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Analysis of teacher competence in enhancing student digital literacy in empowered secondary schools

Dameria Sinaga
Department of Educational Management, Universitas Kristen Indonesia, Jakarta, Indonesia

Abstract
Digital literacy has become one of the essential skills that students must possess to adapt to technological changes and the demands of the future workforce. The role of teachers as facilitators of digital learning is crucial in equipping students with critical, creative, and ethical skills in using technology. This study aims to explore the supporting and inhibiting factors faced by teachers in their efforts to enhance students' digital literacy, as well as to identify effective strategies for integrating digital literacy into the learning process in empowered secondary schools. The study employs a descriptive quantitative method, using path analysis techniques to examine the relationships between variables. The research sample was selected using purposive sampling, allowing researchers to choose the sample based on specific criteria relevant to the research objectives.

Keywords: Teacher competence, literacy, digital

Introduction

Teachers' digital competence faced a significant challenge at the onset of the pandemic. According to Sánchez-Cruzado *et al*. (2021) [19], only a few teachers were prepared to confront these changes in the first weeks of the pandemic. Those who managed to adapt were educators with strong digital skills, who continued the learning process with fewer obstacles. Educators across all levels of education were compelled to rapidly adapt teaching methods, lesson materials, and resources, shifting to online teaching on an unprecedented scale, commonly referred to as emergency remote teaching.

In developed countries, primary and secondary education curricula place considerable emphasis on the integration of information and communication technology (ICT) in schools. Digital competence is expected to be an integral part of teaching activities at all levels as a fundamental skill, with internet access provided both at home and in schools (Blikstad-Balas, 2015) [2]. Digital education is often described as a rapidly evolving field as new technologies emerge. This rapid change can be seen as either motivation or a challenge for educators (Zawacki-Richter & Jung, 2023) [25]. Digital literacy skills are crucial for educators because they significantly impact the classroom learning process. Unfortunately, many teachers use unverified information from the internet as teaching materials due to a lack of skills in sourcing accurate content (Diputra, Tristiantari, & Jayanta, 2020) [4].

While digital usage can bring positive impacts, it also presents significant risks. Digital technology is often exposed to harmful content such as violence, pornography, human trafficking, and cyberbullying (Mazdalifah & Sitepu, 2018) [17]. Another negative impact is moral erosion among teenagers, which can be observed in their clothing choices and language, inspired by their idols without consideration of good and bad norms (Kurniawan *et al*., 2023) [14]. Therefore, digital literacy is essential to be taught by teachers from elementary to secondary levels, enabling students to be trained in accessing, analyzing, and evaluating digital information wisely as needed (Yunitasari & Prasetya, 2022) [23].

Digital media plays a vital role in society, where the skills required to use internet technology are no longer limited to connecting devices, opening or downloading documents, and saving files, but also involve the ability to communicate and process information through speaking, reading, and writing (Luthfia *et al*., 2021) [16]. For adolescents, digital literacy provides significant benefits, helping them quickly take action in analyzing and comparing various information sources (Sumiati & Wijonarko, 2020) [20]. Digital literacy among middle school students refers to their ability to use ICT effectively and critically, to search, evaluate, process, and communicate online. Digital literacy is increasingly important as technology continues to evolve and becomes an inseparable part of daily life (Johanes, Suroyo & Budiastra, 2022) [13]. Several factors can influence middle school students' digital literacy (Hasanah, 2023) [9]:

1. Access to Technology
2. Awareness of Technology
3. Technology Usage Skills
4. Information Literacy
5. Digital Security Awareness
6. Responsible Usage

Improving digital literacy among middle school students can be achieved through collaboration between the government, educational institutions, parents, and the community. Steps such as integrating digital literacy into the curriculum, providing training for teachers and parents, and ensuring reliable access to devices and the internet can help enhance students' digital literacy (Dityasari *et al*., 2022) [5].

Digital literacy has become a fundamental skill that students must possess to adapt to technological changes and meet the demands of the future workforce. Teachers play a crucial role as digital learning facilitators, equipping students with critical, creative, and ethical skills in utilizing technology. However, not all teachers have sufficient professional competence to integrate digital literacy into the learning process. Therefore, this research is essential to identify the extent to which teachers' professional competence impacts the improvement of students' digital literacy, as well as to find effective strategies for developing this competence in

"Sekolah Penggerak" or transformative schools. The results of this study are expected to contribute to shaping more effective educational policies aimed at enhancing digital literacy among students and strengthening the quality of teaching in these transformative schools.

Theoretical Framework

Teacher Competency

Referring to Indonesia's Ministry of National Education Regulation No. 16 of 2007 on Teacher Academic Qualification and Competency Standards, there are four core competencies that serve as indicators of education quality in Indonesia: Pedagogical Competence, Personal Competence, Social Competence, and Professional Competence.

1. **Pedagogical Competence:** This competence includes teachers' abilities to manage and understand students in the learning process. Teachers must master educational theories to help students fully develop their potential (Sukmawati, 2019) [21].

2. **Personal Competence:** This competence refers to the behavior that teachers consistently exhibit in fulfilling their professional duties. Important personality traits include humility, forgiveness, honesty, energy, perseverance, discipline, creativity, empathy, openness, patience, and politeness (Lase, 2016) [15].

3. **Social Competence:** Social competence describes teachers' ability to interact effectively within the school environment and apply classroom instruction. Teachers should be able to communicate well with students, colleagues, principals, administrative staff, and the community (Huda, 2017) [11].

4. **Professional Competence:** This competence reflects teachers' ability to have an in-depth understanding of the subject matter. It encompasses mastery of their field, use of information and communication technology in teaching, and the ability to enhance the quality of learning (Nurtanto, 2016) [18].

Definition of Literacy

Hobbs and Frost suggest that when teaching literacy, the types of texts used in the classroom should expand to include popular cultural artifacts. Introducing literacy through cultural artifacts can enhance the learning process by connecting literacy practices to students' everyday culture and their ways of understanding it (Hobbs, 2016) [10]. According to Fahrianur *et al*. (2023) [7], literacy is a cognitive skill that includes reading and writing activities, regardless of how these skills are acquired. Ika (2018) [12] states that students' literacy intelligence is closely linked to reading ability, which in turn affects their capacity to analyze, think critically, and reflect on information. Although it is known that Indonesian students' literacy skills remain concerning, various factors contribute to their insufficient achievements in this area. Fahmi *et al*. (2021) [6] emphasize that introducing the basic concepts of literacy to students is a crucial step in developing cognitive and language abilities, including reading, writing, and numeracy skills, so they do not face difficulties in adapting to educational demands at school. Additionally, Dina *et al*. (2021) [3] explain that literacy and numeracy are interrelated skills involving the understanding, interpretation, and use of numbers and mathematical symbols to solve problems in various real-life contexts.

Benefits of Digital Literacy

There are ten key benefits of digital literacy, including increased time efficiency, accelerated learning processes, cost savings, enhanced security, easy access to up-to-date information, internet connectivity, simplified decision-making, encouragement of creativity, and the ability to work and learn more quickly while reaching a global audience (Sumiati & Wijonarko, 2020) [20]. Today, digital media is utilized across all age groups and generations, providing advantages in accessing necessary information, facilitating communication, easing workloads, and simplifying shopping—especially significant during the COVID-19 pandemic when access could be done from home (Yulianti *et al*., 2021) [24]. In education, digital literacy helps students become more technologically savvy, while teachers can guide them in prioritizing technical skills relevant to their learning (Admiraal *et al*., 2017) [1]. For educators, effectively using digital resources in the classroom can help students understand and consider the broader impact of technology use (Falloon, 2020) [8]. Digital literacy encompasses the ability to search, evaluate, and manage information, as well as complete tasks using digital devices and the internet in educational, occupational, and social contexts. It involves a blend of literary, cultural, and digital literacy knowledge, and when applied to address local community issues, it leads to localized digital literacy, which can be introduced from early childhood (Wei, 2022) [22].

Research Methodology

This study employs a descriptive quantitative method, using path analysis to examine the relationships between variables. The sample was selected through purposive sampling, allowing the researcher to choose participants based on specific criteria relevant to the research objectives. In this case, two top-performing junior high schools in Karawang Regency were chosen as subjects: SMP Negeri 1 Klari and SMP Tunas Utama. The selection of these schools is based on their academic achievements and strong reputation in providing quality education, making them expected to provide representative and relevant data for measuring the variables under investigation.

Results and Discussion

Profile of the Research Location

SMP Negeri 1 Klari and SMP Tunas Utama were selected as the best schools and later designated as "Sekolah Penggerak" (Driving Schools) in the first cohort of 2021. The Sekolah Penggerak Program is an initiative designed to realize Indonesia's educational vision, aiming to make Indonesia a sovereign, self-reliant, and character-rich nation by fostering the values of "Pelajar Pancasila" (Pancasila Students). This program focuses on improving students' overall learning outcomes, with an emphasis on developing basic competencies such as literacy and numeracy, alongside character strengthening. The development starts with enhancing the quality of human resources, including principals and teachers, considered the main drivers of change within schools. This program refines previous school transformation initiatives with a gradual approach to

advancing the quality of both public and private schools. The goal is for each school to progress one or two stages from its initial condition. The Sekolah Penggerak Program is implemented progressively and comprehensively, integrating with the surrounding environment so that all schools in Indonesia are ultimately expected to participate.

Teachers' Professional Competence

According to Article 28, Paragraph (3), Sub-point c of the National Education Standards, teacher professional competence is defined as the ability to comprehensively and deeply master learning materials and to develop professionalism through reflective actions. This mastery includes an in-depth understanding of teaching materials, which can then be implemented in the learning process. Digital literacy, an essential skill in today's digital era, involves the ability to find, use, create, understand, and analyze information critically, creatively, and reflectively. Digital literacy has become an integral part of teachers' professional competence because, as technology advances, educators are expected to integrate technology into teaching. This integration involves skills in creativity and innovation, communication, collaboration, critical thinking, problem-solving, and technology-based decision-making.

To assess teachers' digital literacy competence, a survey was conducted using a questionnaire distributed to teachers and students via Google Forms. Data analysis was performed using JASP software to determine the level of digital literacy competence. The questionnaire included several key indicators used to measure the related competencies:

1. Information and Data Literacy
2. Critical Thinking Skills
3. Communication Ability
4. Ethics in Technology Use
5. Personal Security
6. Device Security
7. Technology Use Skills

The questionnaire in this study was designed to provide a comprehensive overview of teachers' and students' proficiency levels in various aspects of technology and information use. The results of these measurements will serve as a basis for further developing teachers' professional competencies in the digital era, especially in enhancing the quality of learning in schools. The Direct Effects results were described as follows:

Direct effects

			Estimate	Std. Error	z-value	p	95% Confidence Interval Lower	Upper
X1	→	Y	-0.023	0.051	-0.464	0.642	-0.123	0.076
X2	→	Y	0.171	0.071	2.414	0.016	0.032	0.309

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

Explanation

X1 = Information and Data Literacy,
X2 = Communication and Collaboration,
X3 = School Safety Climate,
Y = Technology Skills

Overall, these results indicate that the mediator variable, Safety, does not play a significant role in bridging the relationship between Information and Data Literacy or Communication and Collaboration with Technology Skills. In this context, the relationships between these variables are more direct, without significant influence from the mediator variable, Safety.

Direct effects

			Estimate	Std. error	z-value	p	95% Confidence interval Lower	Upper
X1	→	Y	-0.023	0.051	-0.464	0.642	-0.123	0.076
X2	→	Y	0.171	0.071	2.414	0.016	0.032	0.309

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

Interpretation of Results

The interpretation of path coefficient results shows:

a. A positive relationship between Safety and Technology Skills (estimate 0.103), meaning that the higher the level of safety, the higher the technology skills.
b. A negative relationship between Information and Data Literacy and Technology Skills (estimate -0.023), indicating that as data literacy increases, technology skills decrease.
c. A strong positive relationship between Communication and Collaboration and Technology Skills (estimate 0.171), suggesting that higher levels of communication and collaboration enhance technology skills.
d. A positive relationship between Information and Data Literacy and Safety (estimate 0.082), indicating that as data literacy increases, safety also improves.
e. A positive relationship between Communication and Collaboration and Safety (estimate 0.142), suggesting that higher communication and collaboration improve the level of safety.

Conclusion

Based on the path analysis results, the following conclusions are drawn:

1. Safety has a positive relationship with Technology Skills, indicating that higher safety levels lead to better technology skills.
2. Information and Data Literacy has a negative relationship with Technology Skills, suggesting that increased data literacy correlates with decreased technology skills, warranting further analysis.
3. Communication and Collaboration have a significant positive relationship with both Technology Skills and Safety, indicating that effective communication and collaboration contribute to enhancing both technology skills and safety.

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