The Influence of Digital Literacy on Teachers' Technological Competence

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Abstract

Digital literacy aims to develop the ability to search for, evaluate, organize information, and complete tasks through digital devices and the internet in the context of learning, work, and social life. This study uses a quantitative method with Path Analysis statistics, employing purposive sampling technique for sample selection. The results of the study found that the direct influence of Information and Data Literacy on Technological Competence is not statistically significant with a value of 0.642. Communication and Collaboration on Technological Competence is statistically significant with $p = 0.016$. The indirect influence of Information and Data Literacy on Technological Competence through Security is not statistically significant with $p = 0.785$. Communication and Collaboration on Technological Competence through Security is not statistically significant with $p = 0.784$.

Keywords: *Digital Literacy, Technological Competence, Teachers*

Introduction

Digital literacy not only provides benefits in the fields of education and health but also extends to industry, economy, tourism, and various other sectors. Digital literacy skills, especially in mastering the internet, have now become essential to support the community's economy. This is evidenced by the rapid development of various online marketplaces (Widyastuti, Nuswantoro, & Sidhi, 2016). Digital literacy offers ten main benefits, including time effectiveness, accelerated learning, cost savings, security, easy access to the latest information, internet connectivity, ease in decision-making, stimulation of creativity, increased efficiency in work and study, and the ability to reach a wider world (Sumiati & Wijonarko, 2020).

Currently, digital media is used by people of all ages and generations. Digital media facilitates access to necessary information, efficient communication, job simplification, and shopping convenience, all of which have become very important during the COVID-19 pandemic as they can be accessed from home (Yulianti et al., 2021). In the field of education, digital literacy is very beneficial in helping students become more digitally literate. Teachers can help students prioritize technical skills in using digital tools and systems tailored to their learning needs (Admiraal et al., 2017).

For educators, more effective utilization of digital resources in the classroom will help students understand and develop awareness of broader considerations related to technology use and its impact (Falloon, 2020). Digital literacy encompasses the ability to search for, evaluate, organize information, and complete tasks through digital devices and the internet in the context of learning, work, and social life, becoming part of teachers' pedagogical competencies. Digital literacy becomes an integration process between literary knowledge, cultural literacy, and digital literacy. When this combination is applied to address local community issues, relevant local digital literacy can emerge and be implemented from kindergarten (Wei, 2022).

With the development of technology, various digital crimes and delinquencies are becoming increasingly prevalent. Data from the Indonesian Child Protection Commission in 2020 shows 103 reports of children victims of online sexual crimes, 9 reports of children as perpetrators of online sexual crimes, 91 reports of children victims of pornography and social media, 389 reports of children as owners of pornographic media, 46 reports of children victims of bullying on social media, and 13 reports of children as perpetrators of bullying on social media. Meanwhile, the Directorate of Primary Schools (2021) also found that 40% of child bullying cases occur online, including on social media. These figures are alarming and indicate the need for a collective effort to ensure that children in schools are not only able to use digital technology but also behave well and respect each other online.

Digital literacy is not just about the ability to operate digital devices in daily life. According to the Directorate of Primary Schools (2021), "digital literacy is one of the six basic literacies that students must master in today's era. Digital literacy implemented from elementary school is closely related to the implementation of the School Literacy Movement that the government has been running." The six literacies include: reading and writing literacy, scientific literacy, numerical literacy, digital literacy, financial literacy, and cultural and civic literacy. The current era of disruption brings rapid changes worldwide, with digital communication supported by social media presenting a significant challenge in the form of the rapid spread of hoax news (Tsaniyah & Juliana, 2019).

Digital literacy has become a crucial need for society to be able to filter and counter false information. Schools, through the competency of teachers as initial educational institutions for students, play an important role in introducing and teaching digital literacy. Through appropriate educational programs and educators' digital competencies, students can be equipped with critical skills to recognize, understand, and wisely manage digital information, allowing them to become responsible and intelligent technology users.

Theoretical Review

Nature of Literacy
Hobbs and Frost explain that to introduce literacy, the variety of texts used in the classroom must be expanded to include popular cultural artifacts. Literacy through the introduction of artifacts is useful for enhancing learning by making literacy practices relevant to students' home cultures and how they understand them (Hobbs, 2016). According to Fahrianur et al. (2023), literacy is a cognitive skill involving reading and writing activities, regardless of how these skills are acquired.

Digital Literacy
Wardhana (2020) states that digital literacy reflects an individual's conscious attitude towards the use and management of digital facilities, including building new knowledge and communicating with others. Digital literacy encompasses the individual's ability to use information and communication technology (ICT) in ways that benefit and avoid negative outcomes from digital engagement in all aspects of daily life, both now and in the future (UNICEF, 2019).

Digital literacy is highly focused on psychological and socio-psychological security issues, as well as ethical and legal aspects (Davydov et al., 2020). It includes issues such as internet addiction, cyberbullying, and understanding the implications of various information and communication operations, such as uploading photos and videos online. Additionally, digital literacy is related to issues of piracy, violations of intellectual property laws, and other digital infringements. Digital literacy is the ability to understand and use information from various digital sources without being influenced by core literacy competencies. The four core competencies of digital literacy are: internet searching, hypertext navigation, knowledge assembly, and content evaluation (Koltay, 2011).

Teacher Competence
Referring to the Regulation of the Minister of National Education No. 16 of 2007 on the Standards of Academic Qualifications and Teacher Competencies, there are four main competencies that serve as benchmarks for the quality of education in Indonesia: Pedagogic Competence, Personality Competence, Social Competence, and Professional Competence. These competencies are crucial for teachers in explaining complex instructions, classroom management, communication, problem-solving, as well as the assessment methods, techniques, and strategies that must be used to meet the demands of complex teaching (Peklaj, 2010).

Teacher competence is related to the execution of tasks as professional educators. Competent teachers are those who master the scientific substance of their subject areas and can conduct engaging learning activities, thereby sparking students' enthusiasm and motivation to learn (Purwoko et al., 2017). According to Mulyasa (2007), one of the sub-competencies of pedagogic competence is determining learning strategies based on student characteristics, the competencies to be achieved, and the teaching materials. Thus, improving pedagogic and professional competencies is essential to enhance student learning satisfaction, demonstrating the close relationship between teacher competence and student learning satisfaction.

In performing their duties, teachers have five competencies that cover all stages of collaborative learning implementation: the ability to plan student interactions, monitor, support, consolidate interactions, and finally reflect on the process (Kaendler et al., 2015). According to Peklaj (2015), competence consists of three levels: cognitive level (ability to think complexly, solve problems, and use knowledge in specific fields), motivational-emotional level (attitudes, values, and readiness to act), and behavioral level (ability to activate and use one's potential in complex situations).

Methodology

This study employs a quantitative method with Path Analysis technique. Purposive sampling was chosen as it is considered the most suitable for determining the informants for this research. Purposive sampling is a technique for sample selection based on

specific considerations to obtain in-depth information (Sugiyono, 2015).

Results and Discussion

Direct effects

		Estimate	Std. Error	z-value	p	95% Confidence Interval	
						Lower	Upper
Information and Data Literacy	→ Technological Competence	-0.023	0.051	-0.464	0.642	-0.123	0.076
Communication and Collaboration	→ Technological Competence	0.171	0.071	2.414	0.016	0.032	0.309

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Results of the Direct Effects in Path Analysis are as follows:

1. The Effect of Information and Data Literacy on Technological Competence. The results from the table indicate that the effect of Information and Data Literacy on Technological Competence is not statistically significant (p = 0.642). The estimated coefficient of -0.023 suggests a very small negative effect, and the 95% confidence interval includes zero, meaning there is no significant effect.
2. The Effect of Communication and Collaboration on Technological Competence. The results from the table show that the effect of Communication and Collaboration on Technological Competence is statistically significant (p = 0.016). The estimated coefficient of 0.171 indicates a fairly large positive effect. The 95% confidence interval [0.032, 0.309] does not include zero, indicating a significant and meaningful effect.

Overall, the table of direct effects shows that while Information and Data Literacy does not have a significant effect on Technological Competence, Communication and Collaboration has a significant positive effect on Technological Competence.

Indirect effects

|	Estimate	Std. Error	z-value	p	95% Confidence Interval	
					Lower	Upper
Information and Data Literacy → School Safety → Technological Competence	0.008	0.031	0.273	0.785	-0.052	0.069
Communication and Collaboration → School Safety → Technological Competence	0.015	0.054	0.274	0.784	-0.090	0.120

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Results of the Indirect Effects in Path Analysis are as follows:

1. Indirect Effect of Information and Data Literacy on Technological Competence through School Safety. The results from the table indicate that the indirect effect of Information and Data Literacy on Technological Competence through School Safety is not statistically significant (p = 0.785). The estimated coefficient of 0.008 suggests a very small positive effect. The 95% confidence interval includes zero, meaning that this indirect effect is not statistically meaningful.
2. Indirect Effect of Communication and Collaboration on Technological Competence through School Safety. The results from the table show that the indirect effect of Communication and Collaboration on Technological Competence through School Safety is also not statistically significant (p = 0.784). The estimated coefficient of 0.015 indicates a very small positive effect. The 95% confidence interval includes zero, meaning that this indirect effect is also not statistically meaningful.

Overall, the table shows that neither Information and Data Literacy nor Communication and Collaboration have significant indirect effects on Technological Competence through School Safety.

Subsequently, a path plot will be presented to visualize the coefficient results in the path analysis.
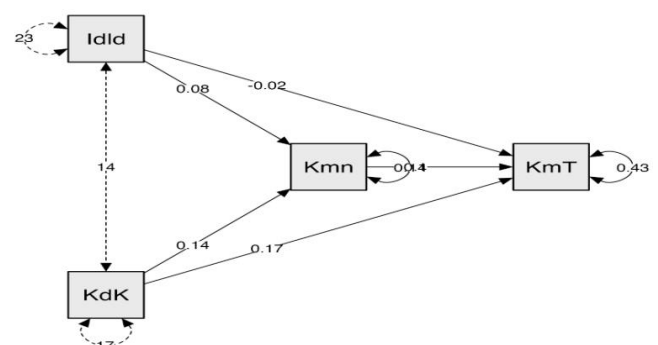
Note

Idld : Information and Data Literacy

Kmn : School Safety

Kdk : Communication and Collaboration

KmT : Technological Competence

Results of Path Analysis Based on the Provided Diagram:

1. Residual Variance of **Idld**. Has a positive effect on School Safety (0.08). Has a negative effect on Technological Competence (-0.02), but this effect is very small.
2. Residual Variance of **Kdk**. Has a positive effect on School Safety (0.14). Has a significant positive effect on Technological Competence (0.17).
3. Residual Variance of **Kmn**. Has a positive effect on Technological Competence (0.14).
4. Residual Variance of **Idld** and **Kdk**. There is a positive correlation (0.14), indicating that an increase in one variable may be associated with an increase in the other variable.
5. Residual Variance. Indicates that most of the variation in these variables is not explained by the model and may be due to other factors not included in this analysis.

Overall, this path diagram shows that Communication and Collaboration have a stronger and more significant effect on Technological Competence compared to Information and Data Literacy. School Safety also plays an important mediating role in influencing Technological Competence.

Conclusion

Information and Data Literacy does not have a significant effect on Technological Competence, whereas Communication and Collaboration have a significant positive effect on Technological Competence. Overall, neither Information and Data Literacy nor Communication and Collaboration have significant indirect effects on Technological Competence through School Safety.

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