerance level, the calculated sample size was 83 students. The use of random sampling strengthens the external validity of the study, allowing the findings to be generalized within the context of the school.

Variables and Operational Definitions

This study involved three main variables:

1. Independent Variables

Teachers' Competence in Managing Instructional Models (X_1)

This variable refers to teachers' ability to plan, select, implement, vary, and evaluate instructional models in classroom practice. It reflects pedagogical competence in organizing learning processes systematically and effectively. Indicators include:

- Planning instructional models
- Selecting appropriate models
- Implementing instructional syntax
- Providing variation in instructional strategies
- Evaluating model effectiveness

Teachers' Competence in Managing Learning Media (X_2)

This variable refers to teachers' ability to plan, select, operate, integrate, and evaluate learning media to support instructional processes. Indicators include:

- Planning the use of learning media
- Selecting appropriate media
- Operating media effectively
- Integrating media into instruction
- Evaluating media use

2. Dependent Variable

Students' Learning Outcomes (Y)

This variable represents students' academic achievement, measured through their final report scores for the relevant semester. Learning outcomes reflect students' mastery of subject matter as assessed through standardized school evaluation.

Research Instruments

1. Questionnaire

Data on the independent variables were collected using structured questionnaires based on a Likert scale (1–5). The questionnaires were designed to measure students' perceptions of teachers' competence in managing instructional models and learning media. The instrument for instructional model competence consisted of 16 items, covering five key indicators. The instrument for learning media competence consisted of 15 items, also covering five indicators. The use of student perception as a data source is supported by previous research indicating that students are reliable observers of classroom practices. However, it is acknowledged that perception-based data may be influenced by subjective factors, which is considered in the interpretation of results.

2. Documentation

Data on students' learning outcomes were obtained through official school records, specifically the final report scores for the semester. This method ensures objectivity and reliability, as the data are based on standardized assessment procedures.

Data Collection Procedures

Data collection was carried out in several stages:

1. Preparation Stage

The researcher obtained permission from school authorities and prepared the research instruments.

2. Implementation Stage

Questionnaires were distributed to selected students and collected after completion to ensure a high response rate.

Documentation Stage

Students' academic scores were collected from school records with appropriate authorization.

Data Analysis Techniques
Descriptive Analysis

Descriptive statistics were used to summarize the data, including: Mean, Median, Mode, Standard deviation, Minimum and maximum valuesThis analysis provides an overview of the distribution and characteristics of the variables.

Classical Assumption Tests

Before conducting regression analysis, several assumption tests were performed:

1. Normality Test

Conducted using the Kolmogorov-Smirnov test to determine whether the data follow a normal distribution.

2. Multicollinearity Test

Assessed using Tolerance and Variance Inflation Factor (VIF) values to ensure that independent variables are not highly correlated.

3. Heteroscedasticity Test

Conducted using the Glejser test to examine the consistency of variance in residuals.

These tests ensure the validity and reliability of the regression model.

Inferential Analysis

To test the research hypotheses, multiple linear regression analysis was employed. The regression model is expressed as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$$

where:

Y	= Students' learning outcomes
X_1	= Instructional model competence
X_2	= Learning media competence
β_0	= Intercept
β_1, β_2	= Regression coefficients
ε	= Error term

Hypothesis Testing

1. t-test (Partial Effect)

Used to determine the individual effect of each independent variable on the dependent variable.

2. F-test (Simultaneous Effect)

Used to assess the combined effect of independent variables on the dependent variable.

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3. Coefficient of Determination (R^2)

Used to measure the proportion of variance in the dependent variable explained by the independent variables.

Validity and Reliability

lthough the instruments were adapted from established sources, validity and reliability considerations remain essential:
-   Content validity was ensured by aligning items with theoretical constructs.
-   Reliability was assessed through internal consistency measures.
-   These steps enhance the credibility of the findings.

This study adhered to ethical standards in educational research. Participation was voluntary, and respondents were informed about the purpose of the study. Confidentiality and anonymity of participants were maintained, and data were used solely for research purposes.

RESULTS AND DISCUSSION

Descriptive Statistics

Descriptive statistics were employed to provide an overview of the distribution and central tendencies of the variables under investigation, namely teachers' competence in managing instructional models (X_1), teachers' competence in managing learning media (X_2), and students' learning outcomes (Y). These descriptive measures serve as a preliminary step in understanding the characteristics of the data prior to inferential analysis. The analysis revealed that the mean score for teachers' competence in managing instructional models (X_1) was within the moderate-to-high category, indicating that, on average, teachers demonstrated a relatively adequate level of competence in selecting, implementing, and evaluating instructional models. However, the standard deviation suggests some variability among respondents, reflecting differences in students' perceptions of teachers' instructional practices. This variability may indicate inconsistencies in the application of instructional models across classrooms. Similarly, the mean score for teachers' competence in managing learning media (X_2) also fell within the moderate-to-high range. This finding suggests that teachers generally possess the ability to utilize learning media effectively, although the presence of variation implies that not all teachers demonstrate the same level of proficiency. Some teachers may be more adept at integrating media into their instruction, while others may rely on more traditional approaches. In terms of students' learning outcomes (Y), the mean score indicates a moderate level of academic achievement. While this suggests that students are achieving satisfactory results, it also highlights room for improvement. The distribution of scores reveals that a proportion of students are performing below the expected standard, which may be associated with variations in instructional quality. Overall, the descriptive analysis underscores the importance of examining the relationship between teacher competence and

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student learning outcomes, as variability in instructional practices may contribute to differences in academic performance.

Normality Test

The normality test, conducted using the Kolmogorov-Smirnov method, indicated that the data were normally distributed ($p > 0.05$). This result suggests that the assumption of normality was satisfied, allowing for the application of parametric statistical techniques such as multiple linear regression.

Multicollinearity Test

The multicollinearity test was conducted using Tolerance and Variance Inflation Factor (VIF) values. The results showed that all tolerance values were greater than 0.10 and all VIF values were below 10, indicating the absence of multicollinearity among the independent variables. This finding confirms that teachers' competence in managing instructional models and learning media are distinct constructs and can be analyzed simultaneously without significant redundancy.

Heteroscedasticity Test

The heteroscedasticity test, conducted using the Glejser method, revealed no significant relationship between the independent variables and the residuals ($p > 0.05$). This indicates that the variance of the residuals is constant, satisfying the assumption of homoscedasticity. The results of these tests confirm that the regression model meets the necessary assumptions, thereby ensuring the reliability of subsequent analyses.

Multiple Linear Regression Analysis

To examine the influence of teachers' competence in managing instructional models and learning media on students' learning outcomes, multiple linear regression analysis was conducted. The regression equation can be expressed as follows: $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$

The results of the regression analysis indicate that both independent variables have positive regression coefficients, suggesting that improvements in teacher competence are associated with increases in students' learning outcomes.

Hypothesis Testing

1. Partial Effects (t-test)

The t-test results indicate that: Teachers' competence in managing instructional models (X_1) has a significant positive effect on students' learning outcomes ($t = 6.179$, $p < 0.05$). Teachers' competence in managing learning media (X_2) also has a significant positive effect on students' learning outcomes ($t = 8.147$, $p < 0.05$). These findings suggest that both variables independently contribute to improving student achievement.

2. Simultaneous Effect (F-test)

The F-test results show that the independent variables jointly have a significant effect on

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students' learning outcomes (F = 33.032, p < 0.05). This indicates that the combined influence of instructional model competence and learning media competence is statistically significant.

3. Coefficient of Determination (R²)

The coefficient of determination (R² = 0.452) indicates that 45.2% of the variance in students' learning outcomes is explained by the independent variables. The remaining 54.8% is attributed to other factors not included in the model, such as student motivation, socio-economic background, and school environment.

The Influence of Instructional Model Competence on Learning Outcomes

The findings of this study demonstrate that teachers' competence in managing instructional models has a significant positive effect on students' learning outcomes. This result reinforces the central role of pedagogical competence in shaping instructional quality and student achievement. From a theoretical perspective, this finding is consistent with constructivist learning theory, which emphasizes the importance of active engagement in the learning process. Instructional models that promote student participation, such as problem-based learning and inquiry-based learning, create opportunities for learners to construct knowledge through meaningful experiences. Teachers who are competent in implementing such models are better able to facilitate deeper learning and enhance students' cognitive development. However, the effectiveness of instructional models is not solely determined by their theoretical foundations but also by their practical implementation. The significant effect observed in this study suggests that teachers who demonstrate higher competence in managing instructional models are more effective in creating structured and engaging learning environments. These environments, in turn, support students' academic achievement. At the same time, the findings highlight the importance of moving beyond traditional, teacher-centered approaches. The continued reliance on lecture-based instruction may limit students' opportunities for active learning and critical thinking. Therefore, enhancing teachers' competence in diverse instructional models is essential for improving learning outcomes.

The Influence of Learning Media Competence on Learning Outcomes

The results also indicate that teachers' competence in managing learning media has a significant positive effect on students' learning outcomes. Notably, the effect of learning media competence appears to be stronger than that of instructional model competence, as indicated by the higher t-value. This finding underscores the growing importance of media integration in contemporary education. Learning media play a crucial role in facilitating understanding, particularly for complex or abstract concepts. By providing visual and interactive representations, media can enhance students' comprehension and retention of information. From the perspective of dual coding theory, the use of both verbal and visual information enhances cognitive processing. Similarly, cognitive load theory suggests that well-designed media can reduce extraneous cognitive load and improve learning efficiency. Teachers who are skilled in selecting and integrating appropriate media are therefore better equipped to support student learning. Nevertheless, the effectiveness of learning media depends on their alignment with instructional objectives. The

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results of this study suggest that when teachers demonstrate competence in managing media, they are more likely to use these tools in ways that enhance learning rather than distract from it.

The Combined Influence of Instructional Models and Learning Media

One of the key contributions of this study is the examination of the combined effect of instructional model competence and learning media competence. The results indicate that these variables jointly have a significant influence on students' learning outcomes. This finding supports the view that effective teaching requires the integration of multiple components. Instructional models and learning media should not be treated as isolated elements but as interconnected aspects of a cohesive instructional system. When these components are aligned, they create synergistic effects that enhance learning.For example, the use of interactive media within a student-centered instructional model can significantly increase student engagement and participation. Conversely, the use of media within a traditional lecture-based model may not fully realize its potential benefits. Therefore, the integration of instructional models and media is critical for maximizing their impact.

Interpretation of R² and Other Contributing Factors

The R^2 value of 0.452 indicates that nearly half of the variance in learning outcomes is explained by the independent variables. While this represents a substantial contribution, it also suggests that other factors play a significant role. These factors may include:

- Student motivation and learning strategie
- Socio-economic background
- School infrastructure
- Teacher-student relationships

This finding highlights the complexity of educational processes and the need for a holistic approach to improving learning outcomes.

Implications for Practice and Policy

The findings of this study have several important implications:

Teacher Professional Development

Training programs should focus on enhancing teachers' competence in both instructional models and learning media.

Instructional Innovation

Schools should encourage the adoption of student-centered teaching approaches supported by appropriate media.

Policy Support

Policymakers should provide resources and support for the integration of technology in education.

Limitations and Future Research

Despite its contributions, this study has limitations, including its reliance on a single school and the use of perception-based data. Future research should explore additional variables and employ more diverse methodologies.

CONCLUSION

Overall, the findings confirm that teachers' competence in managing instructional models and learning media plays a crucial role in improving students' learning outcomes. The integration of these competencies represents a key pathway for enhancing educational quality in secondary education.

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