

Digital Literacy and Professional Engagement of Early Childhood Educators: Impact on Teaching Performance

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Abstract. Digital literacy has emerged as an essential competency for 21st-century educators, contributing to enhanced instructional quality and improved student learning outcomes. This study investigated the influence of digital literacy and professional engagement on the teaching performance of Kindergarten and Grade 1 educators. To ensure statistical representativeness, a quantitative descriptive-correlational research design was employed to examine the levels of digital literacy, professional engagement, and teaching performance among 119 early-grade teachers selected through the Taro Yamane formula. Three validated instruments were utilized: the Classroom Observation Tool (COT) to assess instructional performance, the Digital Literacy Scale (DLS) to measure digital proficiency, and the Teacher Engagement Scale for Professional Development (SITES-PD) to evaluate professional engagement. Instrument reliability was confirmed through pilot testing, with all tools demonstrating acceptable internal consistency as measured by Cronbach's Alpha. Findings indicated that participants exhibited very high levels of digital literacy and professional engagement. Correspondingly, their teaching performance was rated very high, reflecting their mastery of evidence-based instructional strategies. Multiple regression analysis revealed that digital literacy and professional engagement significantly predicted teaching performance. Between the two, professional engagement emerged as the stronger predictor. These results underscore the importance of fostering educators' professional growth and digital competence to enhance instructional effectiveness. The study recommends developing institutional policies that promote digital literacy and ethical technology use, providing continuous professional development programs, and integrating communication, critical thinking, and technology-based instructional strategies in classroom practice.

Keywords: Digital literacy; Professional engagement; Teaching performance; Early childhood education; Instructional effectiveness.

1.0 Introduction

In an era where digital innovation increasingly shapes education, digital literacy has emerged as a core competency for educators. It encompasses various skills, including operating digital tools, critically assessing digital content, and applying technology-enhanced pedagogical strategies (Falloon, 2020). In early childhood education, particularly at the Kindergarten and Grade 1 levels, teachers' capacity to effectively integrate digital tools into instructional practices significantly influences student engagement and learning outcomes. Despite the growing emphasis on digital transformation in education, empirical research remains limited regarding its direct and combined influence on teaching performance, especially among early-grade educators. Most existing studies tend to isolate these variables or focus on higher educational levels, thus overlooking the distinct developmental and instructional demands at the foundational stages of learning (Su & Yang, 2023). Professional engagement,

which includes sustained participation in professional development, collaboration with peers, and active involvement in school initiatives, enhances instructional quality and learner achievement (Liu et al., 2020). For early childhood educators, such engagement fosters responsive, inclusive, and nurturing learning environments essential to young children's developmental needs (Padillo et al., 2021). However, the synergistic effect of professional engagement and digital literacy on teaching performance in early-grade education has yet to be thoroughly explored.

On the other hand, theoretical and empirical literature consistently affirms the value of digital literacy in promoting teaching effectiveness and learner success (Johnson et al., 2021). Concurrently, professional engagement is strongly linked to innovation in pedagogy, responsiveness to diverse learner needs, and overall teacher effectiveness (Liu et al., 2020). However, early-grade educators remain underrepresented in studies examining these variables despite their crucial role in foundational learning. This study, therefore, addresses a critical gap by investigating the combined influence of digital literacy and professional engagement on the teaching performance of Kindergarten and Grade 1 teachers. It aims to understand how these two dimensions interact to shape instructional effectiveness, to inform teacher education programs, policy development, and capacity-building efforts in the early years of schooling.

Furthermore, aligned with Sustainable Development Goal 4 (Quality Education), which emphasizes inclusive, equitable, and quality education for all, this research contributes to the global agenda by highlighting ways to support and empower early-grade educators through targeted digital literacy initiatives and meaningful professional development. As Padillo et al. (2021) assert, sustained professional engagement catalyzes instructional improvement and, when coupled with digital competence, may significantly elevate teaching quality and learner achievement at the most formative stage of education. Understanding early childhood educators' digital literacy levels and professional engagement provides an empirical basis for educational institutions to design focused interventions. These may include curriculum reforms, institutional support systems, and policy guidelines that enhance teacher readiness in a technology-driven educational landscape, ultimately supporting better learning outcomes for young children.

2.0 Methodology

2.1 Research Design

The study utilized the descriptive-correlational research design to quantitatively evaluate the levels of digital literacy and professional engagement among Kindergarten and Grade 1 teachers with teaching performance. Williams (2021) provided detailed information that explains the essentials of identifying, measuring, and interpreting relationships between variables in a non-experimental context with real-world examples. Using standardized assessment tools and surveys, the researcher can gather data on teachers' digital literacy skills, professional engagement, and teaching performance. This design also facilitates examining relationships between the independent variables (digital literacy skills and professional engagement) and the dependent variable (teaching performance) through statistical analysis. Overall, this research design was well-suited for addressing the research questions and providing valuable insights into the factors affecting the teaching performance of the kindergarten and Grade 1 teachers in Manolo Fortich, Bukidnon.

2.2 Research Locale

The study was carried out in the elementary and integrated schools of the Department of Education across four public school districts in Manolo Fortich, Bukidnon, within the Division of Bukidnon, Philippines. These particular settings were selected to gain a focused insight into the teachers' experiences and viewpoints within this region and to ensure adequate participants. The study occurred during the 2024-2025 school year, ensuring the data gathered were current and pertinent to contemporary teaching practices, challenges, and environments.

2.3 Research Participants

The participants of this study included 169 teachers who were currently working for the Department of Education, handling kindergarten and grade 1 classes, and were stationed at schools within the four districts of Manolo Fortich, Bukidnon, Philippines. Applying the Taro Yamane formula, the research approximated the target sample size of 119 out of 169 participants. This simple random sampling approach enabled the researcher to collect comprehensive and representative data from a significant portion of the teaching population within the specified districts. The selection process ensured a degree of generalizability, allowing the findings to reflect broader

patterns concerning digital literacy, professional engagement, and teaching performance among early-grade educators in the Division of Bukidnon.

2.4 Research Instrument

This study used an adapted, modified survey questionnaire: (1) the Classroom Observation Tool (COT) by the Department of Education (DepEd, 2020) to evaluate teaching performance; (2) the Digital Literacy Scale (DLS) by Avinç and Doğan (2024) to measure digital proficiency; and (3) the Teacher Engagement Scale for Professional Development (SITES-PD) by Kelly et al. (2022) to assess professional engagement. All instruments were subjected to a pilot test, and internal consistency was confirmed using Cronbach's Alpha, yielding acceptable reliability scores ($\alpha \geq .80$).

2.5 Data Gathering Procedure and Analysis

This study used specific steps before commencing any data collection for the actual test; the researcher secured ethical clearance from the Research Ethics Committee at Lourdes College. Approval was also obtained from the Schools Division Superintendent (SDS) of the Department of Education – Division of Bukidnon. Data collection was conducted in the participating teachers' classrooms after school hours, with informed consent forms provided to the teacher participants. These teachers were asked to rate their experiences on three survey forms, which assessed their digital literacy skills, professional engagement, and teaching performance.

2.6 Ethical Considerations

This research study followed ethical guidelines. The researcher provided participants with a modified World Health Organization informed consent form to ensure they signed an agreement and were not coerced into participating in the data collection process, following the necessary approvals for the study. Participants were informed that their involvement was voluntary and that they could withdraw from the data collection without penalty by the fundamental ethical principles of the Belmont Report, as emphasized by Amdur and Bankert's ethical guidelines (2021). In compliance with Republic Act No. 10173, all personal information collected, including responses, was securely stored. Adequate security measures were in place to protect the data from loss, unauthorized access, use, or disclosure. The responses were retained for one academic year, after which the forms were shredded by the National Archives of the Philippines Act and the Data Privacy Act of 2012.

3.0 Results and Discussion

3.1 Participants' Assessment of Digital Literacy

Tables 1 and 2 revealed that the participants demonstrated exceptionally high digital literacy skills, as reflected in the overall mean score of 4.69 with a minimal standard deviation of 0.14, indicating consistency across responses.

Table 1. *Distribution of the Participants' Assessment of their Digital Literacy*

Range	Interpretation	Frequency	Percentage (%)
4.51-5.00	Very High	110	92.44
3.51-4.50	High	9	7.56
2.51-3.50	Moderate	0	0.00
1.51-2.50	Low	0	0.00
1.00-1.50	Very Low	0	0.00
Total		119	100.00
Overall Mean		4.69	
Interpretation		Very High	
SD		0.14	

A significant majority of the participants, 92.44 percent, rated their digital literacy very high, while the remaining 7.56 percent rated theirs as high. No participant fell within the moderate, low, or very low categories. These findings suggest that the participants are proficient and confident in navigating digital environments.

The item-level analysis further supports this conclusion. In communication, participants displayed competence in reading online content, typing efficiently, writing formal emails, and easily navigating email functions. They also demonstrated a strong awareness of copyright regulations, particularly in understanding the consequences of unauthorized use and using tools such as Turnitin to avoid plagiarism. Critical thinking skills were evident through real-life problem-solving activities and reflective journaling. Ethical online behavior was consistently

observed, with participants showing high regard for privacy, adherence to cyber laws, cultural sensitivity, and respectful communication in digital spaces.

Table 2. Mean and SD of Participants' Assessment of their Digital Literacy

Indicators	Item No.	Questions	M	Interpretation	SD
Communication	1	I can easily read online content from a screen	4.71	Very High	0.45
	2	I prefer to take prints of online reading materials for better reading.	4.68	Very High	0.47
	3	I can type quickly using both hands.	4.82	Very High	0.38
	4	I know how to write formal emails.	4.76	Very High	0.43
	5	I am well aware of email sending and formatting options.	4.72	Very High	0.45
	6	I prefer other methods of online listening over using headphones and speakers.	4.65	Very High	0.48
Copyright	7	I know the consequences of using copyrighted work online without permission.	4.65	Very High	0.48
	8	I use Turnitin or other similar software to check and avoid unintentional plagiarism.	4.69	Very High	0.46
Critical Thinking	9	My school assigns me online activities relating to real-life problems.	4.66	Very High	0.48
	10	I have an online reflective journal to write.	4.67	Very High	0.54
Character	11	In the online world, I do not use and share others' personal information, pictures, conversations, etc. without their consent.	4.77	Very High	0.42
	12	I remain neutral and tolerant during online discussions.	4.76	Very High	0.43
	13	I respectfully communicate with others while using technology.	4.77	Very High	0.42
	14	I know the consequences of violating cyber laws in the digital world.	4.79	Very High	0.41
	15	I respect the cultural differences in the online world and respond accordingly.	4.71	Very High	0.46
Curation	16	I search for material from renowned websites.	4.66	Very High	0.47
	17	I try to add value to the existing pieces of information available online.	4.73	Very High	0.45
	18	I play my part in adding to and updating online information.	4.71	Very High	0.46
Connectedness	19	I am involved in different online communities for volunteer work.	4.68	Very High	0.57
	20	I participate in different online projects at the national level.	4.71	Very High	0.53
	21	I am actively involved in different online campaigns for community development.	4.62	Very High	0.49
	22	I actively participate in online polls/surveys.	4.66	Very High	0.48
	23	I encourage and help my community to post important information on social media for the benefit of many.	4.70	Very High	0.48
Creativity	24	I write online blogs giving new ideas and perspectives.	4.69	Very High	0.58
	25	I like to post new information on my social media account(s).	4.58	Very High	0.56
	26	I have creative ideas, and I try my best to know how to use them online.	4.67	Very High	0.47
Collaboration	27	In the online world, I worked with others in groups.	4.68	Very High	0.47
	28	I work online with my peers to easily find solutions to the problems.	4.75	Very High	0.44

Participants also showed effective information curation practices by utilizing credible sources, contributing meaningful content online, and enhancing the value of existing information. Their sense of connectedness was reflected in active participation in online communities. Creativity surfaced in their expression of innovative ideas through blog writing and social media content creation. At the same time, collaborative engagement was reflected in teamwork and problem-solving initiatives conducted in virtual environments.

Overall, the participants exhibited holistic digital competence, underpinned by strong ethics, communication, creativity, and collaboration—skills essential in academic, professional, and civic contexts. These findings are supported by Erwin et al. (2022), who emphasized the role of structured digital literacy instruction in fostering

responsible and effective technology use. Similarly, Hall et al. (2020) found that teachers with higher digital literacy skills integrated technology more effectively in their classrooms, improving student engagement.

3.2 Participants' Assessment of Professional Engagement

Tables 3 and 4 show the frequency, percentage, and mean distribution of the participants' assessments of their professional engagement.

Table 3. *Distribution of the Participants' Assessment of their Professional Engagement*

Range	Interpretation	Frequency	Percentage (%)
4.51-5.00	Very High	106	89.08%
3.51-4.50	High	13	10.92%
2.51-3.50	Moderate	0	0.00%
1.51-2.50	Low	0	0.00%
1.00-1.50	Very Low	0	0.00%
Total		119	100.00
Overall Mean		4.77	
Interpretation		Very High	
SD		0.17	

Findings reveal that participants evaluated their professional engagement as high, with an overall mean of 4.77. The majority (89.08%) rated their digital literacy as Very High, while 10.92% reported it as High. No participants assessed their professional engagement as Moderate, Low, or Very Low, reflecting a consistent level of proficiency with a standard deviation of 0.17.

Table 4. *Mean and SD of Participants' Assessment of their Professional Engagement*

Item No.	Questions	M	Interpretation	SD
1	Communication was purposeful in terms of teaching and learning.	4.81	Very High	0.40
2	The teacher was comfortable with learning.	4.72	Very High	0.45
3	The teacher demonstrated self-reliance.	4.75	Very High	0.44
4	The teacher demonstrated flexible thinking.	4.75	Very High	0.44
5	The teacher had a positive perception of students as learners.	4.76	Very High	0.43
6	The teacher had a constructive view of rules and authority.	4.79	Very High	0.41
7	The teachers viewed themselves as a professional.	4.74	Very High	0.44
8	The teacher assumed a leadership role.	4.83	Very High	0.38

Participants demonstrated strong dedication to their professional responsibilities, showing accountability, collaboration, and adaptability. This high engagement is likely due to integrating professional practices into their environments and offering regular skill development opportunities. This aligns with research linking professional engagement to improved productivity, teamwork, and career advancement. Cai et al. (2022) found that supportive resources like distributed leadership and trust boost teacher engagement and performance. Additionally, the participants' high professional engagement reflects their ability to adapt to evolving professional demands and technological advancements, particularly in increasingly digital and collaborative work settings. This demonstrates their readiness to take on leadership roles and contribute meaningfully to their fields. The results also denote that participant are likely to leverage their professional skills to foster innovation, address challenges, and implement solutions effectively.

The data underscored the teachers' readiness to excel and contribute significantly to educational success. The very high scores in leadership (M=4.83) highlighted their ability to inspire and guide others effectively, fostering collaboration and collective growth in their professional environments. Their purposeful communication in teaching (M=4.81) demonstrated a focus on delivering impactful and engaging learning experiences tailored to students' needs. Moreover, the positive perception of students (M=4.76) and a constructive approach to rules (M=4.79) reflected a balanced blend of empathy and structure, key to creating a nurturing yet disciplined environment conducive to learning. Their strong adaptability, as evidenced by high ratings in self-reliance (M=4.75) and flexible thinking (M=4.75), equipped them to address diverse challenges dynamically and efficiently.

The teachers' commitment to continuous improvement was evident in their comfort with learning ($M=4.72$) and professionalism ($M=4.74$), which underlines their growth-oriented mindset and adherence to ethical standards. This combination of personal and professional attributes enabled them to build inclusive, innovative, student-centered learning spaces. The low standard deviation values also signaled uniformity in their responses, implying a consistent culture of excellence and shared dedication to their profession. These insights highlight the teachers' capacity to thrive individually and contribute to the overall advancement of the educational system and student development. The study's findings align with Mişu et al. (2022), showing that higher work engagement and efficacy improve teaching performance, emphasizing the need for professional development. Similarly, Padillo et al. (2021) highlighted the importance of well-planned professional growth initiatives in enhancing teaching quality. Collectively, these studies, including Cai et al. (2022), underscore the critical role of professional engagement in improving educator effectiveness and ensuring young learners receive the best education.

3.3 Participants' Teaching Performance

Tables 5 and 6 revealed that participants exhibited a very high level of teaching performance, as indicated by the overall mean of 6.87 and a standard deviation of 0.10, which indicates similarity of responses.

Table 5. *Distribution of the Participants' Assessment of their Professional Engagement*

Range	Interpretation	Frequency	Percentage (%)
6.6 - 7.0	Integrating	119	100.00
5.6 - 6.5	Consolidating	0	0.00
4.6 - 5.5	Applying	0	0.00
3.6 - 4.5	Developing	0	0.00
3.0 - 3.5	Organizing	0	0.00
Total		119	100.00
Overall Mean		6.87	
Interpretation		Integrating	
SD		0.10	

This consistency underscored their mastery of advanced teaching strategies and ability to implement effective practices across various dimensions of teaching. Teachers demonstrated strong competencies in applying content knowledge across curriculum areas ($M=6.87$) and utilizing diverse strategies to enhance literacy and numeracy skills ($M=6.90$). Their ability to effectively integrate ICT into teaching ($M=6.78$) further showcased their commitment to modern, technology-driven approaches that facilitate learning.

Table 6. *Mean and SD of Participants' Assessment of their Professional Engagement*

Item No.	Questions	M	Interpretation	SD
1	The teacher applied knowledge of content within and across curriculum teaching areas.	6.87	Integrating	0.33
2	The teacher used a range of teaching strategies that enhance learner achievement in literacy and numeracy skills.	6.90	Integrating	0.30
3	The teacher ensured the positive use of ICT to facilitate the teaching and learning process.	6.78	Integrating	0.45
4	The teacher used effective verbal and non-verbal classroom communication strategies to support learner understanding, participation, engagement and achievement.	6.92	Integrating	0.28
5	The teacher maintained supportive learning environments that nurture and inspire learners to participate, cooperate and collaborate in continued learning.	6.87	Integrating	0.33
6	The teacher applied a range of successful strategies that maintain learning environments that motivate learners to work productively by assuming responsibility for their learning	6.83	Integrating	0.38
7	The teacher designed, adapted, and implemented teaching strategies that are responsive to learners with disabilities, giftedness, and talents.	6.87	Integrating	0.34
8	The teacher planned and delivered teaching strategies that are responsive to the special educational needs of learners in difficult circumstances, including geographic isolation, chronic illness, displacement due to armed conflict, urban resettlement, or disasters, child abuse, and child labor practices.	6.88	Integrating	0.32

Communication emerged as a key strength, with teachers excelling in verbal and non-verbal strategies to engage, support, and inspire learners (M=6.92). They also created nurturing and cooperative learning environments (M=6.87) and employed motivational techniques that encouraged learners to take responsibility for their education (M=6.83). Teachers were also highly responsive to the diverse needs of learners, as shown in their ability to design and implement inclusive strategies for learners with disabilities, giftedness, and special educational needs (M=6.87 to M=6.88). These competencies highlight their dedication to equity and inclusivity.

The findings confirmed Lopez-Martín et al. (2023) and Sanfo et al. (2023), who linked teacher quality to student success, showing that well-qualified educators enhance student outcomes. Mailizar et al. (2022) highlighted the importance of technological proficiency and social presence for educators' acceptance of online professional development. De León et al. (2021) emphasized digital skills in effective teaching among pre-service teachers. The findings reflected participants' ability to consistently integrate advanced teaching practices into their work, highlighting their readiness to meet students' complex and diverse needs. Their high level of performance across all indicators positioned them as exemplary educators capable of driving student success and fostering innovative learning environments.

3.4 Participants' Teaching Performance

Table 8 shows that digital literacy and professional engagement significantly influence teacher performance, with an F-value of 9.053 and a p-value of < .001. However, the R^2 value of .135 indicates that only 13.5 percent of the variance in teacher performance is explained by the model, and the adjusted R^2 is .120. This suggests that while these factors are relevant, about 86.5 percent of the variability is due to other factors not included in the model.

Table 7. Regression Analysis on the Influence of Digital Literacy and Professional Engagement

	Unstandardized Coefficients <i>B</i>	Std. Error	Standardized Coefficients <i>Beta</i>	<i>t</i>	Sig.
	5.443	.339		16.04	< .001
Professional Engagement	.142	.052	.245	2.75**	.007
Digital Literacy	.159	.064	.220	2.47*	.015

*Significant at 0.05 level

**Significant at 0.01 level

The low R^2 is not unusual in human behavior and performance studies, particularly in education, where multiple interacting elements shape outcomes. A broader set of variables widely influences teacher performance, including classroom conditions, administrative support, student diversity, access to teaching resources, and emotional well-being. Recent studies emphasize that professional learning environments, leadership support, and collaborative cultures in schools significantly affect how teachers perform their roles (Opfer & Pedder, 2020; König et al., 2020).

Table 8. Model Summary

<i>R</i>	R^2	<i>Adj. R^2</i>	<i>F</i>	<i>p</i>
.367	.135	.120	9.053*	< .001

*Significant at 0.05 level

**Significant at 0.01 level

Individual characteristics such as adaptability, job satisfaction, and social-emotional competence are important in enhancing teacher performance, especially in changing educational contexts (Collie, 2022). Both teaching engagement and digital literacy significantly influenced teacher performance, leading to the rejection of the null hypothesis. Teaching engagement had an unstandardized coefficient of $B = .142$ ($p = .007$) and a standardized beta of .245, indicating a positive association with performance. Digital literacy had a coefficient of $B = .159$ ($p = .015$) and an unstandardized beta of .054, showing that higher digital competence also improves performance. These findings align with research by Zee and Koomen (2020), Petko et al. (2022), and Lindfors et al. (2021), highlighting the importance of engagement and digital skills in teaching.

Overall, the findings indicate that while teaching engagement and digital literacy are important contributors to teacher performance, they explain only a small portion of the variation. A more comprehensive understanding of teacher performance would require models that include other personal, contextual, and institutional variables. Future research may consider factors such as leadership support, emotional resilience, professional development,

and school climate to improve the explanatory power of such models. These findings reaffirm the complexity of teaching and the need to view performance as the result of multiple interrelated influences.

4.0 Conclusion

The findings of the study confirm that both digital literacy and professional engagement significantly influence teacher performance, which can be explained through the Technology Acceptance Model (TAM), Davis (1989), and Self-Determination Theory (SDT), Deci and Ryan (1985). TAM suggests that when individuals perceive technology as valuable and easy to use, they are more likely to integrate it into their practice. The participants' high digital literacy levels reflect acceptance and meaningful application of technology in teaching. Likewise, SDT emphasizes intrinsic motivation, competence, and relatedness as key performance drivers. The strong professional engagement observed in the study indicates that teachers are internally motivated to grow and collaborate, contributing to their overall effectiveness. While these results affirm the relevance of both theories, the study's modest explanatory power suggests that other factors not included in the model – such as institutional support or teaching experience – may also influence teacher performance. Further studies may explore these dimensions to provide a more comprehensive understanding.

5.0 Contributions of Authors

In addition to composing the study, the first author evaluated the internal consistency of the modified survey questionnaires. She also tested the normality of the variables' residuals and conducted the statistical analysis, with the statistical results verified by a certified statistician. The second author established the quality of the manuscript by editing the contents and additional related readings.

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7.0 Conflict of Interests

The author declared that no conflict of interest existed.

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