

Age appropriateness and relevance of digital literacy for young learners: Views of Ghanaian preschool teachers

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ABSTRACT

Six years ago, the Ghanaian Government introduced a standards-based curriculum across all levels of its education system, requiring teachers to develop digital literacy as a core competency among learners. However, teachers' views on the relevance and age-appropriateness of introducing this skill to young children remained unclear. This study surveyed 114 Ghanaian preschool teachers to explore their views on when digital literacy should be introduced and how important they consider it for early childhood education. It also examined the extent to which teacher background factors influence these views. Using stratified random sampling, teachers were selected from both public and private preschools in the Effutu Municipality. Data were collected through a structured questionnaire and analyzed using frequency, percentages, mean, standard deviation, and multiple regression analysis. Findings revealed that most preschool teachers view Kindergarten as the appropriate level to introduce digital literacy. They also consider it highly relevant for young learners, particularly in enhancing engagement, focus, and cognitive development in the 21st century. However, background variables such as teaching experience, school type, grade level taught, and digital literacy training did not significantly predict teachers' views. In conclusion, preschool teachers widely value digital literacy and support its gradual, age-appropriate integration into early childhood education. Therefore, the Ghana Education Service (GES) and the Effutu Municipal Education Directorate should enhance teacher orientation and provide appropriate resources to support the effective and phased implementation of digital literacy in preschools.

Keywords: digital literacy, views, demographics, predict, young learners, preschools in Ghana

INTRODUCTION

In 2019, Ghana introduced significant reforms in its educational system. The Government of Ghana (GoG), through the Ministry of Education (MoE), the Ghana Education Service (GES), and the National Council for Curriculum and Assessment (NaCCA), implemented a new curriculum known as the Standards-Based Curriculum (SBC). This curriculum was introduced in basic schools (i.e., from kindergarten to primary six) as part of the 2017 educational reform (Ministry of Education, 2019). The SBC was designed to replace the Objective-Based Curriculum (OBC), which had been used in Ghana since the formal introduction of education as far back as the eighteenth century (Ministry of Education, 2019). In 1961, Ghana passed the Education Act to formalize and regulate its education system. Since then, the country has undergone several curriculum reforms, in 1974, 1987, and 2007, aimed at improving the efficiency and quality of education for its citizens (Buabeng et al., 2021). All these reforms continued to emphasize the OBC until the 2017 educational reform, which advocated a shift to the SBC (Adu-Gyamfi et al., 2016).

The shift from the Objective-Based Curriculum (OBC) to the Standards-Based Curriculum (SBC) was considered necessary for several reasons. According to the Ministry of Education

(2019), the main goal of the SBC was to address the national need to move the focus of education away from simply passing exams. Instead, it aimed to build learners' character, nurture positive values, improve literacy, boost confidence, and encourage critical thinking. The SBC includes key features such as the development of the 4Rs: reading, writing, arithmetic, and creativity. It also focuses on building core competencies and 21st-century skills, which are essential for lifelong learning. These include foundational skills like critical thinking, collaboration, and digital literacy. In addition, the SBC promotes learner-centered teaching methods such as differentiation, scaffolding, and the use of ICT. It also encourages inclusion and diversity in the classroom (Ministry of Education, 2019).

At the core of the new curriculum is the development of core competencies. It aims to equip learners with 21st-century skills, including critical thinking and problem-solving, creativity and innovation, communication and collaboration, cultural identity and global citizenship, personal development and leadership, as well as digital literacy (Addai-Mununkum, 2020). According to Apau (2021), the new curriculum is also enriched with Ghanaian cultural values such as respect, diversity, equity, and a strong commitment to excellence. These values are intended to help raise young people who are literate, confident, engaged, and capable of thinking critically.

Digital literacy has become necessary in today's digital world as the use of technology has. It has become an important part of education with many countries around the globe implementing digital literacy in their early childhood education curricula. This is to help prepare children for lifelong learning in today's technology-driven world (UNESCO, 2021). Digital literacy is a broad and changing concept. It includes many different skills and abilities (Bayrakçı, 2020; Güneş & Bahçıvan, 2018). It involves knowing how to find, understand, and use information with digital tools and devices (Dinata & Irawan, 2021). According to Ng (2012), digital literacy also means being able to use technology in an effective and meaningful way. In many countries, tools like tablets, computers, and educational apps are used in early learning to support play, communication, and problem-solving (OECD, 2021). In Ghana, the Education Strategic Plan and the new Standards-Based Curriculum for basic schools place a strong focus on digital literacy (Kwaah et al., 2022). Research shows that using digital tools in play-based learning helps children learn better. For example, Miller (2021) found that using educational apps in kindergarten helps children develop abstract thinking, inquiry skills, and language. Liu et al. (2023) also found that digital tools support children's cognitive growth and help them take part more actively in play and learning activities. These tools also build important 21st-century skills.

Early childhood education is very important for the future success of every country. It covers the period from before birth up to about age eight. This is the time when the brain grows the fastest in a person's life (UNICEF, 2020). In Ghana, early childhood includes infants and toddlers (birth to 36 months), preschoolers (ages 3 to 4), kindergarten children (ages 5 and 6), and pupils in primary classes one to three (ages 6, 7, and 8). Education at this stage is crucial because what happens during this time can strongly affect a child's learning and development later in life (Essuman et al., 2021). According to Buabeng et al. (2021), early childhood education helps shape a country's future. It forms the base for all other levels of education. It gives children the skills, attitudes, and knowledge needed for their personal and national development.

However, teachers' ability to develop digital literacy skills among learners in early childhood settings depends on many things. The Ministry of Education (2018) found that digital learning in preschools is still limited. This is due to a lack of infrastructure, few digital materials, and not enough teacher training (Ayisi et al., 2024). Ertmer and Ottenbreit-Leftwich (2010) also explained that teachers' beliefs and attitudes play a big role in whether or not they use technology in their teaching. Tondeur et al. (2017) added that a teacher's background such as their education level, experience, digital training, grade level taught, and school type can affect how they see the use of digital literacy in early education. Peterson et al. (2018) noted that some early childhood teachers find it hard to adopt new teaching methods because of their own beliefs and comfort with older practices. Similarly, Ogegbo and Aina (2020) explained that when teachers think digital tools is not useful for teaching or playing in preschool, they are less likely to use it in a meaningful way. This makes it harder for children to benefit from such digitally-enhanced learning and play.

Even though there is a growing global interest in digital literacy in early childhood education, there is little research in Ghana on how preschool teachers see its importance and when they think it should be introduced. Most studies on digital

learning have focused on other countries such as South Africa (Ogegbo & Aina, 2020), the United States (Sabado, 2018), and Kenya (Nyakoe et al., 2021). In Ghana, the few related studies have mostly focused on teachers at the upper primary or junior high school levels (Amisshah, 2023). This leaves a gap in understanding how digital literacy can be used well in preschools. Also, teacher factors like qualifications, years of experience, training, and the type of school may affect their views about digital literacy. But there is little information on how these factors work together in the Ghanaian preschool setting. Without knowing what preschool teachers think and what influences their views, efforts to bring digital literacy into early childhood education in Ghana may not succeed or may be done in different ways. This study aims to fill that gap. It explores what Ghanaian preschool teachers think about digital literacy, especially when it should start and how important it is for young children. The study also looks at how teacher background factors like qualification, training, experience, school type, and grade level taught can predict their views. The findings will help policymakers, curriculum planners, and teacher educators in Ghana and beyond. It will guide their efforts to improve digital learning in early childhood education. Based on this, the purpose of the study was to find out how teachers view digital literacy for young learners and how their backgrounds shape those views. Specifically, the study sought to:

1. Examine preschool teachers' views on the appropriate level at which digital literacy should be introduced to young learners.
2. Examine preschool teachers' views on the relevance of digital literacy for young learners.

The following hypothesis were also tested:

H₁: Teachers' qualification, experience, digital literacy training, grade level taught and school type significantly predict preschool teachers' views on the appropriate level to introduce digital literacy to young learners.

H₂: Teachers' qualification, experience, digital literacy training, grade level taught and school type significantly predict preschool teachers' views on the relevance of digital literacy for young learners.

LITERATURE REVIEW

The study is anchored on the Extended Technology Acceptance Model (TAM2) and research on young children's digital experiences.

First, the study is informed by the Sociocultural Model of Young Children's Digital Experiences, developed by Lydia Plowman, Christine Stephen, and Joanna McPake, grounded in empirical work published between 2010 and 2012 (Plowman, Stephen, & McPake, 2010; Plowman, McPake, & Stephen, 2012). This model explains young children's engagement with digital technologies as a socially mediated and context-dependent process, emphasizing that learning occurs through everyday practices, play, and social interaction rather than access alone. Its key tenets include: (1) digital engagement is shaped by adult mediation, (2) teachers' beliefs and values influence how technology is introduced, (3) contextual factors such as home and school environments determine digital experiences, (4) mere access to tools is insufficient for learning, and (5) learning emerges within routine, socially interactive activities. In this

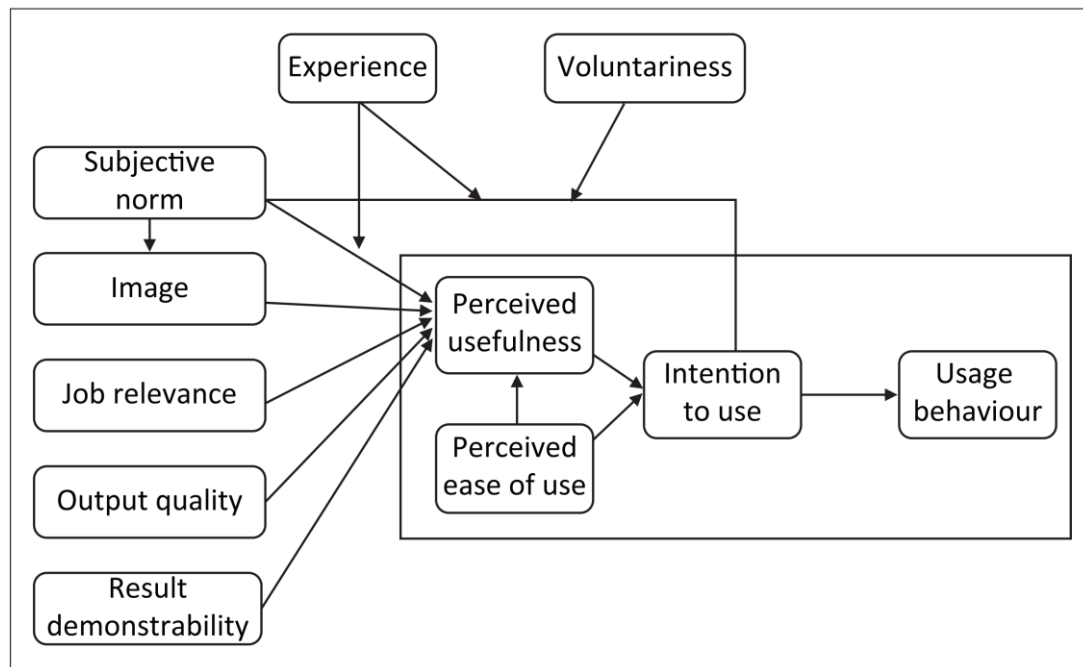


Figure 1. Extended Technology Acceptance Model (TAM2) (Venkatesh & Davis, 2000)

study, the model is applied as a conceptual lens to interpret preschool teachers' views on digital literacy, highlighting how their beliefs, acceptance, and perceived developmental appropriateness influence decisions about when and why digital technologies should be introduced, and how they shape children's digital experiences within early childhood classrooms. This perspective is particularly relevant to the present study, as it supports the idea that teachers' beliefs and acceptance of technology directly influence how, when, and why digital literacy is introduced in preschool settings.

Also, the Extended Technology Acceptance Model was used (see **Figure 1**). The original TAM was developed by Davis in 1989. It was created to explain how people accept and use technology. The model highlights two main ideas: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). These two factors shape a person's attitude toward using technology. This attitude then affects whether or not the person intends to use the technology. Later, in 2000, Venkatesh and Davis improved the original model and created the Extended TAM (TAM2). This version added more variables to explain technology use better. These extra variables include things like social influence, job relevance, experience, and output quality. TAM2 also considers training, support, and a person's background. According to Venkatesh and Davis (2000), these added factors can affect how useful and easy someone thinks a technology is. This shapes their attitude and decision to use it or not. In this study, the external variables in the extended model were very useful. They helped to explore how teacher-related factors, such as qualification, teaching experience, digital literacy training, grade level taught, and school type, can influence preschool teachers' views. These factors go beyond just Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). The model helped explain what teachers think about when digital literacy should be introduced and how important it is for young children. It also showed why some teachers are more willing than others to use digital tools. This depends on whether they think the tools are useful and easy to use in early childhood classrooms.

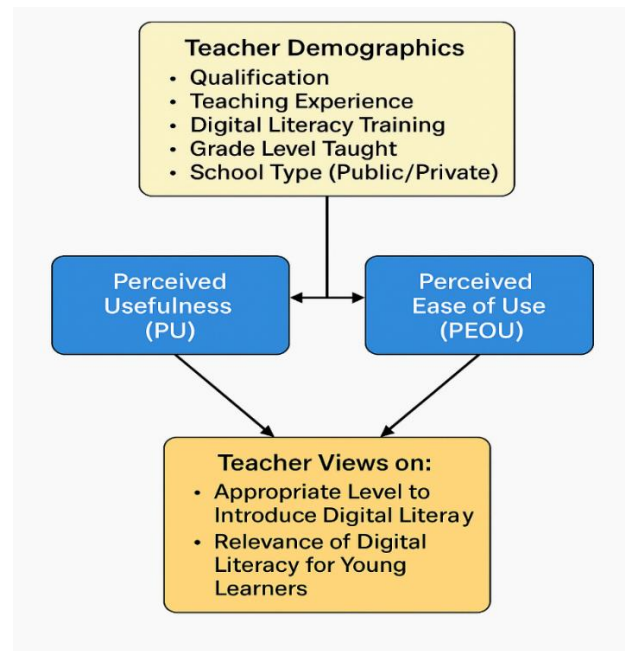


Figure 2. Figure on top of a page (Source: Author's own elaboration)

Figure 2 presents the conceptual framework explaining how teacher background factors relate to their views on digital literacy for young learners.

Several empirical studies have examined teachers' and learners' views, beliefs, and perceptions regarding digital technology and digital literacy in educational contexts, providing valuable insights but also revealing distinct patterns, gaps, and limitations. For example, Sabado (2018) explored high school teachers' perceptions and practices of digital literacy using a qualitative case study approach informed by a digital literacy framework. The study drew on 13 teachers across different subject areas and utilized methodological triangulation through focus group interviews, classroom

observations, and analysis of instructional materials. The findings revealed that teachers had a strong conceptual understanding of digital literacy, especially photovisual literacy, but tended to emphasize photovisual and reproduction skills over other dimensions. This study's strength lies in its use of multiple data sources to enhance credibility; however, its small sample size and focus on secondary education may limit transferability to early childhood contexts. Furthermore, the study highlighted challenges such as limited critical thinking, poor time management, and weak infrastructure, emphasizing the need for sustained professional development and whole-school approaches.

Similarly, Sak et al. (2016) investigated early childhood teachers' beliefs about and use of computer technologies in Turkish preschools through in-depth interviews with 16 teachers, analyzed thematically. The study found that teachers recognized the instructional benefits of technology but faced constraints including limited access to resources and insufficient training. Its strength lies in capturing the perspectives of early childhood educators directly, yet the small and localized sample limits generalizability, and the study does not compare experiences across different school types. Nevertheless, it underscores the importance of targeted professional support and technology-development projects to strengthen integration in early childhood settings.

Kara and Cagiltay (2017) examined in-service preschool teachers' perceptions of technology in early childhood education using semi-structured interviews with 18 teachers. The findings showed broadly positive attitudes toward appropriate technology use, with teachers noting the need for adequate resources, curriculum support, and professional development. A notable contribution of this study is its attention to teachers' awareness of both advantages and potential drawbacks of technology, highlighting the nuanced decision-making involved in technology integration. However, convenience sampling and the limited sample size pose constraints on generalizability. Together with Sak et al. (2016), this study indicates that while teachers generally value technology, practical and structural supports strongly influence its classroom adoption.

Bay (2022) extended these insights by studying 43 preschool teachers from 16 provinces in Turkey, using open- and closed-ended interviews analyzed inductively. Teachers were frequent users of web-based technologies and smartphone apps in personal contexts (97.7%) but less in classrooms (48.8%), often relying on personal devices. Teachers categorized digital applications into four themes, teacher, education, program, and family involvement, and identified benefits such as increased efficiency, facilitation of learning, enhanced transfer of outcomes, and improved communication with families. While the study provides a detailed mapping of teachers' perceptions and classroom practices, it is largely descriptive and does not explore factors influencing differences between teachers or schools. Its strength lies in the broader sample and thematic analysis, which allows for richer synthesis compared to smaller, single-site studies.

Alarfaj (2023) investigated post-pandemic integration of technology in Saudi early childhood classrooms through a case study with 20 teachers using WhatsApp questionnaires and interviews, analyzed via content analysis. Teachers viewed electronic activities as productive, supporting foundational

learning skills, and identified contextual and pedagogical factors influencing adoption. While the study highlights reflective practice and teacher professional development, it is limited by the small sample and regional focus, suggesting caution in extrapolating findings.

Bozcan et al. (2022) explored both teachers' and administrators' perspectives in the Turkish Republic of Northern Cyprus using semi-structured interviews with 20 teachers and 5 administrators. Both groups expressed positive views on technology, identified benefits for instructional activities, and reported adequate support from schools. The inclusion of administrators strengthens the study by providing multiple perspectives on institutional support; however, the reliance on convenience sampling limits representativeness.

From a learner-centered perspective, Segal-Drori and Shabat (2021) examined 171 Israeli preschool children's views on digital technologies through in-depth interviews. Content analysis revealed three key themes: perceived necessity, goals of use, and settings of use. About half of the children, especially younger ones, felt technology was unnecessary, though most recognized its learning value, highlighting social and time-related considerations. This study's strength is its focus on children's perspectives, which complements teacher-centered studies, though developmental differences across age groups suggest the need for more nuanced analysis.

In terms of demographic influences, Nyakoe et al. (2021) surveyed 302 teachers in Kenya regarding the Digital Literacy Programme, focusing on gender differences. Results indicated no significant difference between male and female teachers' attitudes, showing that both genders were equally willing to adopt digital literacy. Similarly, Konca and Erden (2021) surveyed 167 preschool teachers in Turkey and found positive attitudes toward technology but limited classroom use, mostly for passive activities such as cartoons or music, with gender, experience, and attitudes showing no significant influence. These studies collectively suggest that positive perceptions alone are insufficient for effective integration, and other structural or contextual factors must be considered. Finally, Kwaah et al. (2022) examined digital skills and stress among 661 preservice teachers in Ghana. Teachers with lower digital skills reported higher stress during online teaching in the COVID-19 pandemic, largely due to limited access to resources. Coping strategies included peer and family support, highlighting the importance of pre-service digital skills training. The large sample provides strong empirical support, but the online survey method limits qualitative depth.

Taken together, these studies reveal consistent patterns: teachers generally hold positive views toward technology and digital literacy, yet structural, pedagogical, and contextual factors, including access, training, and curriculum support, mediate whether these attitudes translate into practice. Notably, most research is conducted outside Ghana and focuses on older students, with limited attention to preschool teachers. Furthermore, only a few studies examine how teacher characteristics influence perceptions, highlighting a significant gap. Since young children's digital literacy development largely depends on teachers, the present study is critical for understanding preschool teachers' views in Ghana and informing professional development and early childhood education policy.

Table 1. Test of normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Teachers' views on the appropriate level to introduce digital literacy to young learners	.105	114	.110	.976	114	.083
Teachers' views on the relevance of digital literacy for young learners	.120	114	.065	.981	114	.120

a. Lilliefors Significance Correction

METHODS AND MATERIALS

This study used a quantitative approach. Specifically, a descriptive cross-sectional survey design was used to examine how preschool teachers in Ghana view digital literacy for young learners and how teacher-related factors such as qualification, experience, digital literacy training, grade level taught, and school type influence their views. The study's site was the Effutu Municipality in the Central Region of Ghana. A total of 114 preschool teachers from both public and private schools were selected using stratified random sampling. Data were collected through a structured questionnaire. The questionnaire had three parts: demographic information, views on the appropriate level to introduce digital literacy, and views on its relevance for young learners. Respondents ticked boxes to indicate their demographics, and items on the views were measured on a 5-point Likert scale. The items on the instrument were adapted from Westwood (2021) and validated by two lecturers with expertise in early childhood education. After this, a pilot test was conducted using 20 early childhood teachers from the Gomoa East District, a nearby district to Effutu. The reliability of the instrument was established using the Cronbach's Alpha reliability coefficient. The obtained value (0.821) indicated that the instrument was highly reliable and acceptable. After seeking the teachers' consent, the researchers distributed the questionnaires in person, ensuring voluntary participation and confidentiality. Data were analysed using SPSS, with frequency, percentages, mean, standard deviation, and multiple regression analysis used to test how teacher factors predicted their views on digital literacy. The categorical predictors (teachers' qualification, grade level taught, and school type) were dummy-coded before being entered into the regression models. The dependent variables, teachers' views on the appropriate level to introduce digital literacy to young learners (H_1) and teachers' views on the relevance of digital literacy for young learners (H_2) were measured using Likert-scale items. These items were averaged to create composite scores treated as approximately continuous variables, allowing the use of multiple linear regression. Before performing the regression analysis, the data were examined to ensure they met the following necessary statistical assumptions.

First, I checked the sample size requirement, which is critical to the reliability and generalizability of research findings. In multiple regression analysis, Tabachnick and Fidell (2013) recommend a minimum of 15 cases per independent variable to obtain a stable regression equation. In this study, with 114 participants and five independent variables (qualification, experience, digital literacy training, grade level taught, and school type), the ratio is approximately 22.8:1, well above the recommended threshold. Using the formula suggested by Tabachnick and Fidell (2001), $N > 50 + 8m$, where m is the number of independent variables, the minimum sample size required would be $50 + 8 \times 5 = 90$. Therefore, with

114 participants, the study exceeds both criteria, ensuring that the sample size is sufficient for reliable multiple regression analysis.

Second, missing data were examined using the Explore procedure in SPSS (Analyze → Descriptive Statistics → Explore). The dataset contained three missing values across the variables of interest. To handle these, the researcher applied mean substitution (Transform → Replace Missing Values → Method: Series Mean), replacing each missing value with the mean of the corresponding variable. Given that only 3 of 114 responses were missing (<3%), this approach minimized data loss while allowing all cases to be retained for subsequent regression analyses.

Third, test for independence of error: Independence was ensured as responses were collected individually from students without discussion or collaboration, preventing any influence of one participant's response on another. Similarly, in the regression output, the Durbin-Watson statistics of 1.983 (appropriate level) and 1.730 (relevance) fall within the acceptable range of 1.5 to 2.5, indicating that the assumption of error independence was satisfied.

Fourth, normality. The aim was to check to see if residuals are normally distributed: The Shapiro-Wilk test, inspection of Q-Q plots and histogram were used to assess the normality of the dependent variable. The results indicated that the distribution was approximately normal. The results are shown on **Table 1**.

The Kolmogorov-Smirnov and Shapiro-Wilk tests results in **Table 1** shows that teachers' views on the appropriate level to introduce digital literacy (KS $p = .110$; SW $p = .083$) and on the relevance of digital literacy (KS $p = .065$; SW $p = .120$) did not significantly deviate from normality, indicating that the assumption of normality was met.

The Normal P-P Plot of standardized residuals (**Figures 3 and 4**) show that the points were closely aligned to the diagonal line, indicating that the residuals were approximately normally distributed. Thus, the assumption of normality was met.

Similarly, the histogram of standardized residuals is approximately bell-shaped and centered around zero (**Figures 5 and 6**). This suggests that the residuals are normally distributed, fulfilling the assumption of normality in regression. The superimposed normal curve further confirms this, as the bars of the histogram closely follow the curve.

Fifth, linearity or homoscedasticity: Scatterplots were examined to confirm linear relationships between the predictors and the dependent variable. The visual inspection of the scatterplot in **Figure 7** indicated that the data points were randomly distributed around a straight trend, suggesting that the assumption of linearity was met.

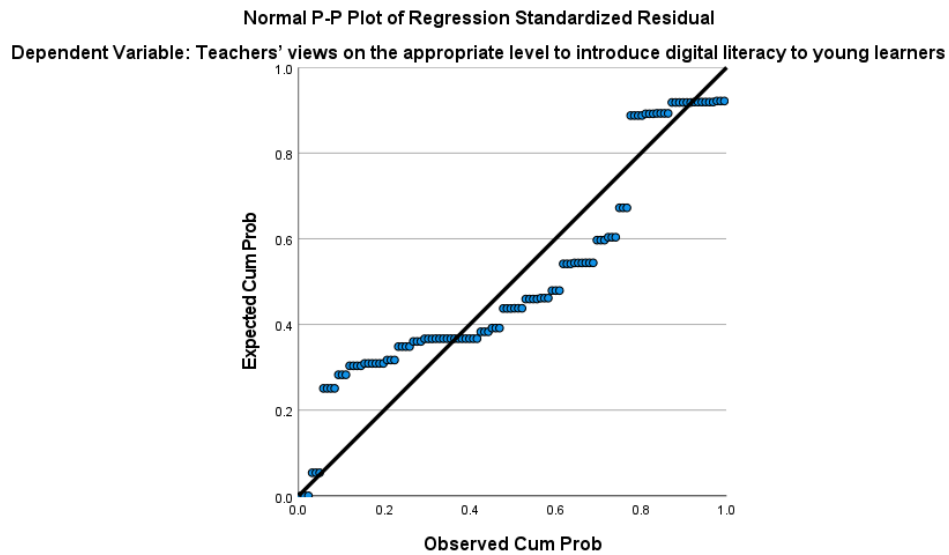


Figure 3. Normal P-P Plot showing normality (appropriate level) (Source: Field data)

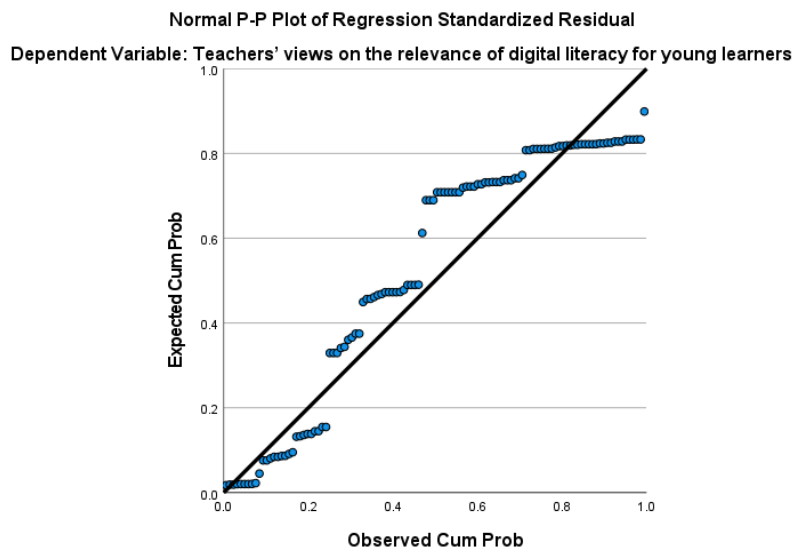


Figure 4. Normal P-P Plot showing normality (relevance) (Source: Field data)

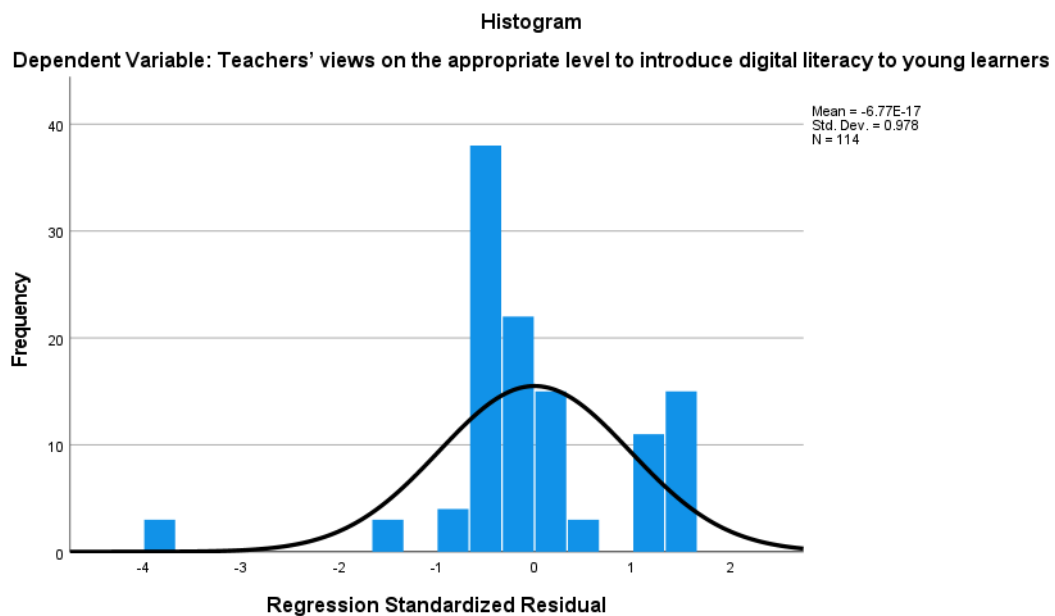


Figure 5. Histogram showing normality (appropriate level) (Source: Field data)

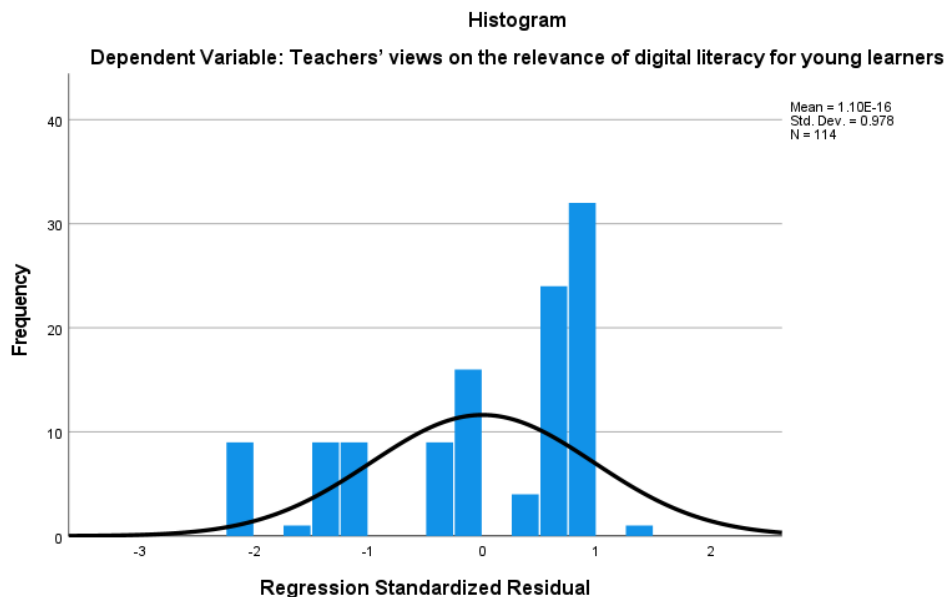


Figure 6. Histogram showing normality (relevance) (Source: Field data)

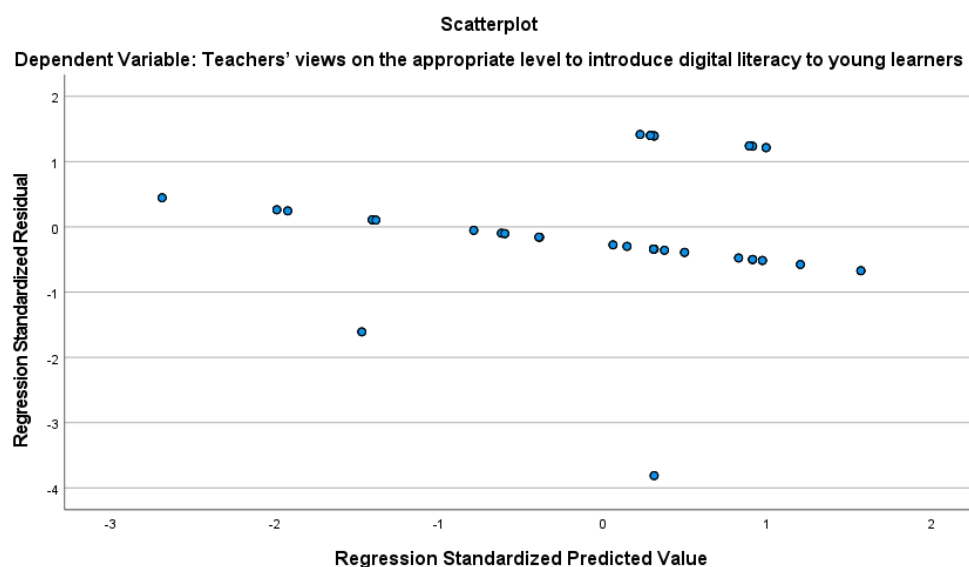


Figure 7. Scatter plot showing homoscedasticity (Source: Field data)

Lastly, the Variance Inflation Factor (VIF) and tolerance values were checked to assess multicollinearity. The tolerance values ranged from 0.618 to 0.738, and the corresponding VIF values ranged from 1.355 to 1.617. Since all VIF values were well below the threshold of 10 and all tolerance values exceeded 0.1, the results indicate no evidence of violation of the assumption of multicollinearity.

With these assumptions satisfied, the data were deemed appropriate for further inferential analysis using multiple linear regression.

RESULTS

This section presents the findings of the study based on the research objectives and hypotheses. The demographic variables of the teachers are presented in **Table 2**.

The demographic data in **Table 2** reveal that in terms of academic qualification, the majority of teachers, 64 (56.1%),

held a Degree in Early Childhood Education (ECE), while 22 (19.3%) had a Degree in Basic Education, and 13 (11.4%) held an MPhil in ECE. A small number had a Diploma in Basic Education (6; 5.3%) or MPhil in Basic Education (6; 5.3%), and only 3 (2.6%) had a Diploma in ECE. This high percentage of degree holders, particularly in ECE, suggests that most respondents may have a good understanding of child development, which could influence how they perceive the relevance of digital literacy for young learners, making academic qualification a likely predictor. In terms of teaching experience, a majority of teachers, 64 (56.1%), had between 1 and 5 years of experience, followed by 39 (34.2%) with 6 to 10 years. Only 8 (7.0%) had taught for more than 15 years, and 3 (2.6%) had 11 to 15 years of experience. The large proportion of early-career teachers may imply greater openness to new digital practices, which could affect their readiness to integrate digital tools and influence their views on when digital literacy should be introduced. Regarding grade level taught, 48 teachers (42.1%) taught Basic 1 to 3, 47 (41.2%) taught

Table 2. Demographic variables

Variables	Category	Frequency	Percent
Academic Qualification	Diploma in ECE	3	2.6 %
	Degree in ECE	64	56.1 %
	MPhil in ECE	13	11.4 %
	Diploma in Basic Edu.	6	5.3 %
	Degree in Basic Edu	22	19.3 %
	MPhil in Basic Edu	6	5.3 %
	Other certificates	0	0.0 %
	Total	114	100.0
Teaching Experience	1-5 years	64	56.1 %
	6-10 years	39	34.2 %
	11-15 years	3	2.6 %
	Above 15 years	8	7.0 %
	Total	114	100.0
Grade Level	Nursery	19	16.7 %
	KG	47	41.2 %
	Basic 1 to 3	48	42.1 %
	Total	114	100.0
School Type	Public	45	39.5 %
	Private	69	60.5 %
	Total	114	100.0
Training on Digital Literacy	Yes	55	48.2 %
	No	59	51.8 %
	Total	114	100.0

Table 3. Preschool teachers views on appropriate level for digital literacy skills

Statements	Frequency (%)						M/SD	
At what level should teachers teach learners about:	N	CR	NS	KG	PM	JHS	M	SD
Identifying digital devices (e.g., TV, laptop, tablet, phones, projector, music player, radio).	114	10 (9)	36 (32)	37 (33)	13 (11)	18 (16)	2.94	1.19
Basic operations of digital devices (e.g., how to turn on, off, play, pause, forward, backwards)	114	0 (0)	31 (27)	38 (33)	39 (34)	6 (5)	3.18	0.89
How to search on the internet using digital devices	114	0 (0)	16 (14)	25 (22)	51 (45)	22 (19)	3.63	1.07
How to play games with digital devices	114	19 (17)	25 (22)	25 (22)	33 (29)	12 (11)	2.95	1.27
How to watch online videos	114	9 (8)	0 (0)	32 (28)	43 (38)	30 (26)	3.75	1.09
How to use word processing skills (e.g., MS word, paint, excel, notepad, PowerPoint)	114	0 (0)	2 (2)	25 (22)	55 (48)	32 (22)	3.94	0.92
Overall M=3.40; SD = 1.07								
Key: Agree (AG), Disagree (DG), Mean (M), Standard deviation (SD)								

Kindergarten, and 19 (16.7%) were in Nursery. Since most teachers are currently handling early childhood classes, their day-to-day experiences may directly shape their perspectives on the appropriate level for introducing digital skills, making grade level taught a relevant predictor. On school type, 69 (60.5%) of respondents were from private schools and 45 (39.5%) from public schools. The dominance of private school teachers, who may have better access to digital resources, suggests they might hold more favourable views about digital integration, making school type another important predictor. Finally, 59 teachers (51.8%) indicated they had not received any digital literacy training, compared to 55 (48.2%) who had. This near-even split highlights the varied preparedness among teachers and implies that prior training could significantly influence their confidence and beliefs about the role and timing of digital literacy in early childhood education in Ghana.

Research Objective 1: Preschool Teachers' Views on the Appropriate Level at Which Digital Literacy Should be Introduced to Young Learners

The aim of this objective was to find out from the teachers the level at which they deemed appropriate for young learners to be introduced to digital literacy. Respondents were asked to select the most appropriate level: Creche (CR), Nursery (NS), Kindergarten (KG), Primary (PM) and Junior High School (JHS).

The data were analysed using frequency, percentage, mean and standard deviation. The mean scores were interpreted as follows: 1.00-1.49 (Crèche), 1.50-2.49 (Nursery), 2.50-3.49 (Kindergarten), 3.50-4.49 (Primary), and 4.50-5.00 (JHS). The results are presented in **Table 3**.

The data presented in **Table 3** show that most of the teachers, 83 (73%), indicated that learners should be taught to identify digital devices like TVs, tablets, and computers at the early childhood level, specifically from Nursery to Kindergarten. Only 31 (27%) preferred Primary or JHS levels. The mean score of 2.94, which falls within the Kindergarten range (2.50-3.49), suggests that most teachers support introducing this skill around Kindergarten. The standard deviation of 1.19 indicates varied responses. Similarly, 108 (95%) of the teachers preferred that children learn basic operations of digital devices such as turning them on or off from Nursery to Primary level. Only 6 (5%) preferred JHS. The mean score (3.18) shows a general agreement that these skills should be introduced by Kindergarten level, while the standard deviation (0.89) indicates consistent responses. For searching the internet using digital devices, most teachers, 73 (64%), believed this skill should be introduced at Primary or JHS. Only 41 (36%) suggested lower levels. The mean score of 3.63, which falls in the Primary range, indicates that teachers generally agreed this more advanced skill should come later. The standard deviation of 1.07 suggests differences in opinions. In

Table 4. Preschool teachers views on relevance of digital literacy skills for young learners

Statements	Frequency (%)			Mean/SD	
	N	DG	AG	M	SD
Digital literacy is key for children's development in the 21st century	114	5 (4)	109 (96)	3.87	0.45
Using digital tools in class keeps children focused and attentive.	114	11 (10)	103 (90)	3.70	0.56
Early exposure to digital tools improves children's readiness for primary education.	114	9 (8)	105 (92)	3.73	0.82
Digital literacy helps children develop fine motor and cognitive skills.	114	13 (11)	101 (89)	3.67	0.49
Children who engage with digital tools learn faster than those who do not.	114	17 (15)	97 (85)	3.54	0.44
Digital tools make learning more interactive and fun for young learners.	114	4 (4)	110 (96)	3.89	0.52

Key: Agree (AG), Disagree (DG), Mean (M), Standard deviation (SD)

Table 5. Descriptive statistics

Demographic Variables	N	Mean	Std. Deviation
Type of qualification	114	2.98	1.40
Teaching experience	114	1.61	0.84
Grade Level	114	2.25	0.72
School Type	114	1.39	0.49
Training on Digital Literacy	114	1.75	1.06
Views on Grade level for digital literacy	114	3.11	0.76

the case of teaching children how to play games on digital devices, responses were mixed. While 69 (61%) preferred early levels from Crèche to Kindergarten, 45 (39%) indicated Primary or JHS. The mean score of 2.95 still falls within the Kindergarten range, but the standard deviation of 1.27 shows a wider spread in views. With regard to watching online videos, most of the teachers, 73 (64%), chose Primary and JHS as the suitable levels, while 41 (36%) preferred earlier levels. The mean score of 3.75, which falls in the Primary range, indicates general agreement that video content should be introduced from Primary level. The standard deviation of 1.09 shows varied views on this. Finally, most of the teachers, 87 (76%), indicated that word processing skills like using Microsoft Word and PowerPoint should be introduced from Primary level and above. Only 27 (24%) preferred lower levels. The mean score of 3.94, shows agreement that this skill should be introduced at this later stage. The standard deviation of 0.92 indicates consistent views. It can be concluded, based on the average mean score of 3.40, that preschool teachers view Kindergarten as the appropriate level at which digital literacy should be introduced to young learners in Ghanaian schools.

Research Objective 2: Preschool Teachers' Views on the Relevance of Digital Literacy for Young Learners

This objective examined teachers views on how relevant they consider digital literacy to be for young learners. Respondents were asked to indicate their level of agreement with several statements about the importance of digital literacy in early childhood education. The responses were analyzed using frequency, percentage, mean and standard deviation. The mean score was calculated as follows; $M(\bar{x}) = 1 + 2 + 3 + 4 = 10/4 = 2.5$. Therefore, a mean score above 2.5 indicates agreement, while a mean score below 2.5 indicates disagreement. Similarly, standard deviation values below 1.0 suggest consistency in responses, while values of 1.0 or above indicate variation. The results are presented in **Table 4**.

The data presented in **Table 4** show that the majority of teachers, 109 (96%), agreed that digital literacy is key for children's development in the 21st century, while only 5 (4%) disagreed. The mean score of 3.87, which is above 2.5, indicates agreement, and the standard deviation of 0.45 shows consistency in responses. Similarly, 110 (96%) of the teachers agreed that digital tools make learning more interactive and fun for young learners, while 4 (4%) disagreed. The mean score of 3.89 indicates agreement, and the standard deviation of 0.52

suggests consistent views. Also, 105 (92%) of the teachers agreed that early exposure to digital tools improves children's readiness for primary education, while 9 (8%) disagreed. The mean score of 3.73 indicates agreement, and the standard deviation of 0.82 shows some variation in responses. In addition, 103 (90%) of the teachers agreed that using digital tools in class keeps children focused and attentive, while 11 (10%) disagreed. The mean score of 3.70 indicates agreement, with a standard deviation of 0.56. Furthermore, 101 (89%) of the teachers agreed that digital literacy helps children develop fine motor and cognitive skills, while 13 (11%) disagreed. The mean score of 3.67 indicates agreement, and the standard deviation of 0.49 shows consistency. Lastly, 97 (85%) of the teachers agreed that children who engage with digital tools learn faster than those who do not, while 17 (15%) disagreed. The mean score of 3.54 also indicates agreement, with a standard deviation of 0.44. The data suggest that preschool teachers consider digital literacy highly relevant for young learners, particularly in terms of making learning more engaging ($M = 3.89$), supporting children's overall development in the 21st century ($M = 3.87$), and improving school readiness through early exposure ($M = 3.73$). Teachers also agreed that digital tools help maintain learners' attention in class ($M = 3.70$), support the development of fine motor and cognitive skills ($M = 3.67$), and promote faster learning among children ($M = 3.54$).

HYPOTHESIS

Research Hypothesis One

H₁: Teachers' qualification, experience, digital literacy training, grade level taught and school type significantly predict preschool teachers' views on the appropriate level to introduce digital literacy to young learners.

This part of the analysis presents the results of a regression analysis conducted to determine whether teacher background characteristics predict their views on the appropriate grade level for introducing digital literacy in early childhood education. The descriptive statistics are presented on **Table 5**.

The descriptive results show that the average score for level for digital literacy ($M = 3.11$, $SD = 0.76$) was higher than the average scores for most predictors, including qualification ($M = 2.98$), teaching experience ($M = 1.61$), grade level taught ($M =$

Table 6. Regression model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.260 ^a	.067	.024	.576

a. Predictors: (Constant), Education/training on digital literacy, Teaching Experience (in years);, Class handled, Type of Qualification, Type of School

Table 7. ANOVA results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.591	5	.518	1.560	.178 ^b
	Residual	35.874	108	.332		
	Total	38.465	113			

a. Dependent Variable: Teachers' views on the appropriate level to introduce digital literacy to young learners

b. Predictors: (Constant), Education/training on digital literacy, Teaching Experience (in years);, Class handled, Type of Qualification, Type of School

Table 8. Coefficients results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.108	.307		10.126	.000
	Type of School	.103	.126	.087	.819	.415
	Type of Qualification	-.116	.042	-.280	-2.753	.007
	Teaching Experience (in years):	.010	.067	.014	.143	.887
	Class handled	.091	.085	.113	1.073	.286
	Education/training on digital literacy	.013	.036	.036	.364	.717

a. Dependent Variable: Teachers' views on the appropriate level to introduce digital literacy to young learners

Table 9. Regression model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.181 ^a	.033	-.012	1.009

a. Predictors: (Constant), Education/training on digital literacy, Teaching Experience (in years), Class handled, Type of Qualification, Type of School

2.25), and digital literacy training ($M = 1.75$). This suggests some variation in teachers' perceptions, warranting further analysis via regression.

To test the hypothesis, a multiple linear regression was conducted. The results from the model summary are shown in **Table 6**.

The model summary indicates a weak positive correlation ($R = .260$) between the combined teacher characteristics and their views on the appropriate level for introducing digital literacy. The R Square value of 0.067 suggests that only 6.7% of the variance in the dependent variable is explained by the predictors. The adjusted R^2 (0.024) is even lower, indicating a limited explanatory power after adjusting for the number of predictors.

The overall significance of the model was assessed using ANOVA as presented in **Table 7**.

Table 7 shows that the overall regression model was not statistically significant, $F(5, 108) = 1.560$, $p = .178$. This means that when taken together, the five background factors (qualification, experience, grade level taught, school type, and training) do not significantly predict teachers' views on the appropriate level for introducing digital literacy.

The specific contribution of each predictor is presented in **Table 8**.

From **Table 8**, it is clear that only the type of qualification was a statistically significant predictor of teachers' views ($B = -.116$, $p = .007$). The negative coefficient suggests that higher levels of qualification are associated with a preference for introducing digital literacy at a later stage. However, the remaining predictors, school type ($p = .415$), teaching experience ($p = .887$), grade level taught ($p = .286$), and digital literacy training ($p = .717$) did not show statistically significant relationships with teachers' views on the appropriate level for

introducing digital literacy. Given that the overall regression model was not statistically significant, this finding should be interpreted with caution. While differences in academic qualifications may be associated with variation in teachers' expectations regarding the timing of digital literacy introduction, this relationship cannot be considered conclusive.

Research Hypothesis Two

H₂: Teachers' qualification, experience, digital literacy training, grade level taught and school type significantly predict preschool teachers' views on the relevance of digital literacy for young learners.

This section presents the results of a regression analysis examining how teacher-related factors influence their views on the relevance of digital literacy for young learners. The analysis included the following independent variables: type of qualification, teaching experience, grade level taught (class handled), school type, and training on digital literacy. The dependent variable was teachers' views on the relevance of digital literacy. The results are presented on **Table 9**.

The model summary in **Table 9** indicates a weak correlation ($R = .181$) between the combined predictor variables and teachers' views on the relevance of digital literacy. The R Square value of 0.033 shows that only 3.3% of the variance in teachers' views is explained by the model. The adjusted R^2 value of $-.012$ suggests that the model has very little, and possibly no explanatory power when adjusted for the number of predictors.

The ANOVA results are presented in **Table 10**.

Table 10. ANOVA table

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.730	5	.746	.732	.601 ^b
	Residual	110.024	108	1.019		
	Total	113.754	113			

a. Dependent Variable: Teachers' views on the relevance of digital literacy for young learners

b. Predictors: (Constant), Education/training on digital literacy, Teaching Experience (in years);, Class handled, Type of Qualification, Type of School

Table 11. Coefficients results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.926	.537		5.444	.000
	Type of School	.291	.221	.143	1.319	.190
	Type of Qualification	.018	.074	.025	.245	.807
	Teaching Experience (in years):	-.013	.117	-.011	-.114	.909
	Class handled	-.043	.148	-.031	-.292	.771
	Education/training on digital literacy	-.042	.062	-.068	-.677	.500

a. Dependent Variable: Teachers' views on the relevance of digital literacy for young learners

Table 10 shows that the overall regression model was not statistically significant, $F(5, 108) = 0.732$, $p = .601$. This means that the combined effect of the five background variables does not significantly predict preschool teachers' views on the relevance of digital literacy for young learners.

The specific contribution of each predictor is presented in **Table 11**.

Table 11 shows that none of the predictor variables had a statistically significant effect on teachers' views. All p-values were well above the 0.05 threshold, indicating that variables such as qualification ($p = .807$), teaching experience ($p = .909$), grade level taught ($p = .771$), school type ($p = .190$), and training on digital literacy ($p = .500$) did not significantly influence how teachers perceive the relevance of digital literacy for young children. Based on the results, it is concluded that teachers' background characteristics such as qualification, experience, grade level, school type, and digital literacy training, did not significantly predict their views on the relevance of digital literacy in early childhood education. This suggests that the belief in the importance of digital literacy is widely shared among preschool teachers in the study, regardless of their demographic differences.

DISCUSSION

Appropriate Level for Digital Literacy Education

The findings for research question indicate that most preschool teachers in Ghana consider Kindergarten to be the appropriate stage for introducing digital literacy, particularly for basic competencies such as identifying digital devices and learning how to operate them. More advanced skills such as internet use, watching online videos, and word processing, were generally viewed as more suitable for introduction at the Primary level. This staged approach reflects teachers' sensitivity to the developmental readiness of young children and aligns with evidence that early childhood is a critical period for building foundational skills (UNICEF, 2020; Buabeng et al., 2021). Similar conclusions were drawn by Liu et al. (2023), who found that digital tools enhance children's cognitive development and learning engagement when introduced in developmentally appropriate ways. These findings can be meaningfully interpreted through the Sociocultural Model of Young Children's Digital Experiences (Plowman et al., 2010;

2012), which emphasizes that children's digital learning is socially mediated, context-dependent, and shaped by adult beliefs and practices. According to this model, digital learning does not occur simply through access to technology but emerges through everyday routines, play, and guided interaction. The teachers' preference for introducing digital literacy gradually, starting with basic awareness and progressing to more complex skills, reflects this sociocultural perspective. Their views suggest an understanding that young children's engagement with digital technologies must be carefully scaffolded and aligned with developmental and contextual considerations. In this sense, teachers act as key mediators of children's digital experiences, shaping not only when technology is introduced but also how it is framed within classroom practices. The findings also align closely with Ghana's national curriculum framework. The Kindergarten curriculum under the Common Core Programme (CCP), developed by the National Council for Curriculum and Assessment (NaCCA), promotes play-based and activity-oriented learning and encourages age-appropriate exposure to ICT. Under the strand "ICT and Digital Literacy," learners are expected to recognize digital devices, demonstrate basic awareness of their use, and observe technology in everyday contexts (Ministry of Education, 2019). This supports the teachers' views that digital literacy should begin early but remain limited to foundational competencies at the Kindergarten level. The consistency between teachers' perspectives and curriculum expectations suggests coherence between policy intentions and classroom-level beliefs.

In addition to the sociocultural perspective, the findings can be further understood through the Extended Technology Acceptance Model (TAM2) (Venkatesh & Davis, 2000). While the original Technology Acceptance Model (Davis, 1989) emphasizes Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) as key determinants of technology acceptance, TAM2 expands this framework by incorporating external variables such as social influence, job relevance, experience, training, and support. In the context of this study, these external variables are particularly relevant, as they correspond closely with teacher-related characteristics such as qualification, teaching experience, digital literacy training, grade level taught, and school type. The teachers' cautious but positive stance toward early digital literacy introduction suggests that their acceptance of digital tools is shaped not only by perceptions of usefulness and ease of use, but also by

professional judgment, training experiences, and contextual demands of early childhood education. The tendency to delay more complex digital skills until later grades indicates that teachers weigh the perceived educational value of technology against concerns about age-appropriateness and classroom practicality. This aligns with TAM2's assertion that background characteristics and contextual factors influence how individuals evaluate and adopt technology. Thus, variations in teachers' views may reflect differences in how useful and manageable they perceive digital tools to be within early childhood settings. The preference for a phased introduction of digital literacy is also consistent with international guidelines. Global frameworks proposed by UNESCO (2021) and OECD (2021) advocate a developmental approach to digital integration in early childhood education, emphasizing gradual exposure, guided use, and alignment with children's cognitive and social development. Sabado's (2018) findings further support this perspective, demonstrating that although teachers may possess adequate knowledge of digital literacy, the extent and nature of integration vary depending on the complexity of the skills and learners' readiness. This suggests that teachers actively adapt digital practices based on their professional judgment and contextual realities.

Relevance of digital literacy for preschoolers

The findings from Research Question Two indicate that preschool teachers in Ghana strongly perceive digital literacy as highly relevant in early childhood education. Teachers reported that digital literacy supports children's development, enhances focus, improves school readiness, and facilitates faster learning. High mean scores and low standard deviations across the survey items suggest a shared professional understanding of its value. These results align with previous research demonstrating the pedagogical benefits of technology when integrated meaningfully in early learning contexts (Miller, 2021; Dinata, 2021; Ng, 2012). The findings theoretically reflect the views of Plowman et al. (2010; 2012) that digital learning is socially mediated, context-dependent, and shaped by adult beliefs and practices. Teachers' strong endorsement of digital literacy reflects an understanding that technology should be introduced in ways that support children's learning through guided interaction, play, and everyday activities, rather than through access alone. From this perspective, teachers act as mediators of young children's digital experiences, making professional judgments about the timing and nature of digital literacy introduction to align with developmental readiness and classroom contexts. Similarly, the Davis (2000) and Venkatesh and Davis (2000) provides a complementary lens. The teachers' positive views about the relevance of digital literacy suggest high perceived usefulness, particularly in supporting children's cognitive development and school readiness. Variations in teacher-related factors, such as qualification, teaching experience, digital literacy training, grade level taught, and school type can influence perceptions of both usefulness and ease of use. Consequently, teachers' willingness to introduce digital tools and their cautious, phased approach can be understood as an outcome of these attitudinal and contextual factors.

The findings also align with international literature on early childhood educators' perspectives. Sak et al. (2016) found that Turkish preschool teachers recognized the instructional benefits of technology but faced constraints including limited resources and insufficient training. Kara and Cagiltay (2017) reported broadly positive attitudes among in-service teachers,

highlighting the importance of adequate resources, curriculum support, and professional development. Bay (2022) extended this work with a larger sample, showing that while teachers frequently used web-based technologies personally, classroom use was more limited, often relying on personal devices, and teachers categorized digital applications according to teacher, education, program, and family involvement themes. Similarly, Alarfaj (2023) and Bozcan et al. (2022) found that contextual and institutional support strongly influenced the degree to which teachers could integrate digital tools in practice. These studies collectively indicate that while teachers generally value digital literacy, practical and structural factors shape actual classroom implementation. From a learner-centered perspective, Segal-Drori and Shabat (2021) reported that preschool children recognized the learning value of technology but younger learners were less likely to see it as necessary, highlighting the importance of age-appropriate and socially mediated digital experiences. This aligns with the Ghanaian teachers' cautious approach to introducing more complex digital skills at later stages, demonstrating developmental sensitivity in practice. Similarly, the Ghana Standards-Based Kindergarten Curriculum emphasizes early, age-appropriate introduction of digital concepts to foster creativity, communication, problem-solving, and observation skills (Ministry of Education, 2019). Teachers' views, therefore, reflect both theoretical understanding and alignment with national curriculum expectations.

The alignment between theory, national curriculum standards, and teachers' perceptions indicates that Ghanaian preschool teachers adopt a thoughtful, developmentally informed, and context-sensitive approach to digital literacy. Nonetheless, as highlighted in the literature, systemic and contextual constraints including access, resources, and training, may limit the consistent and effective implementation of digital literacy in early childhood classrooms. Addressing these factors through targeted professional development, infrastructure support, and curriculum guidance is essential to translate positive attitudes into meaningful classroom practice.

Teachers' demographics and appropriate level for digital literacy education

Based on hypothesis 1, the regression analysis revealed that the type of qualification was the only statistically significant predictor of preschool teachers' views on the appropriate level for introducing digital literacy. The negative coefficient indicates that teachers with higher qualifications tend to favor introducing digital literacy at a slightly later stage, emphasizing developmental appropriateness. The other predictors (school type, teaching experience, grade level taught, and digital literacy training) did not significantly influence teachers' views. Given that the overall regression model was not statistically significant, these findings should be interpreted cautiously, as the relationships observed may not generalize beyond the sample. The influence of qualification on teachers' views reflects the observation by Plowman et al. (2010; 2012) that young children's engagement with digital technologies is socially mediated and context-dependent, shaped by adult beliefs and pedagogical practices. Teachers with higher qualifications may draw on deeper theoretical understanding and training to evaluate when and how digital tools should be introduced, balancing the developmental needs of children with curricular goals. Their cautious stance

aligns with the sociocultural emphasis on guided and meaningful learning experiences, where access alone is insufficient, and technology integration must be scaffolded within everyday routines and play. The findings also align with international studies of early childhood teachers' perspectives. Sak et al. (2016) and Kara and Cagiltay (2017) reported that teachers recognize the benefits of technology but often face structural constraints, such as limited access and insufficient training, which influence their classroom implementation. Bay (2022) and Alarfaj (2023) similarly observed that teachers frequently use digital technologies personally but demonstrate more cautious classroom integration, often guided by their perceptions of developmental appropriateness and pedagogical relevance. From a learner-centered perspective, Segal-Drori and Shabat (2021) found that children themselves have varying readiness for digital engagement, supporting teachers' cautious, phased approach as developmentally appropriate.

At the same time, Davis (1989) and Venkatesh & Davis (2000) examine how external factors, such as training, experience, social influence, and perceived usefulness, shape attitudes toward technology adoption. In this context, teachers' qualifications function as an external factor that influences their perceptions of the usefulness and appropriateness of digital tools in early childhood classrooms. Teachers with advanced qualifications may perceive more complex digital skills as less appropriate for younger children, reflecting a belief that foundational play-based learning should precede structured digital instruction. This aligns with Ertmer and Ottenbreit-Leftwich (2010), who argued that teachers' personal beliefs significantly shape instructional decisions beyond access or formal training. The current findings also resonate with prior empirical research. Tondeur et al. (2017) found that teachers' educational background influences their instructional preferences and openness to integrating technology, supporting the observation that higher-qualified teachers may prioritize developmental readiness. Similarly, Sabado (2018) noted variation in teachers' integration of digital skills based on training and personal beliefs, highlighting how pedagogical orientations mediate technology use. These studies, when interpreted through the Sociocultural Model, suggest that teachers' decisions about digital literacy are not purely pragmatic but grounded in their professional understanding of child development and classroom learning dynamics. While the regression results suggest that qualification plays a role, the non-significance of other predictors including school type, experience, grade level taught, and digital literacy training highlights the complex interplay between teacher characteristics and classroom practices. Through the lens of TAM2, these non-significant factors may reflect that perceived usefulness and ease of use of digital tools are mediated more strongly by personal beliefs and pedagogical knowledge than by experience or training alone. In practice, this implies that while professional development and contextual supports remain important, fostering positive teacher beliefs and reflective pedagogical reasoning is equally critical for meaningful digital literacy integration.

Teachers demographic and relevance of digital literacy for preschoolers

Contrary to the first hypothesis, the regression results for Hypothesis Two showed that none of the teacher-related variables significantly predicted views on the relevance of

digital literacy in early childhood education. This suggests that beliefs about the importance of digital literacy are shared broadly among teachers, regardless of differences in qualification, experience, or training. This uniformity may reflect a collective recognition among teachers that young children's digital learning is socially mediated and context-dependent: teachers act as key facilitators in guiding meaningful engagement with technology, rather than relying solely on access (Plowman et al., 2010, 2012). Their shared belief in digital literacy's relevance underscores the sociocultural notion that adult mediation and pedagogical judgment are central to children's early digital experiences. The findings also shows that the lack of predictive power from training or experience suggests that teachers' intrinsic perceptions of digital literacy's value may be more influential than formal qualifications or exposure alone (Davis, 1989; Venkatesh & Davis, 2000). High shared agreement across teachers could indicate that perceived usefulness of digital literacy is widely acknowledged, consistent with Nyakoe et al. (2021), who reported no significant gender differences in openness to digital literacy, and Kwaah et al. (2022), who emphasized that exposure to digital tools through training reinforces recognition of digital content's importance for both preservice and in-service teachers, particularly during challenges such as the COVID-19 pandemic. Nonetheless, translating beliefs into classroom practice remains constrained by contextual and structural factors, as highlighted by the Sociocultural Model. Many preschools in Ghana lack the infrastructure, materials, and sustained professional development necessary for effective digital integration (Ministry of Education, 2018; Ayisi et al., 2024). From a TAM2 perspective, this limitation may reduce perceived ease of use, thereby constraining actual adoption despite widespread recognition of usefulness. Moreover, the lack of significant effects from training and experience may reflect variability in program quality or practical relevance; as Peterson et al. (2018) and Ogegbo and Aina (2020) noted, even when training is provided, teachers' comfort with traditional teaching methods and their personal beliefs about digital tools' utility heavily influence implementation decisions.

CONCLUSIONS AND RECOMMENDATIONS

The study revealed that preschool teachers preferred introducing basic digital literacy at the Kindergarten level and advanced skills at the Primary level, aligning with Ghana's curriculum and global standards. Hence, the Ghana Education Service (GES) and the Effutu Municipal Education Directorate should strengthen teacher orientation and resource provision to support the phased implementation of digital literacy as outlined in the national curriculum. Teachers should be provided with illustrated guides and digital kits tailored for Kindergarten, along with demonstration models for gradual skill progression.

Also, teachers widely agreed on the importance of digital literacy for young learners' development, regardless of background. To capitalize on teachers' positive perceptions, the Ministry of Education in Ghana and the Effutu Municipal Education Directorate should mainstream digital literacy into play-based classroom routines by embedding ICT concepts into storybooks, songs, and learning centers. Furthermore, short digital awareness workshops can help teachers integrate

technology meaningfully using the tools available in their settings.

Additionally, only qualification significantly influenced teachers' views, with higher-qualified teachers preferring a later introduction of digital literacy; however, this finding is inconclusive due to the overall non-significant regression model. Hence, GES and NaCCA should harmonize teacher training with curriculum goals to ensure that all teachers, regardless of qualification, understand the rationale for early, developmentally appropriate digital exposure.

Lastly, no background factors significantly predicted views on relevance; belief in the value of digital literacy was shared. The Ministry of Education in Ghana and the Effutu Municipal Education Directorate should ensure equal access to digital resources across all school types to support the implementation of these shared beliefs.

A major limitation of the study was that, because the overall regression model was not statistically significant, the findings should be interpreted cautiously, with teachers' qualifications as the only significant predictor of views on the timing of digital literacy, with higher-qualified teachers favouring a later introduction. Similarly, although teachers' qualification, experience, digital literacy training, grade level taught, and school type were not significant predictors of preschool teachers' views on the relevance of digital literacy for young learners, the negative adjusted R^2 indicates that the model performed worse than an intercept-only model. This suggests that these predictors have little explanatory power for the outcome and represents a limitation of the study. Future research should consider additional factors that may better explain teachers' views. It is also suggested for future studies to examine the availability of resources to implement digital literacy skills in Ghana's basic schools.

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