



E- ISSN: 2980-4760
P- ISSN: 2980-4752

DOI: 10.17613/cmjv-1386

Teachers' Digital Literacy and Self-Efficacy in Blended Learning

Jessa A. Garzon, MAEd

jessagarz92@gmail.com

Teacher III, Tomas Oppus Pilot School
SDO-Maasin City, Philippines

Julius R. Garzon, EdD

jgarzon3213@gmail.com

Master Teacher III, Ibarra National High School
SDO-Maasin City, Philippines

 **International Journal of Multidisciplinary Educational Research and Innovation** is an international peer-reviewed academic journal that highly values the importance of developing knowledge in multidisciplinary educational and innovative research. The journal's scope is broad, with the goals of disseminating information and providing a place for discussion, theoretical inquiry, practical applications, research discoveries, and experimentations in the field of education.

Recommended Citation

Garzon, J. & Garzon, J. (2023). Teachers' Digital Literacy and Self-Efficacy in Blended Learning. *International Journal of Multidisciplinary Educational Research and Innovation*. 1(4), 162-174. <https://doi.org/10.17613/cmjv-1386>.

Authors retain copyright. Articles published under a Creative Commons Attribution 4.0 (CC-BY) International License. This license allows this work to be copied, distributed, remixed, transformed, and built upon. An appropriate attribution is given, a link is provided to the license, and changes made are indicated.





TEACHERS' DIGITAL LITERACY AND SELF-EFFICACY IN BLENDED LEARNING

Jessa A. Garzon, MAEd¹, Julius R. Garzon, EdD²

¹Tomas Oppus Pilot School, SDO-Maasin City, Philippines

²Ibarrá National High School, SDO-Maasin City, Philippines



ABSTRACT

This study examines the relationship between technological profile, digital literacy, and self-efficacy among teachers in blended learning. The study utilized the descriptive-correlational design. The participants involved 35 teachers selected via purposive sampling from urban schools in Maasin City implementing printed and online teaching modalities. Standardized tools assessed teachers' digital technology profile, literacy, and self-efficacy. Significant findings revealed that teachers have easy access to digital technology, are somewhat familiar with technological concepts, often utilize ICT-based technologies, and perceive usage purposes as necessary. Teachers' digital literacy and self-efficacy are at the average level. Correlation analysis established a significant and strong relationship between the technological profile of teachers and their digital literacy. Digital literacy also significantly and strongly correlated with self-efficacy. This study concluded that the technological profile of teachers influences their digital literacy level. Teachers with high digital literacy skills increase their self-efficacy in technology integration. The blended learning approach constitutes teachers' digital literacy and self-efficacy as critical players of effectiveness.

Keywords: digital literacy, self-efficacy, blended learning, digital technology, correlation

Received: August 2023

Revised: September 2023

Accepted: October 2023

Available: November 2023

INTRODUCTION

The digital economy is at the center of the 21st century, and everyday practices have significantly changed due to digital technologies. In this age of digitalization, possessing digital skills is crucial for individuals to keep up with the swiftly evolving digital demands, and teachers are no exception. As education has shifted to the new standard, virtual platforms have become indispensable in the workplace. For teachers, being digitally literate involves having proper access, familiarity, utilization, and understanding of digital technologies. These fundamentals are essential for teachers to navigate pedagogies incorporating technology in blended learning and actively participate in virtual professional activities. Previous observations of teachers revealed that many lack self-confidence in their technological background, impacting their willingness and confidence to undertake technology-driven tasks like creating reports and fulfilling professional commitments. This research claims that teachers' technological proficiency is closely connected to their digital literacy, which, in turn, is influenced by their self-efficacy in effectively delivering blended learning in the new everyday context.



Authors retain copyright. Articles published under a Creative Commons Attribution 4.0 (CC-BY) International License. This license allows this work to be copied, distributed, remixed, transformed, and built upon for any purpose provided that appropriate attribution is given, a link is provided to the license, and changes made were indicated.

Globally, there has been a significant focus on research on digital literacy. Greene, Yu, and Copeland (2014) underscored that being digitally literate involves searching and managing information and critically evaluating and integrating digital data. While contemporary students are often perceived as proficient with technology, many need help utilizing it efficiently. The authors assert that students must develop competencies in planning, monitoring, and controlling information. Additionally, Area-Moreira, Bonilla, and Mesa (2020) found that teachers' main reluctance arises due to insufficient technological resources, accessibility challenges, and schools not being well-equipped for multimedia learning settings. Perceptions reinforce these resistances, often shaped by teachers' traits and motivation. They affect their perception of effectiveness and the practical integration of Information and Communication Technology (ICT) in their teaching approaches. However, while this literature focuses on conceptual definitions, scale development, and relevance to different aspects, more empirical and correlational evidence should be found regarding teachers' digital literacy and self-efficacy. While most existing research centers on students' digital skills, teachers' digital literacy may remain a peripheral concern. Therefore, establishing new research evidence that explores the close connection between digital literacy levels and the efficacy of technology use, especially in the context of blended learning, is imperative.

In the Philippine context, there has been a focus on advancing digital literacy, although there has yet to be a comprehensive implementation or complete institutionalization. The Department of Education (DepEd) has initiated ICT efforts such as the Learning Resource Management and Development System (LRMDS) and an ICT literacy program spanning various education levels. Additionally, DepEd has executed a computerization program (DCP) aimed at facilitating e-learning and supplying schools with essential technology. In 2021, DepEd introduced the DepEd Commons, the DepEd Learning Management System (DLMS), distributed DepEd 5G SIM cards, and launched the DepEd Project Be Techie in School (B.T.S.) 2.0 in collaboration with Microsoft Philippines. In the Maasin City Division, virtual platforms, especially in the new normal, have become a prevalent practice to ensure that learners can engage with more than just printed materials. Additionally, teachers' professional learning and development now predominantly occur virtually. However, many teachers remain uncomfortable with this approach due to their low digital literacy. Ng (2012) supports the idea that individuals with higher digital literacy find it easier to adapt to new developments. Despite the calls for contemporary teachers to possess solid digital literacy, there still needs to be more training on digital technology usage in blended learning, which can impact their interest, confidence, and capability to apply these tools effectively.

The idea for this research investigation originated in light of the current situation and the identified gap in digital literacy knowledge. Employing a quantitative approach, this study aims to evaluate teachers' digital literacy skills and their levels of self-efficacy. Considering all these elements, it is timely to carry out this research to offer evidence-based guidance for interventions based on data or policy suggestions that can tackle the digital literacy requirements of teachers, thereby improving their capacity to deliver successful blended teaching and participate effectively in virtual work-related tasks.

Research Questions

1. What is the technological profile of teachers in terms of:
 - 1.1 access to digital technologies;
 - 1.2 Familiarity with a selection of technological concepts;
 - 1.3 Utilization of digital technologies; and
2. What is the digital literacy level among teachers in implementing blended learning in terms of:
 - 2.1 cognitive dimension;
 - 2.2 technical dimension; and



Authors retain copyright. Articles published under a Creative Commons Attribution 4.0 (CC-BY) International License. This license allows this work to be copied, distributed, remixed, transformed, and built upon for any purpose provided that appropriate attribution is given, a link is provided to the license, and changes made were indicated.

- 2.3 socio-emotional dimension?
3. What is the level of teachers' self-efficacy towards integrating technology in terms of:
 - 3.1 Cognition;
 - 3.2 Confidence; and
 - 3.3 Capability?
4. Is there a significant relationship between teachers' technological profile and digital literacy?
5. Is there a significant relationship between teachers' digital literacy and their self-efficacy levels?

RESEARCH METHODOLOGY

Research Design

This quantitative study used a descriptive-correlational design. Descriptive-correlational studies describe the variables and the relationships that occur naturally between and among them. The descriptive aspect of this study looked into the assessment of digital literacy skills and self-efficacy levels among the participants. According to Seers and Crichton (2001), descriptive research describes what exists, determines the frequency with which it occurs, and categorizes the information.

Likewise, this study attempts to correlate the identified significant variables to see if the significance and strength of the relationship exist between them. According to Walker (2005), correlational studies involve systematically investigating the nature of relationships, or associations between and among variables, rather than direct cause-effect relationships. Furthermore, this design utilized a non-experimental method wherein a researcher measures two variables and understands and assesses the statistical relationship between them.

Research Respondents

The respondents of this study involved selected elementary and secondary teachers from urban schools implementing blended teaching modality in Maasin City Division, Southern Leyte, Philippines. These teachers are engaged in printed modules and online teaching strategies either in synchronous or asynchronous methods using digital platforms such as Google Classroom, Email, Facebook, messenger, and virtual instruction via Zoom or Google Meet. In selecting respondents, purposive random sampling was used. Selection criteria for respondents include technology utilization for online teaching, urban type setting, and internet availability. In quantifying the sample, six (6) schools were picked randomly from among twelve (12) identified urban schools implementing blended learning, where 20% of total teachers per school were taken. Thirty-five (35) teachers were derived as a sample. According to Gay & Diehl (1992), for descriptive and correlational studies, at least 10-20% of the population is acceptable, and at least 30 subjects are enough to establish a relationship.

Research Instrument

For data collection, this study employed standardized instruments. To evaluate teachers' digital technology profile and digital literacy skills in blended learning implementation, the study adapted the tool standardized in Ng's (2012) study. A 5-Likert scale, ranging from 1 (Very Difficult) to 5 (Very Easy), was used to assess access to digital technologies. Similarly, a 5-Likert scale, ranging from 1 (Not at all Familiar) to 5 (Extremely Familiar), was utilized to evaluate familiarity with selecting technological concepts. ICT-based technologies were also measured on the same 5-Likert scale, ranging from 1 (Never Utilized) to 5 (Always Utilized). Lastly, to gauge the importance of using different web-based technologies, a scale adapted from Kennedy et al. (2008) was applied, ranging from 1 (Not Important) to 5 (Very Important).



Authors retain copyright. Articles published under a Creative Commons Attribution 4.0 (CC-BY) International License. This license allows this work to be copied, distributed, remixed, transformed, and built upon for any purpose provided that appropriate attribution is given, a link is provided to the license, and changes made were indicated.

To assess the digital literacy level of teachers, this study adapted a standardized questionnaire from Ng's (2012) study called the Digital Literacy Scale. This tool comprises three (3) sub-dimensions and ten (10) items. Respondents must rate the items on a Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The level of digital literacy was interpreted using a range of scores adapted from Bayrakci and Narmanlioglu's (2021) study.

On the other hand, the teachers' self-efficacy level was measured using an adapted tool developed by Wang, Ertmer, and Newby (2004) called Self-efficacy Towards Integrating Technology in Teaching. This Likert scale survey consists of fifteen (15) statements and is identified as a proven, valid instrument for measuring self-efficacy in integrating technology for learning. Indicators were categorized into three dimensions: cognition, confidence, and capacity, each of which has five (5) items to respond to. Furthermore, slight modifications were incorporated to align with this research's needs, context, and purpose.

Data Analysis

The following statistical tools were used to analyze the gathered data in order to address the study's queries:

A percentage score was employed to analyze and describe the digital literacy level of the teachers.

The arithmetic mean was used to describe the level of access to technology, familiarity with technological concepts, the level of utilization, purposes of usage, and the self-efficacy level of teachers. Standard Deviation was used to measure the degree of dispersion or spread of responses in the survey or assessment of teachers on technological profile and their self-efficacy level.

Pearson's R was used to test the significance and strength of the relationship between technological profile, digital literacy, and teachers' self-efficacy.

RESULTS AND DISCUSSION

The Access to Digital Technologies

Teachers' access to technologies (Table 1) illustrates their capacity to acquire or utilize digital tools to streamline their teaching competencies while implementing blended learning.

Table 1. Teachers' Level of Access to Digital Technologies

Digital Technologies	Mean	Level of Accessibility	Over-all Mean	SD	Over-all Interpretation
Mobile Phone	4.83	Very Easy to Access			
iPod/MP3/MP4	3.34	Neutral			
Laptop	4.71	Very Easy to Access	4.16	.89	Easy to Access
Smart TV	4.26	Easy to Access			
Projector	3.66	Easy to Access			

Legend: 4.50-5.00 (Very Easy to Access), 3.50-4.49 (Easy to Access), 2.50-3.49 (Neutral), 1.50-2.49 (Difficult to Access), 1.00-1.49 (Very Difficult to Access)

The results revealed that mobile phones and laptops are two primary digital tools teachers find accessible. This suggests that these technologies are readily available and essential for teachers' daily teaching activities. In contrast, teachers expressed a neutral stance regarding the accessibility of iPod/MP3/MP4 technologies, indicating indecision about their use in the classroom, as these devices are not commonly used for teaching purposes. On the other hand, teachers have easy access to Smart TVs and projectors, as these technologies are typically available in schools for instructional purposes.



Authors retain copyright. Articles published under a Creative Commons Attribution 4.0 (CC-BY) International License. This license allows this work to be copied, distributed, remixed, transformed, and built upon for any purpose provided that appropriate attribution is given, a link is provided to the license, and changes made were indicated.

On average, teachers generally find it easy to access digital technologies, as these tools are essential for their teaching needs. According to Beurer-Zuellig and Meckel (2008), digital technologies offer several advantages for collaborative work, including automatic communication review and archiving, simplification of team coordination and task management, faster processes, improved accessibility, and a source of up-to-date information.

Familiarity with the Selection of Technological Concepts

In modern times, teachers, as digital users, have to be familiar with varied technological concepts. This familiarity was assessed to determine teachers' awareness of the existing platforms and software that would aid them in delivering blended learning.

Table 2. *Familiarity with Selection of Technological Concepts*

Technological Concepts	Mean	SD	Description
Youtube	4.57	0.73	Extremely Familiar
Facebook	4.77	0.49	Extremely Familiar
Google. docs	4.17	0.89	Moderately Familiar
Movie maker	3.46	1.17	Somewhat Familiar
Photoshop	3.11	1.11	Somewhat Familiar
Digital Story	2.86	1.12	Somewhat Familiar
WebQuest	2.63	1.11	Somewhat Familiar
ePortfolio	2.66	1.21	Somewhat Familiar
Wiki	2.80	1.18	Somewhat Familiar
Blog	3.00	1.84	Somewhat Familiar
OVER-ALL MEAN		3.402	
OVER-ALL INTERPRETATION		SOMEWHAT FAMILIAR	

Legend: 4.50-5.00 (Extremely Familiar), 3.50-4.49 (Moderately Familiar), 2.50-3.49 (Somewhat Familiar), 1.50-2.49 (Slightly Familiar), 1.00-1.49 (Not at all Familiar)

The results indicated that YouTube and Facebook are highly familiar to teachers, suggesting they use these platforms frequently. On the other hand, Google Docs is only moderately familiar to teachers, as it is not extensively utilized in their daily teaching practices. The remaining technological concepts introduced are somewhat familiar to teachers, as they are not regular users of these tools and have limited exposure. Teachers may have some awareness of these concepts but still have questions and insufficient knowledge about how to use them in their teaching strategies effectively. Teachers lack substantial exposure to other technological concepts, which can be attributed to the challenges of understanding technical aspects and the limited opportunities to gain expertise in these areas. According to Blaskó et al. (2021) and Di Pietro et al. (2020), numerous educational institutions exhibit a deficiency in expertise and limited digital capabilities, expanding disparities, inequalities, and declining learning outcomes. The necessity for schools to acquire and build upon the experience has arisen from these outcomes, aiming to boost their digital capacity (European Commission, 2020) and elevate their levels of digitalization (Costa et al., 2021).

The Level of Utilization of Digital Technologies

Effective use of digital technologies in teaching demands the teachers have a good level of expertise in the technical and pedagogical aspects. Thus, the level of utilization among teachers was captured to assess teachers' ability to understand and utilize ICT-based technologies.



Authors retain copyright. Articles published under a Creative Commons Attribution 4.0 (CC-BY) International License. This license allows this work to be copied, distributed, remixed, transformed, and built upon for any purpose provided that appropriate attribution is given, a link is provided to the license, and changes made were indicated.

Table 3. *The Level of Utilization of Digital Technologies*

ICT-based Technologies	Level of Proficiency	SD	Description	Mean	Overall Description
Word Processor	4.23	1.31	Often Utilized	3.75	Often Utilized
PowerPoint	4.06	1.11	Often Utilized		
Spreadsheet	3.74	1.24	Often Utilized		
Video Editing	3.49	1.04	Sometimes Utilized		
Photo/Image	3.23	1.03	Sometimes Utilized		

Legend (adopted from Vagias, 2006): 4.50-5.00 (Always Utilized), 3.50-4.49 (Often Utilized), 2.50-3.49 (Sometimes Utilized), 1.50-2.49 (Rarely Utilized), 1.00-1.49 (Never Utilized)

On average, teachers often utilize ICT-based technologies, indicating they possess a certain level of proficiency in these technologies. However, not all of these technologies are fully employed by teachers in creating materials for blended learning. This implies that teachers may excel in using Microsoft software but not as proficient in video or photo editing. This highlights the need for teachers to enhance their skills to fully harness the potential of these tools to enhance their teaching practices in the context of effective blended learning through technology. Teachers should take advantage of digital technologies, as they offer opportunities to facilitate blended, online, and mobile learning (Tulinayo et al., 2018). Research also suggests that school teachers should involve students in a more comprehensive application of technological concepts and resources that align with their learning abilities and targeted goals (Abouelnaga et al., 2019).

The Digital Literacy Level among Teachers

The digital literacy self-assessment aims to capture teachers' ability and understanding of technology-aided instruction. Knowing where teachers stand in this digital era is essential to establish the baseline of teachers' digital literacy across dimensions.

Table 4. *The MPS Results on the Digital Literacy Level*

Dimension	Mean Percentage Score	Level
Technical	72.67	Average
Cognitive	74.86	Average
Socio-Emotional	84.57	Above Average / Good
Overall Mean & Interpretation	77.37	Average

Legend: 91-100% (High/Perfect), 81-90% (Above Average/Good), 71-80% (Average), 61-70% (Below Average/Weak), 50-60% (Low/Poor)

The digital literacy level of teachers is currently considered average. While teachers may be socially and emotionally capable when using technology for various purposes, their cognitive and technical skills in utilizing digital technologies, whether web-based or ICT-based, are not sufficiently developed to maximize their effectiveness in blended learning. Teachers appear to lack mastery and a deeper understanding of the concepts and application of digital technologies. They may have acquired some technological know-how through their experiences and observations. However, they cannot fully justify their use in the classroom, especially when dealing with unfamiliar ICT-based or web-based concepts. This requires additional opportunities to explore various forms and types of technology.

Ocak and Karakuş (2018a) argue that digital literacy deserves attention because it can transform teachers into creative, innovative, cooperative, communicative, critical thinkers, problem solvers, and astute decision-makers, in addition to providing knowledge of technological concepts. This implies that teachers may not be able to fully embrace technology-aided instruction due to their knowledge gap regarding the application of digital technologies that suit the learning content for students. Perifanou et



Authors retain copyright. Articles published under a Creative Commons Attribution 4.0 (CC-BY) International License. This license allows this work to be copied, distributed, remixed, transformed, and built upon for any purpose provided that appropriate attribution is given, a link is provided to the license, and changes made were indicated.

al. (2021) explain that individuals with essential digital skills can retrieve, evaluate, store, produce, present, and exchange information and collaborate within virtual networks.

The Teachers' Self-Efficacy in Integrating Digital Technology

Self-efficacy across all dimensions is assessed to capture how teachers perceive their effectiveness in implementing a blended approach using digital technologies in the new normal.

Table 5. *The Mean Score of the Teachers in Terms of Self-Efficacy*

Dimension	Mean Score	SD	Level
Cognitive	3.38	0.87	Average
Confidence	3.42	0.85	Average
Capability	3.45	0.92	Average
Overall Mean & Interpretation	3.417	0.88	AVERAGE

Legend: 4.50-5.00 (High/Perfect), 3.50-4.49 (Above Average/Good), 2.50-3.49 (Average), 1.50-2.49 (Below Average/Weak), 0.00-1.49 (Low/Poor)

The results indicate that the overall self-efficacy of the teachers is at an average level. This observation is consistent across the three dimensions: cognitive, confidence, and capability, as reported by the respondents. These findings suggest that teachers' confidence in using technology is only moderately developed. It implies that they might not be well-versed in their knowledge and understanding of digitalization, technological-pedagogical skills for integrating technology, and their ability to use technology in their teaching consistently. Furthermore, this finding suggests that teachers may not be fully equipped with the knowledge and skills necessary to be cognitively adept, confidently prepared, and fully capable of harnessing the potential of digitalization in blended learning. Given this level of self-efficacy, teachers may not be particularly enthusiastic about embracing a blended approach to education. According to Kent and Giles (2017), self-efficacy is a reliable indicator of teachers' likelihood to incorporate instructional technology into their teaching practices. Similarly, teachers' beliefs about their ability to effectively utilize technology, in general, are directly linked to their willingness to integrate technology into their teaching.

The Correlation Results between Technological Profile and Digital Literacy of Teachers

The correlation test between teachers' technological profiles and digital literacy determined the degree of the relationship between them. The results (Table 7) provide a basis for inference regarding the significance of the influence of the teachers' profile on their level of digital literacy.

Table 6. *The Pearson r Results on the Relationship of the Teachers' Technological Profile and Digital Literacy*

Variables	Test	r**	Strength	p*	Interpretation	
Access	Digital	Pearson-R	.581	Moderate	.000	Significant
Familiarity	Literacy		.607	Strong	.000	Significant
Utilization	Skills		.819	Very Strong	.000	Significant
Purpose of Usage			.798	Strong	.000	Significant

*relationship is significant at $\alpha = 5\%$ ($p\text{-value} < 0.05$);

**Strength of correlation (by Liang et al., 2019) is Very Strong at $0.80 < r < 1.0$; Strong at $.60 < r < .79$; Moderate at $.40 < r < .59$

Correlation analysis reflected a significant and strong relationship between teachers' Technological profiles and digital literacy levels. This implies that teachers' background in digital technology, covering



Authors retain copyright. Articles published under a Creative Commons Attribution 4.0 (CC-BY) International License. This license allows this work to be copied, distributed, remixed, transformed, and built upon for any purpose provided that appropriate attribution is given, a link is provided to the license, and changes made were indicated.

aspects like access, significantly and moderately impacts their digital literacy skills. The strong correlation underscores that the link between technological profile in terms of familiarity, utilization and purposes of usage and digital literacy is high, indicating that teachers with a more advanced technological profile demonstrate higher levels of digital literacy. In simpler terms, changes in the technological profile are closely tied to fluctuations in digital literacy. The close dependence of digital literacy on the technological profile is evident. The implications suggest that the technological background of teachers plays a crucial role in nurturing digital literacy. Thus, if teachers receive adequate exposure, learning opportunities, and pedagogical content knowledge, they enhance their proficiency in technology integration to deliver the curriculum effectively. Similarly, well-equipped teachers experience increased efficiency in facilitating blended learning, enhancing learners' academic performance.

The Significance of Relationship between Digital Literacy and Self-Efficacy of Teachers

As reflected in Table 8, Pearson's analysis highlighted the significance and strength of the relationship between digital literacy and self-efficacy.

Table 7. The Pearson-r result between Digital literacy and Self-Efficacy Levels

Variables Tested		Test Used	r	strength	p-value	Sig.
Independent	Dependent					
Digital Literacy	Self-Efficacy	Pearson-R	.866**	Very Strong	.000*	Significant

*relationship is significant at $\alpha = 5\%$ ($p\text{-value} < 0.05$);

**Strength of correlation (by Liang et al., 2019) is Very Strong at $0.80 < r < 1.0$; Strong at $.60 < r < .79$; Moderate at $.40 < r < .59$

The results demonstrate a very strong and significant relationship between digital literacy and self-efficacy. Consequently, digital literacy can be considered a critical factor in enhancing efficiency. Moreover, teachers' ability to utilize digital technologies reflects their likelihood of incorporating them into blended learning delivery. Hence, well-equipped teachers with digital skills gain confidence in effectively using these tools in conjunction with appropriate pedagogical methods within the blended learning process. Therefore, teachers' inclination to integrate ICT grows stronger if digital literacy is sufficiently developed. The digitalization of teaching becomes more feasible when self-efficacy issues are adequately addressed.

Supporting this finding, a study by Hatlevik and Hatlevik (2018) revealed a positive correlation between teachers' ICT self-efficacy and their integration of ICT into teaching. This implies that teachers with higher ICT self-efficacy are more inclined to incorporate ICT into their teaching practices. On the other hand, Aslan (2021) asserted that teachers are expected to possess digital literacy and high self-efficacy, given that 21st-century Generation Z learners are deeply entrenched in the digital age, which is an irreversible reality for them. Thus, teachers with solid digital literacy and self-efficacy comprehend the pivotal role of technological tools in blended learning, enabling them to address and overcome the challenges encountered.



CONCLUSION

The technological profile of teachers influences their level of digital literacy. Teachers possessing high digital literacy skills increase their self-efficacy in integrating technology. Digital literacy at an average level indicates insufficient knowledge and technical skills that necessitate training and consistent application. The findings should be utilized to strengthen efforts in developing programs and projects on ICT development among schools. Likewise, training activities, such as the Enhancement Training Program on Digital Literacy, that focus on various types of digital technologies, ICT tools, and websites may be proposed at least at the division level to address teachers' technical needs in classroom teaching. Furthermore, additional studies on digital literacy and self-efficacy may be carried out or replicated to strengthen the findings and contribute to the limited literature in the Philippine context.

REFERENCES

- Abouelnaga, H. M., Metwally, A. B. AlDhmour, M., Shoshan, H., Saleh, M., Mazouz, L. A., Abouelmagd, H., Alsmadi, S., Aljamaeen, R., Eljawad, L., & Hamad, L. (2019). A survey on educational technology in Saudi Arabia. *International Journal of Applied Engineering Research*, 14(22), 4146-4160.
- Alchamdani, Fatmasari, Anugrah, E. R., Sari, N. P., Putri, F., & Astina. (2020). The impact of the COVID-19 pandemic on the online learning process in the College at Southeast Sulawesi. *Jurnal Kesehatan Lingkungan*, 12(1), 129–136. <https://doi.org/10.20473/jkl.v12i1si>.
- Area-Moreira, M., Bonilla, P. J. S., & Mesa, A. L. S. (2020). La transformación digital de los centros escolares. *Obstáculos y resistencias. Digit. Educ. Rev.*, 37, 15–31.
- Aslan, S. (2021). Analysis of digital literacy self-efficacy levels of pre-service teachers. *International Journal of Technology in Education*, 4(1), 57–67. <https://doi.org/10.46328/ijte.47>
- Bach, A. J., Wolfson, T., & Crowell, J. K. (2018). Poverty, literacy, and social transformation: An interdisciplinary exploration of the digital divide. *Jmle*, 10(1), 22–41. doi:10.23860/jmle-2018-10-1-2
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, pp. 84, 191–215. <http://dx.doi.org/10.1037/0033-295X.84.2.191>
- Beck, E., Goin, M. E., Ho, A., Parks, A., & Rowe, S. (2021). Critical digital literacy as a method for teaching tactics of response to online surveillance and privacy erosion. *Computers and Composition*. <https://doi.org/10.1016/j.compcom.2021.102654>
- Bedran, P. F. (2016). Digital literacy and language teacher education in contemporary times. *Rev. Entrelenguas*, 2, 225–247.
- Beurer-Zuellig, B., & Meckel, M. (2008). Smartphones enable mobile collaboration. Proceedings of the 41st Annual Hawaii International Conference on System Sciences (HICSS 2008) (pp. 49–59). Waikoloa, HI. doi: 10.1109/HICSS.2008.399



- Blaskó, Z., Costa, P. D., & Schnepf, S. V. (2022). Learning losses and educational inequalities in Europe: Mapping the potential consequences of the COVID-19 crisis. *Journal of European Social Policy*, 32(4), 361–375.
- Blažič, B. J., & Blažič, A. J. (2020). It is overcoming the digital divide with a modern approach to learning digital skills for elderly adults. *Educ. Inf. Tech.*, 25(1), 259–279.
- Darlis, V., & Sari, D. K. (2020). The effectiveness of blended learning: The impact of student's characteristics and digital literacy on student performance. In Proceedings of the 3rd International Conference on Educational Development and Quality Assurance (ICED-QA 2020) (pp. 561–566). *Advances in Social Science, Education, and Humanities Research*, 506(1). <https://doi.org/10.2991/assehr.k.200818.106>
- Di Pietro, G., Biagi, F., Costa, P., Karpiński, Z., & Mazza, J. (2020). The likely impact of COVID-19 on education: Reflections based on the existing literature and recent international datasets (*Vol. 30275*). *Publications Office of the European Union*.
- Faraj, S., Renno, W., & Bhardwaj, A. (2021). Unto the breach: What the COVID-19 pandemic exposes about digitalization. *Information and Organization*, 31(1), 100337. <https://doi.org/10.1016/j.infoandorg.2021.100337>
- Francisco, E., Ferreira, H. M., & Goulart, I. D. V. (2019). Digital literacy: What is discussed about the use of digital technologies in the formation of Portuguese-speaking teachers? *Texto Livre-Líng. E Tecnologia*, 12, 109–127.
- Greene, J. A., Yu, S., & Copeland, D. Z. (2014). Measuring critical components of digital literacy and their relationships with learning. *Computers & Education*, 76, 55–69. <https://doi.org/10.1016/j.compedu.2014.03.011>
- Gumness, G. (2019). Faculty initiative and the role of self-efficacy in raising digital literacy: A study. ProQuest LLC, East Eisenhower Parkway.
- Hadiyanti, N. F. D., Hobri, Prihandoko, A. C., Susanto, Murtikusuma, R. P., Khasanah, N., & Maharani, P. (2021). Development of mathematics e-module with STEM-collaborative project-based learning to improve mathematical literacy ability of vocational high school students. *Journal of Physics: Conference Series*, 1839(1). <https://doi.org/10.1088/1742-6596/1839/1/012031>
- Hatlevik, O. E. (2017). Examining the relationship between teachers' self-efficacy, digital competence, strategies to evaluate information, and school ICT use. *Scandinavian Journal of Educational Research*, 61(5), 555–567. <https://doi.org/10.1080/00313831.2016.1144580>
- Hatlevik, I. K., & Hatlevik, O. E. (2018). Examining the relationship between teachers' ICT self-efficacy for educational purposes, collegial collaboration, lack of facilitation, and the use of ICT in teaching practice. *Frontiers in Psychology*, 9(935). <https://doi.org/10.3389/fpsyg.2018.00935>
- Herrera-Aguilar, M., Medina-Aguilar, G. A., & Martínez-Musiño, C. (2015). La alfabetización informacional y la alfabetización digital en estudiantes de Comunicación: El caso de la



Universidad Autónoma de Querétaro. In *Claves para la comprensión de la cultura digital* (pp. 11–41). Mexico: Universidad Autónoma de Querétaro.

- Jenson, J., Tomin, B., & Terzopoulos, T. (2018). Making Space for Innovation: Teacher Perspectives on a Wearable Technology Curriculum. In *Proceedings of the 11th International Conference of Education, Research and Innovation (ICERI, 2018)*, Seville, Spain, 12–14 November 2018; p. 4360.
- Karunaratne, T., Zhemchugova, H., Byungura, J.C., & Olsson, U. (2019). Towards an agile-based process model for practical teacher training on LMS. In *Proceedings of the 18th European Conference on E-learning (ECEL)*, Copenhagen, Denmark, 7–8 November 2019; pp. 284–293.
- Kent, A.M., & Giles, R.M. (2017). Preservice Teachers' Technology Self-Efficacy. *SRATE Journal*, 26(1), 9-20.
- Lai, J., & Widmar, N.O. (2021). Revisiting the Digital Divide in the COVID-19 Era. *Applied Economic Perspectives and Policy*, 43(1), 458–464. doi:10.1002/aapp.13104
- Liang, Y., Abbott, D., Howard, N., Lim, K., Ward, R., & Elgendi, M. (2019). How Effective Is Pulse Arrival Time for Evaluating Blood Pressure? Challenges and Recommendations from a Study Using the MIMIC Database. *Journal of clinical medicine*, 8(3), 337. <https://doi.org/10.3390/jcm8030337>
- Lordache, C., Mariën, I., & Baelden, D. (2017). Developing Digital Skills and Competences: A Quick-Scan Analysis of 13 Digital Literacy Models. *Italian Journal of Sociology of Education*, 9(1). doi:10.14658/pupj-ijse-2017-1-2
- Ng, W. (2012). Can we teach digital natives digital literacy? *Computers & Education*, 59(3), 1065–1078.
- Ocak, G., & Karakuş, G. (2018). Pre-service teachers' digital literacy self-efficacy scale development. *Kastamonu Eğitim Dergisi*, 26(5), 1427-1436.
- Paraskeva, F., Bouta, H., & Papagianni, A. (2008). Individual characteristics and computer self-efficacy in secondary education teachers to integrate technology in educational practice. *Computers & Education*, 50, 1084–1091.
- Perifanou, M., Tzafilkou, K., & Economides, A.A. (2021). The Role of Instagram, Facebook, and YouTube Frequency of Use in University Students' Digital Skills Components. *Education Sciences*, 11(766). <https://doi.org/10.3390/educsci11120766>
- Rapanta, C., Botturi, L., Goodyear, P., Guàrdia, L., & Koole, M. (2020). Online university teaching during and after the COVID-19 crisis: Refocusing teacher presence and learning activity. *Postdigital Science and Education*, pp. 2, 923–945.



- Seers, K., & Crichton, N. (2001). Quantitative research: Designs relevant to nursing and healthcare. *NT Research*, 6(1), 487-500.
- Senemoğlu, N. (2018). Development, learning, and teaching: From theory to practice. *Ankara: Anı Yayıncılık*.
- Supriyadi, T., Julia, J., Aeni, A. N., & Sumarna, E. (2020). Action research in hadith literacy reflects hadith learning in the digital age. *International Journal of Learning, Teaching and Educational Research*, 19(5), 99–124. <https://doi.org/10.26803/ijlter.19.5.6>
- Nugraha, A. A. P. P. Y., & Widiana, I. W. (2021). Learning Alternative Energy Using Graphic Video Media. *International Journal of Elementary Education*, 5(2), 224–230. <https://doi.org/http://dx.doi.org/10.23887/ijee.v5i2.35154>
- Tulinayo, F. P. (2018). Digital technologies in resource-constrained higher learning institutions: A study on students' acceptance and usability. *International Journal of Educational Technology in Higher Education*, 15(36), 1-19.
- Vartanova, E., & Gladkova, A. (2019). New Forms of the Digital Divide. Digital media inequalities: Policies against divides, distrust, and discrimination, 193–213.
- Wang, L., Ertmer, P. A., & Newby, T. J. (2004). Increasing preservice teachers' self-efficacy beliefs for technology integration. *Journal of Research on Technology in Education*, 36(3), 231-250.
- Walker, W. (2005). The strengths and weaknesses of research designs involving quantitative measures. *Journal of Research in Nursing*, 10(5), 571–82.
- Yu, T.-K., Lin, M.-L., & Liao, Y.-K. (2017). Understanding Factors Influencing Information Communication Technology Adoption Behavior: The Moderators of Information Literacy and Digital Skills. *Computers in Human Behavior*, 71, 196–208. doi: 10.1016/j.chb.2017.02.005.

