



The Effect of Digital Literacy, Innovative Attitudes, and Interpersonal Communication on Teacher Performance

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ABSTRACT

Objective: Assessing a teacher's performance may involve examining how much they have achieved the necessary competencies. This research investigates the effect of digital literacy, innovative attitudes, and interpersonal communication on teacher performance. **Method:** The statistical survey methodology was employed in this study in order to substantiate its findings. The researchers of this study employed the Partial Least Squares-Structural Equation Model (PLS-SEM) to derive the latent variable values. This investigation was conducted at a public elementary school in Serang City, in the Banten Province of Indonesia. The Serang City region in Indonesia is home to 14 public primary schools. The study sample comprised 14 school administrators and 236 public elementary school teachers in Serang City, Banten, Indonesia. The sampling technique was random sampling. The questionnaire functions as the instrument for gathering data in this study. **Results:** The research uncovered four noteworthy and statistically significant discoveries. One is that a direct relationship exists between digital literacy and innovative mindsets. A direct relationship exists between innovative mindsets and teacher performance. A direct relationship exists between digital literacy and interpersonal communication. Interpersonal communication and teacher performance exhibit a positive association. **Novelty:** This research is intriguing due to variations in emphasis, research participants, and incorporation of research factors compared to earlier studies. Previous research only examined digital literacy, innovative attitudes, interpersonal communication, and teacher performance. This research will combine digital literacy, innovative attitudes, interpersonal communication, and teacher performance into a single research topic.

INTRODUCTION

Assessing a teacher's performance may involve examining how much they have achieved the necessary competencies. Professional competence, personality competence, and educational competence comprise the four competencies (Ishak & Suyatno, 2020). Examining teacher performance is captivating despite its longstanding presence in educational research. Several educational academics have previously investigated the issue of teacher performance (Mailool et al., 2020). Teacher performance has a vital role in improving the quality of education through their efforts. Therefore, the topic of teacher performance has been a significant focus of research for educational academics up to the present time.

Furthermore, the current advancements in information technologies have facilitated transparency in implementing educational methods in schools. The availability of this information enhances the ease of monitoring teacher performance. In order to address teacher performance issues, all school leaders must exert significant effort. Teacher performance encompasses teachers' measurable actions and

behaviors that contribute to attaining school or organizational objectives (Wahab et al., 2020). Teacher performance refers to the demonstrated capacity of a teacher to fulfill their responsibilities at school, namely in the execution of instructional tasks (Suprayitno et al., 2022). The substandard performance of educators in acquiring knowledge and its subsequent impact on the caliber of education has been examined in several studies, including those conducted by (Firlianza & Suhardi, 2024 Shohib et al., 2024 Tang, 2020 Yuliandra et al., 2024). The caliber of teachers in Indonesia needs to improve, encompassing deficiencies in competence, knowledge, and pedagogical ability. The substandard quality of the teacher would adversely affect multiple aspects, such as pupils' academic performance and the learning process. Teachers play a vital role in establishing a learning atmosphere that motivates students to participate actively in educational tasks (Kanya et al., 2021).

Furthermore, to enhance the caliber of education, teachers need to possess a dependable and enduring comprehension of digital literacy. The teacher's lack of comprehension of digital literacy may adversely affect the learning process and academic achievement as stipulated by the school curriculum (Afriliandhi et al., 2022). The inconsistency and inadequate quality of educators are responsible for this. The teacher's inadequate expertise will adversely affect many factors, including the student's academic progress and learning trajectory. Educators have a vital role in establishing a learning atmosphere that fosters students' active participation in educational endeavors. The advancement of technology has significantly enhanced teachers' learning capabilities. Digital technology has made it easier to acquire information, dramatically facilitating the acquisition of knowledge and the implementation of effective teaching strategies. The presence of these diverse advantages presents both a prospect and a difficulty. There are opportunities to enhance the quality of learning and challenges for teachers to further develop their skills, particularly in mastering technological advancements (Dharma, 2022).

Teachers can utilize digital tools to efficiently arrange and manage learning projects, enabling them to promptly distribute assignments to pupils (Muntu et al., 2023). A robust positive association between teacher digital literacy and teacher performance (Afriliandhi et al., 2022; Dharma, 2022; Sappaile et al., 2023; Setyawan et al., 2022). Within the current educational context, the incorporation of technology has not only reshaped the conventional methods of teaching and learning but has also emphasized the crucial responsibility of educators in adjusting to a swiftly changing digital age. Different digital technologies enable people to transmit information using all four linguistic aptitudes, which is challenging for a modern society trying to foster fresh proficiencies. Colleges and universities are increasingly implementing digital literacy programs to equip students to effectively utilize digital tools and critically consume and create diverse content as digital technologies continue to shape teaching, learning, and research. In the advancing era of digitalization, the acquisition of social, cognitive, and technological skills is becoming increasingly crucial for effectively addressing the diverse challenges that emerge in the digital realm. The term used to refer to this particular knowledge and skill is digital literacy (Ko et al., 2022).

As per the research conducted by Reddy et al. (2022), digital literacy refers to an individual's skills, talents, and abilities to utilize digital technologies effectively. It also includes comprehending the standards and customs of properly utilizing pertinent digital technology. Alternative interpretations of digital literacy are more strongly associated with the vocabulary of media or multimedia literacy, highlighting the act of

consuming and producing media. Furthermore, some define digital literacy as the aptitude to choose and employ digital technologies corresponding to computer or information communication (ICT) literacy (Hall et al., 2014). According to Lukitasari et al. (2022), digital literacy refers to the competence in navigating, accessing, and evaluating online reading materials and the skills to store, share, and provide feedback on such materials, especially on social media platforms. According to Yildiz (2020), digital literacy refers to the capacity to utilize digital means to get and disclose information. Asserts that digital literacy encompasses the necessary abilities for persons in the 21st Century to effectively utilize digital tools to accomplish their goals in various life situations. Digital literacy enables individuals to effectively and judiciously utilize digital technology while cultivating a discerning approach to acquiring and analyzing information and digital content. When setting up digital communication, digital literacy skills can help enhance learning activities by offering recommendations, contributions, and stories relevant to certain learning subjects (Brata et al., 2022).

In the 21st Century, digital literacy has become an essential aspect of effective teaching. It involves the skills to navigate, assess, and ethically interact with digital information and resources. Simultaneously, it has become crucial to cultivate forward-thinking mindsets among educators, enabling them to enthusiastically adopt and integrate state-of-the-art technologies and teaching methods into their instructional strategies. Schools are structured educational establishments that must proactively anticipate progress and intensify competition by designing learning curricula that align with students' growth, society's evolution, and the skills these learners require. During educational endeavors, it is imperative for the teacher to effectively facilitate significant advancements in order to foster pupils' capacity for innovation (Ahyudin et al., 2021). The researchers conducted a study to consolidate and refine the factors utilized in past research based on four prior investigations (Christensen & Knezek, 2022; Han & Xu, 2020; Irwandi et al., 2023; Nurabadi et al., 2021) unlike prior studies that examined individual factors with distinct objectives, this study integrated digital literacy, innovative attitudes, and interpersonal communication variables to investigate their impact on teacher performance, revealing a correlation.

This research is intriguing due to variations in emphasis, research participants, and incorporation of research factors compared to earlier studies. Previous research only examined digital literacy, innovative attitudes, interpersonal communication, and teacher performance. This research will combine digital literacy, innovative attitudes, interpersonal communication, and teacher performance into a single research topic. The research aims to enhance teachers' digital literacy in schools to promote innovative attitudes and interpersonal interactions, ultimately leading to improved teacher performance in state elementary schools. This article offers detailed information on digital literacy, innovative attitudes, and interpersonal communication, which may impact the effectiveness of teachers in public schools. Researchers seek to analyze these factors' intricate intersections and mutual influences to gain valuable insights that can guide educational policies, professional development initiatives, and teaching strategies. The researcher formulated hypotheses based on the relationship between variables, in line with the established objectives.

1. Digital literacy and innovative attitudes have a positive correlation.
2. Innovative attitudes and teacher performance have a positive correlation.
3. Digital literacy and interpersonal communication have a positive correlation.
4. Interpersonal communication and teacher performance have a positive correlation.

RESEARCH METHOD

This study employed a statistical survey approach to ensure the accuracy of its results; in order to generate predictions, the researchers used the Partial Least Squares-Structural Equation Model (PLS-SEM) to determine the values of the hidden variables. Smart PLS and Structural Equation Modelling (SEM) research models were used to perform the study (Raghuram, 2024; Riana et al., 2021). Serang City, in the Indonesian province of Banten, is home to a public elementary school where the investigation occurred. Ten public elementary schools serve the residents of Indonesia's Serang City region. Fourteen school administrators and two hundred thirty-six primary school teachers from Serang City, Banten, Indonesia, comprised the research sample. A random approach was used to accomplish the sampling. Examine the procedures used to collect data by use of questionnaire surveys. Using WhatsApp, we distributed a digital survey to all school administrators using a Google Form. Researchers randomly selected teachers and principals, and then the principals distributed the information to them. The data for this investigation will be collected via the questionnaire. In order to gather information and data, researchers used surveys. Results from a Likert-scale survey were used in the study. One approach to conducting surveys using the Likert scale is to have respondents rate their degree of agreement using a scale from 1 to 5. Responders can be directly provided questionnaires through Google Form links. The study's sample was estimated to comprise 250 individuals. The questionnaire contains respondents' names and inquiries/statements about each assessed characteristic.

PLS path modeling was employed to analyze the data primarily because it can estimate all model parameters simultaneously, distinguishing it from regression. Previous research has substantiated this assertion (Riyadi et al., 2023). The current work utilizes Partial Least Squares Structural Equation Modelling (PLS-SEM) to assess the construct validity, discriminant validity, convergent validity, and composite reliability. The idea was explored using reliable PLS bootstrapping and Smart PLS multiple regression analysis. The research process commences with a needs analysis to prepare for research. It involves studying related literature, defining the problem, and selecting the research sample. The second step involves developing and preparing research tools that include digital literacy, innovative attitudes, interpersonal communication, and teacher performance assessments and testing these research scales. Following the scale trial results, the next step is to conduct research by distributing the scale to respondents. The data collected is analyzed to derive study findings. Figure 1 displays the flowchart used in this research.

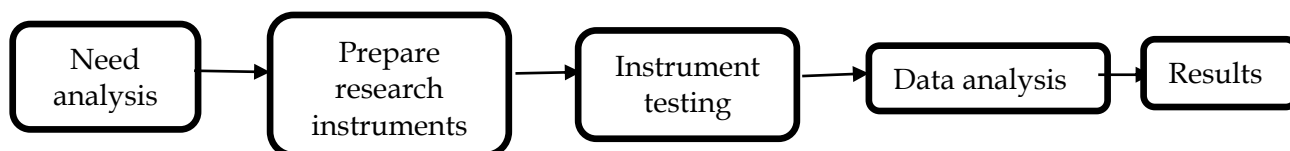


Figure 1. Flowchart of research procedure (Mulyana et al., 2024).

RESULTS AND DISCUSSION

Results

The study included 236 teachers and 14 school principals from 14 public elementary schools in Serang City, Banten Province, Indonesia. Respondent profiles encompass

gender, tenure, and educational qualifications. The participants' demographic characteristics are displayed in Table 1.

Table 1. Respondent profile.

Variable	Total	Percentage
Gender		
Man	150	60.000%
Woman	100	40.000%
	250	100.000%
Teachers		
Man	136	54.400%
Woman	100	40.000%
	236	94.400%
Principals		
Man	10	4.000%
Woman	4	1.600%
	14	5.400%
Principal's Educational Background		
Bachelor	10	4.000%
Master	4	1.600%
	14	5.400%
Teacher Education Background		
Bachelor	200	
Master	36	80.000%
	236	14.400%
		94.400%
Age (Principals)		
23-30	5	2.000%
31-40	7	2.800%
41-55	2	0.800%
	14	5.600%
Age (Teachers)		
23-30	20	8.000%
31-40	150	60.00%
41-55	66	26.400%
	236	94.400%
Period of Service (Principals)		
< 5 years	-	-
10 - 20 years	8	3.200%
20 - 30 years	6	2.400%
	14	5.600%
Period of Service (Teachers)		
< 5 years	20	8.000%
10 - 20 years	150	60.000%
20 - 30 years	66	26.400%
	236	94.400%

Statistical Analysis and Assessment of Normal Distribution

The question exclusively provides information in numerical format. Table 2 displays various normality measures and descriptive data for each item-level construct, including skewness, kurtosis, standard deviation, and mean. The descriptive statistics show that out of all the variables that make up DL, the one with the lowest mean value

is DL2, with a standard deviation of 1.227. On the other hand, DL1 has the most significant standard deviation at 0.875 and the highest mean value at 4.440. Elementary school teachers in Serang City have effectively included lessons on digital literacy in their lesson plans. Between an average of 3.960, a standard deviation of 1.122 (IA1), a maximum of 4.250, and a standard deviation of 0.921 (IA2), the IA value falls within a wide range. These results show how important it is for teachers to have an inventive mindset. With a mean of 3.980 and a standard deviation of 1.039 (IC33), the IC dimension (IC5) displays the most uniform distribution. The highest average and variability, with values of 4.060 and 1.047, respectively, were found in the IC4 dimension. Enhancing teacher performance can be achieved by cultivating their potential. Finally, yet importantly. The TP, mean, and standard deviation dimensions have a minimum value of 3.960 and 1.122 (TP3), respectively. The maximum values for these dimensions are 4.440 and 0.875 (TP1), respectively. These findings indicate that an elevated level of digital literacy and innovative attitudes among teachers will enhance the efficacy and quality of teaching in schools because proficient educators yield higher outcomes for their students.

Table 2. Statistical analysis and assessment of normal distribution.

Construct	Item	Mean	Min	Max	Standard Deviation	Excess Kurtosis	Skewness
DL	DL1	4.440	1.000	5.000	0.875	2.293	-1.630
	DL2	3.990	1.000	5.000	1.277	-0.389	-0.976
	DL3	4.000	1.000	5.000	1.275	-0.051	-1.074
	DL4	4.050	1.000	5.000	1.203	-0.341	-0.972
	DL5	4.210	1.000	5.000	1.098	0.904	-1.349
IA	IA1	3.960	1.000	5.000	1.122	0.072	-0.913
	IA2	4.250	1.000	5.000	0.921	0.553	-1.069
	IA3	4.020	1.000	5.000	1.157	-0.275	-0.904
	IA4	4.140	1.000	5.000	1.010	0.348	-0.996
	IA5	4.050	1.000	5.000	1.220	-0.405	-0.970
IC	IC1	4.050	1.000	5.000	1.226	0.361	-1.082
	IC2	4.020	1.000	5.000	1.049	-1.098	-0.780
	IC3	3.980	1.000	5.000	1.039	0.196	-0.828
	IC4	4.050	2.000	5.000	1.062	-0.842	-0.712
	IC5	4.060	2.000	5.000	1.047	-0.829	-0.705
TP	TP1	4.440	1.000	5.000	0.875	2.293	-1.630
	TP2	3.990	1.000	5.000	1.277	-0.389	-0.976
	TP3	3.960	1.000	5.000	1.122	0.072	-0.913
	TP4	4.250	1.000	5.000	0.921	0.553	-1.069
	TP5	4.050	1.000	5.000	1.126	0.361	-1.082
	TP6	4.020	1.000	5.000	1.049	-1.098	-0.780
	TP7	4.050	2.000	5.000	1.062	-0.842	-0.712
	TP8	4.060	2.000	5.000	1.047	-0.829	-0.705

Note: DL: Digital Literacy; IA: Innovative attitudes; IC: Interpersonal Communication; TP: Teacher Performance.

Measurement Model (Outer Model): Validity and Reliability

The measurement model identifies concurrent and convergent forms of validity. Convergent validity is assessed using three indices: peripheral loadings, average variance extracted (AVE), and composite reliability (CR). Table 3 and Figure 2 demonstrate that the measurement results are dependable. All sixteen outer loadings (0.705-0.955) exceed the significance threshold of 0.500 at the 0.05 significance level. Due to peripheral loadings below 0.500, seven items (DL3, DL5, IA3, IC3, TP3, and TP4)

were excluded from the study. Additionally, the findings indicated that the AVE values, which varied between 0.613 and 0.786, surpassed the minimum requirement of 0.50. (Adeleke et al., 2018; Henseler et al., 2016) Cronbach's alpha and composite reliability (CR) are recommended to be higher than 0.700. Table 3 shows that all structures have Cronbach's alpha and CR values higher than the critical value of 0.70.

Table 3. Convergent validity.

Construct	Item Code	Outer Loading	Cronbach Alpha	CR	AVE
DL	DL1	0.855	0.725	0.833	0.626
	DL2	0.808			
	DL4	0.704			
IA	IA1	0.822	0.701	0.826	0.613
	IA2	0.755			
	IA4	0.770			
IC	IC1	0.951	0.904	0.935	0.786
	IC2	0.700			
	IC4	0.916			
	IC5	0.955			
TP	TP1	0.722	0.935	0.949	0.760
	TP2	0.942			
	TP5	0.928			
	TP6	0.732			
	TP7	0.934			
	TP8	0.939			

Note: N = 250. DL: Digital Literacy; IA: Innovative attitudes; IC: Interpersonal Communication; TP: Teacher Performance

The test's discriminatory power was assessed using the Fornell-Larcker Criterion. The procedure contrasts the association between latent ideas with the square root of the AVE. It is reasonable to expect a latent construct to explain the variations in its indicator better than other latent constructs. Following the reasoning, it stands to reason that the square root of the AVE for each construct should surpass the AVE correlations between latent constructs. Thus, the construct exhibits sufficient discriminant validity due to its empirical uniqueness. In conclusion, convergent and discriminant validity evaluations show that the construct is adequately valid and reliable in the study model.

Table 4. Discriminant validity: Fornell-Larcker criterion.

	DL	IA	IC	TP
DL	0.783			
IA	0.764	0.791		
IC	0.617	0.504	0.872	
TP	0.602	0.487	0.887	0.993

Structural Model: Examination of the Impact of Interaction

The objective of structural model evaluations is to verify hypotheses concerning the statistical significance (t-values), the range of confidence intervals, and the relative significance (R²) of exogenous and endogenous variables. The bootstrap method was utilized in the computation of T-values and standard errors. The procedure involves producing 5,000 arbitrary samples and calculating the mean of the results.

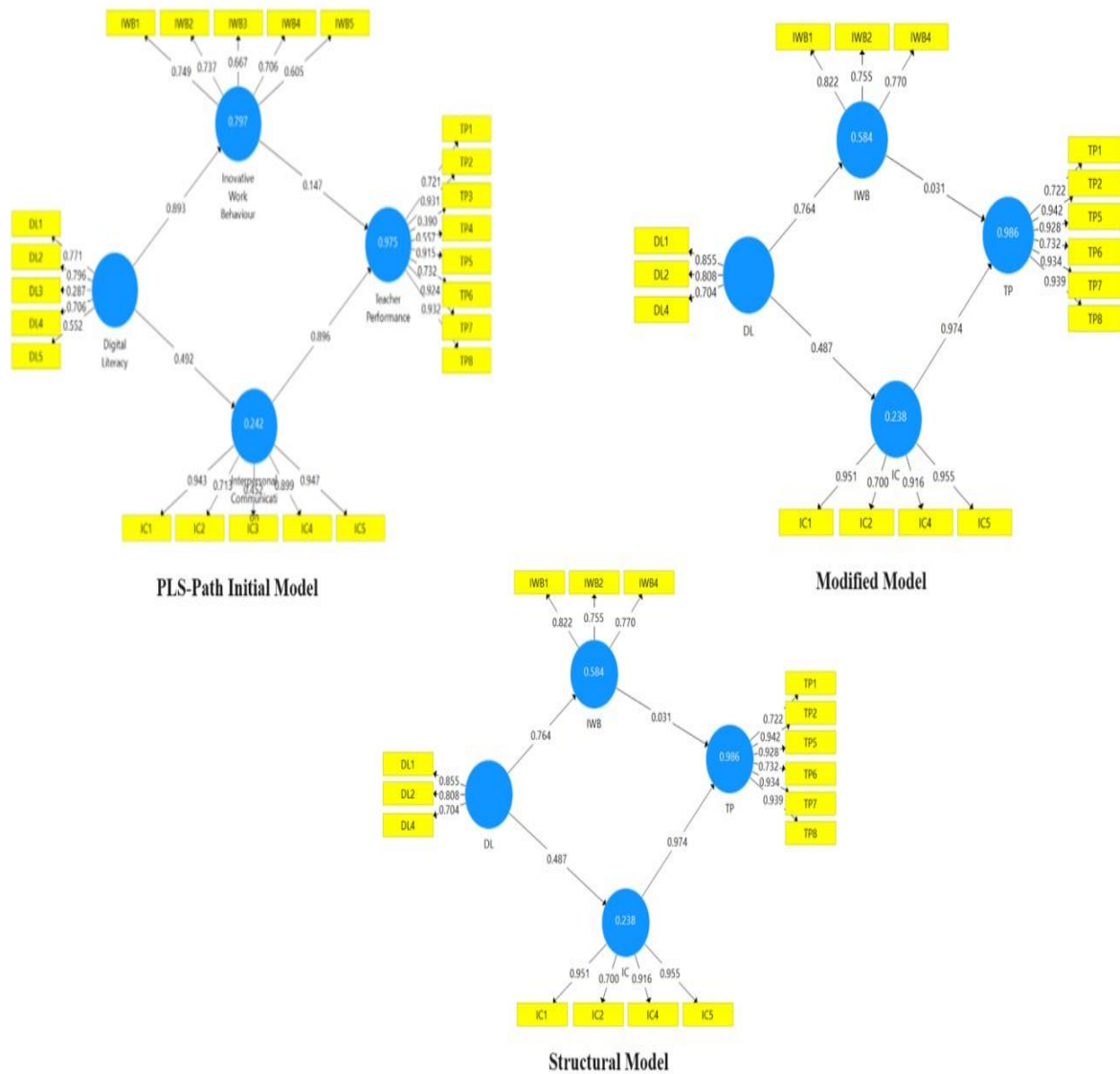


Figure 2. PLS-Path initial model, modified model, and structural model.

Figure 2 and Table 5 presented confidence intervals for the correlation between DL and IA, ranging from 0.702 to 0.798. The statistical significance of this link was high, with a beta coefficient (β) of 0.764 and a t-value of 32.077. These findings indicate that a standard deviation rise in DL was linked to a corresponding increase in IA. Therefore, we cannot dismiss H1.

Table 5. Hypotheses.

Hypothesis	Path	Std. Beta	Std. Error	t-value	Bias	Confidence Bias (2.500%)	Interval Corrected (97.500%)	Decision
H1	DL -> IA	0.471	0.072	6.254	0.018	0.286	0.565	Accepted
H2	DL -> IC	0.556	0.065	8.412	0.016	0.408	0.663	
H3	IA -> TP	0.208	0.044	4.654	0.003	0.114	0.283	
H4	IC->TP	0.831	0.039	21.535	-0.002	0.761	0.903	

In addition, there is a strong positive correlation between DL and IA, as shown by the statistically significant t-value of 6.254. Table 4 and Figure 2 show that the association's confidence interval ranges from 0.286 to 0.565. There is a 0.471 point rise in IA for every one standard deviation decrease in DL. Hence, H2 is supported by the evidence. The positive correlation between DL and IC is further supported by the β coefficient of 0.556. The t-value of 8.412 indicates that the correlation is statistically significant. Figure 2 and Table 4 demonstrate that the confidence intervals for the linkages vary between 0.408 and 0.663. According to the data, a result of 0.556 indicates a significantly positive correlation between increasing DL and increasing IC standard deviation. It provides statistical support for H3: An excellent educator will have a high IC. Since IC and TP are positively correlated, the data ultimately support H4. A t-value of 21.535 and a correlation coefficient (β) of 0.831 are presented. This correlation has a confidence interval of 0.761 to 0.903. According to the data, a rise of one standard deviation in IC positively correlates with a TP of 0.761.

The coefficient of determination (R^2) indicates how much of the variation in the dependent variable within the adjusted PLS path model can be explained by exogenous variables. By analyzing the structural model's standard errors, we may determine that DL may explain around 58.4% of the possible mild IA variability. Similarly, deep learning can detect about 23.8% of IC variations with some accuracy, albeit with very modest performance. In addition, there was a substantial link between DL and IA, as they accounted for 98.6% of the total TP variance. In addition, the model's performance on the blindfold test (Q^2) shows that it can adequately anticipate endogenous variables. In quantitative terms, DL is 0.308, TP is 0.179, and IC is 0.740. According to (Hair et al., 2017), if the Q^2 value is more than 0, the model has a solid predictive relevance.

Discussion

The current research examines the impact of digital literacy, innovative attitudes, and interpersonal communication on teachers' performance. The statistical analysis of the structural model reveals significant positive correlations between digital literacy and innovative attitudes, innovative thinking patterns, teacher performance, and digital literacy and interpersonal communication. The research findings indicate a positive association between interpersonal communication and teacher performance.

This study introduces four research hypotheses. This study has generated several significant discoveries. The empirical research is on the impact of digital literacy on attitudes towards innovation. This finding is consistent with prior research conducted by Pilav-Velić et al. (2021) and Sary (2023), demonstrating a favorable impact of digital competence and innovative work behavior. Teachers can enhance their proficiency in digital skills, foster creativity and problem-solving abilities, and cultivate self-reliance in studying and teaching through diverse digital technology. Considering the significance of digital literacy, educators can assist uninterested and reluctant students in actively participating and working together during classroom activities. Teachers can enhance individuals' cognitive and metacognitive autonomy and consciousness.

The second study demonstrates a direct association between innovative mindsets and teacher performance. Research findings indicate a strong and favorable correlation between innovative mindsets and teacher performance. The findings of this study align with the outcomes of prior studies that indicated a direct, positive, and significant impact of behavior on teacher performance (Purwanto et al., 2020; Sofiyan et al., 2022). Teachers with a creative growth mentality believe they may enhance their abilities

through dedication, diligence, and collaboration. Additionally, they place high importance on personal growth due to acquiring knowledge from innovative job conduct. It will cultivate their thinking, fostering a growth mindset receptive to difficulties. Each endeavor inherently carries the potential for failure. However, individuals with a growth mindset do not fear failing or making errors because they perceive these mistakes and failures as valuable opportunities for learning and personal progress.

The third study demonstrates a clear and direct positive association between digital literacy and interpersonal communication. Research findings indicate a direct relationship between digital literacy and interpersonal communication. The findings of this study align with the outcomes of prior research, indicating that digital technology has impacted the interpersonal communication abilities of Generation Y. Digital literacy refers to an individual's proficiency and competence in utilizing internet technology to discern and manipulate reliable information and successfully employ it for everyday tasks, professional endeavors, and educational pursuits within the classroom.

The fourth study demonstrates the beneficial impact of interpersonal communication on teacher effectiveness. Empirical evidence demonstrates a direct and favorable relationship between interpersonal communication and teacher performance. The outcomes of this study align with prior studies (Melianah et al., 2021; Mistiah et al., 2022; Susanti, 2021), indicating that enhancing interpersonal communication can enhance teacher effectiveness, enabling them to demonstrate their optimal abilities. Establishing effective interpersonal communication is crucial. The originality of this research lies in incorporating digital literacy, innovative attitudes, and interpersonal communication as variables to enhance teacher effectiveness. Prior studies have investigated the correlation between digital literacy and teacher performance and the relationship between interpersonal communication and teacher performance.

CONCLUSION

Fundamental Finding: According to the prior findings and discussion, the research uncovered four noteworthy and statistically significant discoveries. One is that a direct relationship exists between digital literacy and innovative mindsets. A direct relationship exists between innovative mindsets and teacher performance. A direct relationship exists between digital literacy and interpersonal communication. Interpersonal communication and teacher performance exhibit a positive association.

Implication: This research aims to enhance teacher performance in Indonesia by developing their digital literacy and interpersonal communication abilities. It will foster innovative attitudes among teachers, ultimately improving teacher performance. In addition, it is imperative for policymakers, such as school principals, to offer assistance and create chances for teachers to enhance their existing competencies. **Limitation:** In addition, this study had various research constraints. Due to time and money constraints, the research sample was restricted to school principals and instructors in Serang. Consequently, the study was only able to encompass some locations in Indonesia. **Future Research:** Research on the effects of digital literacy, innovative attitudes, and interpersonal communication on teacher performance is anticipated to be conducted at all levels of Indonesian education, not just primary education.

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