

## The Effect of AI Mindset on the Pedagogical Competence of Teachers at Muhammadiyah Vocational High Schools in Sorong Regency

Muhamad Irlan Gustiana<sup>1\*</sup>, Indri Anugrah Ramadhani<sup>1</sup>, Firman<sup>1</sup>

<sup>1</sup>Information Technology Education, Universitas Pendidikan Muhammadiyah Sorong, Sorong, Indonesia

\*Corresponding Author: [muhamadirlangustiana@gmail.com](mailto:muhamadirlangustiana@gmail.com)

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### ABSTRACT

*This study investigates the influence of AI mindset on the pedagogical competence of vocational high school teachers at Muhammadiyah Vocational Schools in Sorong Regency. A quantitative research design was applied using a survey approach to examine the relationship between the research variables. Data were obtained through questionnaires administered to 36 teachers who met the predetermined research criteria. The analysis revealed that AI mindset has a positive and statistically significant relationship with teachers' pedagogical competence. The Pearson correlation analysis generated a correlation coefficient of 0.561 with a significance level of 0.000, indicating a moderate positive association between the two variables. Furthermore, the results of the simple linear regression analysis showed a regression coefficient of 0.616, suggesting that higher levels of AI mindset are associated with improved pedagogical competence among teachers. Additionally, the coefficient of determination ( $R^2$ ) was calculated at 0.315, meaning that 31.5% of the variation in teachers' pedagogical competence can be explained by AI mindset, while the remaining 68.5% is attributed to other variables not included in this study. These findings emphasize the importance of developing teachers' AI mindset as a strategic factor in strengthening pedagogical competence, particularly within the context of ongoing digital transformation and the increasing integration of artificial intelligence in educational practices.*

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## 1. INTRODUCTION

The rapid advancement of digital technology has significantly transformed many aspects of human life, including the field of education. One of the most influential technological developments in recent years is Artificial Intelligence (AI), which has attracted considerable attention from researchers and educators. The integration of AI into educational environments provides new opportunities to improve learning processes through adaptive, efficient, and data-driven instructional approaches [1]. Various AI-based applications, such as intelligent tutoring systems, learning analytics, and recommendation systems, allow educators to provide personalized learning experiences that are tailored to students' individual needs and learning characteristics [2]. These developments indicate that digital technology has become an essential component in the transformation of modern education systems [3]. In this context, teachers play a crucial role in ensuring that technological innovations can be effectively integrated into teaching and learning activities to improve the quality of education [4].

In the context of vocational education, particularly in Vocational High Schools (SMK), the use of technology becomes increasingly important. Vocational education is not only aimed at providing theoretical knowledge but also focuses on developing practical competencies that are relevant to the needs of the industrial sector [5]. Rapid technological advancements in industry require vocational education institutions to produce graduates who possess skills that are aligned with these developments [6]. Therefore, teachers are expected to design innovative learning activities supported by appropriate technological tools so that students can develop their competencies more effectively [7]. One of the essential competencies required for teachers to achieve this objective is pedagogical competence, which includes the ability to plan, implement, and evaluate learning activities in an effective and systematic manner [8].

In addition to professional competencies, teachers' readiness to adopt technological innovations is also influenced by psychological factors. One of the most widely discussed factors in educational research is mindset, which refers to how individuals perceive their abilities and respond to challenges and changes in their environment [9]. Teachers who possess a growth mindset tend to be more open to innovation and show a greater willingness to learn new technologies that can enhance their teaching practices [10]. With the increasing implementation of artificial intelligence in education, the concept of AI

mindset has emerged to describe an individual's readiness to understand, accept, and utilize AI technologies within professional practices [11]. Previous research also indicates that positive attitudes toward technology significantly influence the level of technology acceptance and its implementation in educational environments [12].

Several previous studies have examined the role of artificial intelligence in educational settings and its impact on teaching and learning processes. Research shows that the use of AI technologies can enhance learning effectiveness by supporting personalized learning environments when teachers possess sufficient technological competence [13]. Other studies emphasize that teachers play a central role in the successful implementation of AI because their perceptions and attitudes toward technology influence the level of technology adoption in the classroom [14]. In addition, institutional support, teacher competence, and digital literacy have been identified as important factors that determine the success of technology integration in education [15]. Empirical studies also indicate that the integration of digital technologies can support innovative learning practices and improve student engagement when teachers are prepared to utilize technological tools in instructional activities [16]. Teacher readiness and attitudes toward digital learning environments also influence the effectiveness of technology-based learning implementation [17]. Furthermore, recent studies highlight that teachers' digital competence and their ability to adapt to emerging technologies are essential for supporting the transformation of education in the digital era [18]. Other research has also explored the adoption of artificial intelligence in educational institutions and highlighted the importance of teacher involvement in ensuring effective technology implementation in learning processes [19]. In addition, systematic reviews of artificial intelligence in education demonstrate that AI has been widely studied in relation to learning analytics, intelligent tutoring systems, and automated feedback systems, indicating the increasing importance of AI technologies in educational research and practice [20].

Although previous studies have explored the integration of artificial intelligence and the role of teachers in technology adoption, most of these studies primarily focus on technological skills, digital literacy, or institutional readiness. Research that specifically examines the relationship between teachers' psychological readiness particularly in terms of AI mindset and pedagogical competence in managing the learning process remains relatively limited. Furthermore, empirical studies that investigate this relationship within the context of vocational education are still scarce. This limitation is especially evident in the context of vocational education in Indonesia, where studies related to the integration of artificial intelligence in teaching practices are still developing.

Therefore, this study aims to analyze the influence of AI mindset on the pedagogical competence of teachers at Muhammadiyah Vocational High Schools in Sorong Regency. The novelty of this research lies in examining the relationship between teachers' psychological readiness toward artificial intelligence and their pedagogical competence in managing learning processes within vocational education settings. Unlike previous studies

that mainly emphasize technological skills or digital literacy, this study focuses on teachers' cognitive and psychological perspectives toward artificial intelligence and how these perspectives influence pedagogical competence in the teaching process. The findings of this research are expected to contribute to the development of teacher competencies in responding to the transformation of technology-based education. In addition, the results of this study may serve as a reference for educational institutions in formulating strategies to strengthen teacher competencies so that they can adapt more effectively to the advancement of artificial intelligence technologies in the learning process.

## **2. RESEARCH METHOD**

This research applied a quantitative approach with a survey design to examine the influence of AI mindset on teachers' pedagogical competence. A quantitative approach was selected because it enables researchers to examine relationships between variables objectively through statistical analysis, allowing the research results to be presented in a systematic and empirical manner [21]. The research was conducted during the 2025–2026 academic period. Data were collected using a questionnaire instrument based on indicators representing the variables investigated in this study. The questionnaire employed a five-point Likert scale ranging from strongly disagree to strongly agree to measure respondents' perceptions related to AI mindset and pedagogical competence.

The study involved teachers who work at Muhammadiyah Vocational High Schools (SMK Muhammadiyah) in Sorong Regency. The population consisted of 36 teachers, and due to the relatively small population size, all members were included as research participants using a total sampling technique. Thus, the sample also consisted of 36 teachers, ensuring that the data represented the entire population. Data collection was conducted by distributing questionnaires through the Google Form platform.

The research instrument consisted of 23 questionnaire items divided into two variables. The independent variable, AI mindset, was measured using 11 items representing indicators such as teachers' understanding of artificial intelligence concepts, attitudes toward the use of AI technology in learning, and readiness to utilize AI tools in teaching activities. Meanwhile, the dependent variable, teachers' pedagogical competence, was measured using 12 items including indicators such as the ability to plan learning activities, implement the learning process, and evaluate learning outcomes.

The research procedure involved several stages, including problem identification related to the use of artificial intelligence in learning and its relationship with teachers' pedagogical competence, followed by a literature review to obtain theoretical references supporting the research variables. The questionnaire instrument was then developed and evaluated by an expert validator to assess the suitability of the items with the indicators of the research variables. Based on the validator's feedback, several items were revised to

improve clarity and relevance. After revision, the instrument was considered appropriate for data collection and distributed to respondents through Google Form.

The overall research procedure was then represented in the form of an algorithm to illustrate the research stages in a structured and systematic manner, starting from the planning stage until the data analysis process [22].

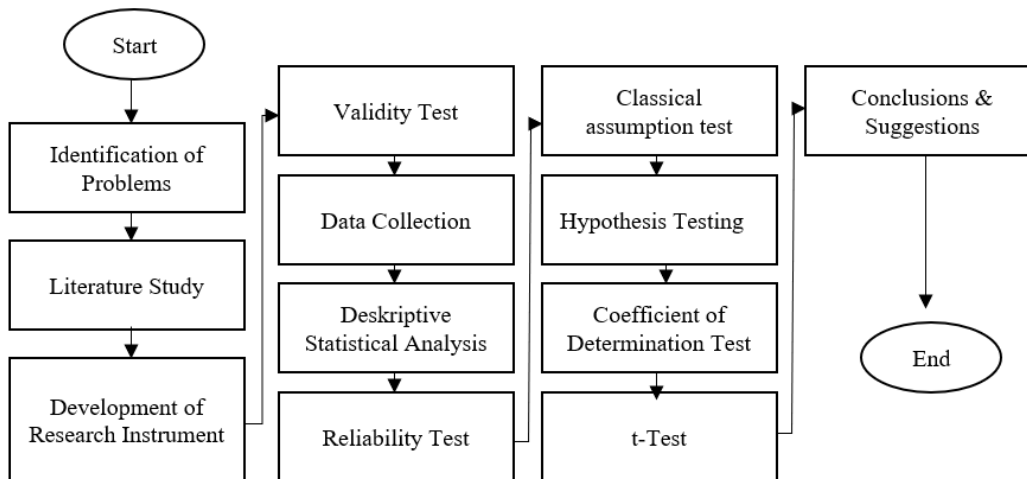


Figure 1. Flowchart of Research Methodology

The analysis of the collected data was conducted through several statistical procedures. Initially, descriptive statistical analysis was performed to summarize the main characteristics of the dataset. This step aimed to describe the overall distribution of responses for each research variable by calculating indicators such as mean values, percentages, and response patterns obtained from the participants.

Prior to conducting the main statistical analysis, the questionnaire instrument was reviewed by an expert validator to ensure that each item appropriately represented the conceptual indicators of the variables being investigated. The validator provided several recommendations related to wording and the relevance of specific statements. Based on these recommendations, a number of items were revised to enhance clarity and ensure better alignment with the research constructs.

After the data collection process was completed, the dataset was analyzed using the Statistical Package for the Social Sciences (SPSS). Classical assumption testing was conducted before performing regression analysis. Two tests were applied at this stage: the normality test and the linearity test. The normality test was used to determine whether the data distribution met the assumption of normality, while the linearity test was performed to verify that the relationship between the independent variable (AI Mindset) and the dependent variable (teachers' pedagogical competence) followed a linear pattern.

To examine the influence of AI mindset on teachers' pedagogical competence, this study employed simple linear regression analysis. This method allowed the researcher to estimate the contribution of the independent variable to changes in the dependent variable. In addition, the coefficient of determination ( $R^2$ ) was calculated to identify the proportion of variance in pedagogical competence that could be explained by AI mindset. The final stage of the analysis involved hypothesis testing using a t-test to determine whether the effect of AI mindset on pedagogical competence was statistically significant.

### 3. RESULTS AND DISCUSSION

#### 3.1. RESPONDENT CHARACTERISTICS

Table 1. Demographic Characteristics of Respondents

Characteristics	Category	Frequency	Percentage
Gender	Male	16	44.4%
	Female	20	55.6%
School	SMK Muhammadiyah Aimas	18	50%
	SMK Muhammadiyah Salawati	18	50%
Age	< 30 years	10	27.8%
	30 – 39 years	14	38.9%
	≥ 40 years	12	33.3%
Total Respondents		36	100%

The respondents in this study consisted of 36 teachers from SMK Muhammadiyah Aimas and SMK Muhammadiyah Salawati in Sorong Regency. In terms of gender, the respondents were dominated by female teachers (55.6%), while male teachers accounted for 44.4%. Based on age, most respondents were in the 30–39 years age group, followed by teachers aged 40 years and above, and those under 30 years old. These results indicate that the respondents involved in this study came from diverse demographic backgrounds.

#### 3.2. DESCRIPTIVE STATISTICAL TEST

Table 2. Descriptive Statistics of Research Variables

	N	Minimum	Maximum	Mean	Std. Deviation
AI MINDSET	36	32	49	38.47	3.273
Pedagogical Competence	36	41	58	46.17	3.598
Valid N (listwise)	36				

The descriptive statistical analysis shows that the study involved 36 teacher respondents. For the AI Mindset variable, the observed scores ranged from 32 to 49. The mean value was 38.47, accompanied by a standard deviation of 3.273, indicating a relatively consistent distribution of responses among participants. Regarding the Pedagogical Competence variable, the scores varied between 41 and 58, with an average value of 46.17 and a standard deviation of 3.598. This distribution reflects a moderate variation in the level

of pedagogical competence among the participating teachers. Overall, these descriptive findings suggest that teachers at Muhammadiyah Vocational High Schools in Sorong Regency demonstrate a generally adequate level of AI Mindset and pedagogical competence, which may support the effective implementation of teaching and learning processes in the classroom.

### 3.3. TEST THE VALIDITY OF THE INSTRUMENT

The research instrument used in this study was a questionnaire designed based on the indicators representing the variables of AI Mindset and teachers' pedagogical competence. Prior to its implementation for data collection, the instrument was subjected to a content validation process conducted by an expert validator with expertise in the field of education and learning technology. This validation process aimed to assess the relevance of each questionnaire item to the research indicators, evaluate the clarity of the wording, and determine whether the instrument was appropriate to be used in the study.

Based on the evaluation provided by the expert, several questionnaire items required revision to improve their clarity and ensure better alignment with the indicators of the research variables. The revisions were carried out in accordance with the recommendations given by the validator. After the improvement process was completed, the instrument was considered appropriate and ready to be used as the primary tool for collecting data in this research.

### 3.4. RELIABILITY TEST

**Table 3.** Research Instrument Reliability Test Result

Variable	Cronbach's Alpha	N of Items	Information
AI MINDSET	.688	11	Reliable
Pedagogical Competence	.646	13	Reliable

The reliability analysis indicated that the AI Mindset variable achieved a Cronbach's Alpha value of 0.688 based on 11 questionnaire items. Meanwhile, the Pedagogical Competence variable produced a Cronbach's Alpha coefficient of 0.646 from 13 items. Both coefficients are higher than the minimum reliability criterion of 0.60, which suggests that the instruments used in this study can be considered reliable. These results imply that the questionnaire items demonstrate acceptable internal consistency in measuring the AI Mindset and teachers' pedagogical competence variables.

### 3.5. NORMALITY TEST

**Table 4.** Normality Test Result

Statistic	df	Sig.	Statistic	df	Sig.
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AI MINDSET	.181	36	.065	.865	36	.098
Pedagogical Competence	.157	36	.024	.918	36	.173

a. Lilliefors Significance Correction

The normality test in this study was performed using the Shapiro–Wilk method since the number of respondents was fewer than 50. The analysis results indicated that the AI Mindset variable obtained a significance value of 0.098, while the Pedagogical Competence variable produced a significance value of 0.173. Since both significance values are higher than 0.05, it can be concluded that the research data follow a normal distribution.

### 3.6. LINEARITY TEST

**Table 5.** Linearity Test Result of AI Mindset on Pedagogical Competence

		Sum of Squares	df	Mean Square	F	Sig.
Pedagogical Competence*	Between Groups	(Combined) 246.092	10	24.609	2.973	.013
	Linearity	142.512	1	142.512	17.219	.000
AI MINDSET	Deviation from Linearity	103.580	9	11.509	1.391	.245
Within Groups		206.908	25	8.276		
Total		453.000	35			
		R	R Squared	Eta	Eta Squared	
Pedagogical Competence * AI MINDSET		.561	.315	.737	.543	

The results of the linearity test indicated that the significance value for Linearity was 0.000, which is lower than 0.05. This result demonstrates that a linear relationship exists between AI Mindset and teachers’ pedagogical competence. Furthermore, the Deviation from Linearity value was 0.245, which is higher than 0.05, confirming that the association between the two variables can be considered linear. These findings suggest that improvements in teachers’ AI Mindset are likely to be followed by increases in their pedagogical competence.

### 3.7. PEARSON CORRELATION TEST

**Table 6.** Pearson Correlation Result

		AI MINDSET	Pedagogical Competence
AI MINDSET	Pearson Correlation	1	.561**
	Sig. (2-tailed)		.000
	N	36	36
Pedagogical Competence	Pearson Correlation	.561**	1
	Sig. (2-tailed)	.000	
	N	36	36

Correlation is significant at the 0.01 level (2-tailed).

The Pearson correlation analysis revealed a correlation coefficient of 0.561 with a significance value of 0.000. Because the significance value is lower than 0.05, it indicates that a statistically significant relationship exists between AI Mindset and teachers' pedagogical competence. Furthermore, the correlation coefficient of 0.561 is classified as a moderate to strong correlation, suggesting that teachers with a higher AI Mindset tend to demonstrate higher levels of pedagogical competence.

### 3.8. SIMPLE LINEAR REGRESSION TEST

**Table 7.** Simple Linear Regression Result

Model	B	Std. Error	Beta	t	Sig.
1 (Constant)	22.449	6.025		3.726	.001
AI MINDSET	.616	.156	.561	3.950	.000

a. Dependent Variable: Pedagogical Competence

The results of the simple linear regression analysis produced the following regression equation:

$$Y = 22,449 + 0,616X \tag{1}$$

The regression analysis shows that the constant value is 22.449. This means that when the AI Mindset variable remains unchanged, the predicted value of teachers' pedagogical competence is 22.449. In addition, the regression coefficient for AI Mindset is 0.616, which implies that every one-unit increase in AI Mindset leads to an increase of 0.616 in teachers' pedagogical competence. These findings indicate that AI Mindset has a positive influence on teachers' pedagogical competence.

### 3.9. COEFFICIENT OF DETERMINATION TEST

**Table 8.** Coefficient of Determination (R<sup>2</sup>) Result

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.561 <sup>a</sup>	.315	.294	3.02192

a. Predictors: (Constant), AI MINDSET

b. Dependent Variable: Pedagogical Competence

The coefficient of determination analysis produced an R Square value of 0.315. This result suggests that 31.5% of the variance in teachers' pedagogical competence can be explained by the AI Mindset variable. Meanwhile, the remaining 68.5% is influenced by other factors that were not examined in this study. Therefore, it can be concluded that AI Mindset contributes meaningfully to the improvement of teachers' pedagogical competence.

### 3.10. T- TEST

Table 9. t-Test Result

Model	B	Std. Error	Beta	t	Sig.
1 (Constant)	22.449	6.025		3.726	.001
AI MINDSET	.616	.156	.561	3.950	.000

a. Dependent Variable: Pedagogical Competence

The results of the t-test analysis show that the AI Mindset variable produced a t-value of 3.950 with a significance level of 0.000. Because this significance level is lower than the conventional threshold of 0.05, the effect of AI Mindset on teachers' pedagogical competence can be considered statistically significant. These findings indicate that AI Mindset contributes meaningfully to the development of pedagogical competence among teachers at Muhammadiyah Vocational High Schools in Sorong Regency. Consequently, the proposed research hypothesis is supported, implying that teachers who possess a stronger AI Mindset are more likely to demonstrate higher levels of pedagogical competence during the teaching and learning process.

### 3.11. DISCUSSION

The findings of this study provide empirical evidence that AI Mindset plays a significant role in shaping the pedagogical competence of teachers at Muhammadiyah Vocational High Schools in Sorong Regency. The Pearson correlation analysis produced a correlation coefficient of 0.561 with a significance value of 0.000, indicating a statistically significant relationship between the two variables. This correlation falls within the moderate category, suggesting that teachers who demonstrate more positive perceptions and attitudes toward artificial intelligence tend to exhibit stronger pedagogical competence in the teaching and learning process. This result implies that teachers' perspectives toward emerging technologies may influence how effectively they design, implement, and evaluate learning activities.

The regression analysis further strengthens this finding. The regression coefficient of 0.616 indicates that an increase in teachers' AI Mindset is associated with an improvement in their pedagogical competence. In practice, teachers who are more open to artificial intelligence are more likely to adopt innovative instructional strategies and integrate digital tools into classroom activities. The t-test result ( $t = 3.950$ ;  $p = 0.000$ ) confirms that the relationship between AI Mindset and pedagogical competence is statistically significant, thereby supporting the research hypothesis.

Another important finding is reflected in the coefficient of determination ( $R^2 = 0.315$ ). This result indicates that AI Mindset explains 31.5% of the variance in teachers' pedagogical competence, while the remaining 68.5% may be influenced by other factors not included in this study. These factors may include teaching experience, professional development opportunities, institutional support, and teachers' level of digital literacy. Therefore,

pedagogical competence should be viewed as a multidimensional construct that is influenced by both technological attitudes and professional development factors.

In addition, the respondents' background may also contribute to the relationship between AI Mindset and pedagogical competence. The teachers involved in this study varied in terms of age, teaching experience, and subject specialization. Teachers with longer teaching experience or those who teach technology-related subjects may have greater exposure to digital tools and innovations in education. Such experience can influence their readiness to adopt artificial intelligence in learning activities. Therefore, demographic characteristics such as teaching experience and subject specialization may indirectly influence how teachers perceive and utilize AI technologies in the learning process.

These findings are consistent with previous studies which emphasize that the successful integration of educational technology depends on teachers' readiness and competence in using digital tools in the learning process [16]. Teachers who possess positive attitudes toward technology tend to be more capable of designing interactive learning environments and utilizing technology to enhance student engagement [17].

Furthermore, the rapid development of artificial intelligence in education provides new opportunities to improve learning effectiveness. AI technologies can support adaptive learning systems, provide automated feedback, and assist teachers in analyzing student learning data [18]. Previous research has also shown that AI-based tools can help teachers manage learning resources, monitor student progress, and develop more personalized learning strategies [19].

In the context of vocational education, the development of teachers' AI Mindset becomes increasingly important. Vocational schools are required to prepare students for a workforce that is highly influenced by technological transformation and digital innovation. Therefore, teachers must be able to integrate relevant technologies into the teaching process. Strengthening teachers' AI Mindset can help ensure that vocational education remains relevant to the needs of modern industry [20].

Overall, the results of this study highlight that fostering a positive AI Mindset among teachers may contribute to the improvement of pedagogical competence. Institutional support and professional development programs that focus on digital and AI literacy may help teachers adapt to technological changes and create more innovative learning environments.

#### **4. CONCLUSION**

The results of this study confirm that AI Mindset plays a significant and positive role in influencing the pedagogical competence of teachers at Muhammadiyah Vocational High Schools in Sorong Regency. Statistical analysis demonstrated a meaningful relationship between the two variables, as indicated by a correlation coefficient of 0.561 and a significance value of 0.000. These findings suggest that teachers who possess stronger

perspectives and readiness toward artificial intelligence tend to exhibit higher levels of pedagogical competence during the teaching and learning process.

The simple linear regression analysis further supports this conclusion. The regression coefficient of 0.616 indicates that improvements in teachers' AI Mindset are associated with increases in their pedagogical competence. In addition, the coefficient of determination ( $R^2 = 0.315$ ) shows that 31.5% of the variation in teachers' pedagogical competence can be explained by AI Mindset, while the remaining 68.5% is influenced by other factors not examined in this study.

These findings highlight the importance of strengthening teachers' AI Mindset as part of professional development efforts in the digital era. Educational institutions are therefore encouraged to provide training programs and professional development initiatives that enhance teachers' knowledge and skills in utilizing AI-based technologies to support effective teaching and learning practices.

However, this study has several limitations that should be considered. The number of respondents was limited to 36 teachers from Muhammadiyah Vocational High Schools in Sorong Regency, which may restrict the generalizability of the findings to broader educational contexts. In addition, this study only examined the influence of AI Mindset on teachers' pedagogical competence without considering other potential variables such as digital literacy, teaching experience, and institutional support.

Therefore, future research is recommended to involve a larger sample size and explore additional variables that may influence teachers' pedagogical competence in order to provide a more comprehensive understanding of teacher development in the era of digital transformation.

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