



Assessing digital literacy resources in Ghanaian preschools: Differences between public and private school types

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ABSTRACT

Digital literacy skills are increasingly being emphasized across all levels of Ghana's education system as part of the 2019 educational reforms. Given the growing relevance of digital competence in early childhood education, both public and private preschools are expected to provide enabling environments for digital learning. However, before teachers can promote these skills, the digital resources must be available. This study assessed the state of available resources for developing learners' digital literacy skills in Ghanaian public and private preschool settings. A quantitative comparative design was adopted, involving 69 teachers from public schools and 45 from private schools in the Effutu Municipality. Stratified random sampling was used to select these teachers. Data were analyzed using frequencies, percentages, mean scores, standard deviations, and independent samples t-tests. The findings revealed that public preschools are generally under-resourced, with most devices either unavailable, spoilt, or insufficient. In contrast, private preschools were moderately resourced, with mobile phones, smart TVs, and laptops being the most accessible. However, critical tools such as tablets and internet connectivity were still lacking in both school types. The independent samples t-test revealed a statistically significant difference between public and private preschools in the availability of digital resources. The study concludes that although private preschools appear better equipped, both settings face challenges in fully promoting digital literacy. It is therefore recommended that proprietors and the Effutu Education Directorate make deliberate efforts to improve resource allocation and digital infrastructure in preschools to promote equitable access to digital literacy development from the early years.

Keywords: digital literacy, resources, preschool, school type, difference, Effutu

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INTRODUCTION

Digital literacy is the ability to access, understand, and use information from various sources through digital tools. It helps learners develop essential skills for future success, as modern workplaces demand continuous digital competence (Peromingo & Pieterse, 2018). According to Wafula and Mmbone (2025), digital literacy enables learners to locate, evaluate, use, and create information using digital tools and networks. Amissah (2023) adds that digital literacy is vital for modern life, supporting economic growth and helping societies face current challenges.

The integration of digital literacy into early childhood education has become a global priority. In today's digital era, being digitally skilled is essential for navigating everyday life. Choudhary and Bansal (2022) argue that early investment in digital skills prepares young learners for the demands of a rapidly changing world. Bondah (2021) emphasizes that children should begin learning the role of technology early, using computers, programmed toys, and online content through play and

exploration. This early exposure forms the base for more advanced digital use later in life. Koech (2021) highlights that digital tools such as tablets, laptops, smartboards, and audiobooks support teaching and learning in early education. Zitter and Hoeve (2012) also note that these technologies allow children to take virtual tours and experience real-world situations they may not otherwise encounter. In line with this, Ghana's educational reforms, particularly the standards-based curriculum, emphasize digital literacy as a core competency starting from the preschool level (Ministry of Education, 2019).

However, implementing this vision requires more than curriculum changes, it depends heavily on the availability of appropriate resources. It is therefore surprising that empirical studies reported a lack of instructional resources even after the curriculum reform (Aboagye & Yawson, 2020; Apau, 2021; Danquah & Poku, 2024). For instance, Danquah and Poku (2024) found that both teachers and headteachers cited a shortage of teaching and learning materials, which negatively impacted standards-based curriculum implementation. Similarly, Soma et al. (2021) identified poor internet connectivity, inadequate ICT infrastructure, and limited teacher knowledge of digital tools as major

barriers to digital integration in schools. Bondah (2021) highlights that while many Ghanaian early childhood educators recognize the value of digital technology, practical implementation remains limited due to the lack of digital tools, inadequate internet access, and minimal institutional support. Abdulai and Dery (2018) further assert that although ICT has the potential to strengthen engagement between teachers and parents in early childhood settings, such benefits are rarely realized in public schools due to infrastructure gaps and low digital capacity. Meanwhile, Owusu and Govender (2023) reported that although teachers in rural areas showed enthusiasm for digital game-based learning, most lacked the necessary devices and training to implement it effectively.

These reports implies that while digital literacy is recognized as a foundational skill for learners in today's technology-driven world, compelling Ghana's early childhood curriculum to integrates this priority, the reality in schools often does not match the policy intent. These limitations are more pronounced in public preschools, where resource allocation remains inadequate. Buabeng et al. (2021), therefore, argue that for children to fully develop their digital skills and reach their potential, both public and private preschools must be equally or comparably resourced. Ensuring equal access to digital tools in all early childhood settings is essential for achieving Millennium Development Goal 2 (universal primary education) and supporting Ghana's broader national development.

Given these realities, the problem is not just about whether digital literacy is important, but whether the necessary resources are available to make its development possible in early years education. While previous studies have looked at the issue, the majority have focused on ICT integration in preschools (Abdulai & Dery, 2018), but this was done prior to the introduction of Ghana's new standards-based curriculum. Studies that focused on the new curriculum largely examined teachers' views and readiness (Amissah, 2023; Bondah, 2021; Owusu & Govender, 2023), with limited attention to the actual availability of teaching and learning resources to promote digital literacy. More importantly, few studies have comparatively examined how public and private preschools in Ghana differ in their access to digital resources. This study, therefore, addresses these gaps by examining the state of resource availability in both contexts. By filling these gaps, the study will provide useful data to guide school leaders and teachers in addressing digital resource needs. It would also inform policy decisions by offering evidence to help the government and stakeholders reduce the digital gap between public and private preschools and improve equity in early childhood education. Based on this, the purpose of the study was to assessed the state of available resources for developing learners' digital literacy skills in Ghanaian public and private preschool settings. Specifically, the study sought to:

1. Examine the state of available resources for developing learners' digital literacy skills in public preschool settings in Effutu.
2. Examine the state of available resources for developing learners' digital literacy skills in private preschool settings in Effutu.

The study tested this research hypothesis:

H₀: There is no statistically significant difference in the state of available resources for developing learners' digital literacy skills between public and private preschool settings in Effutu.

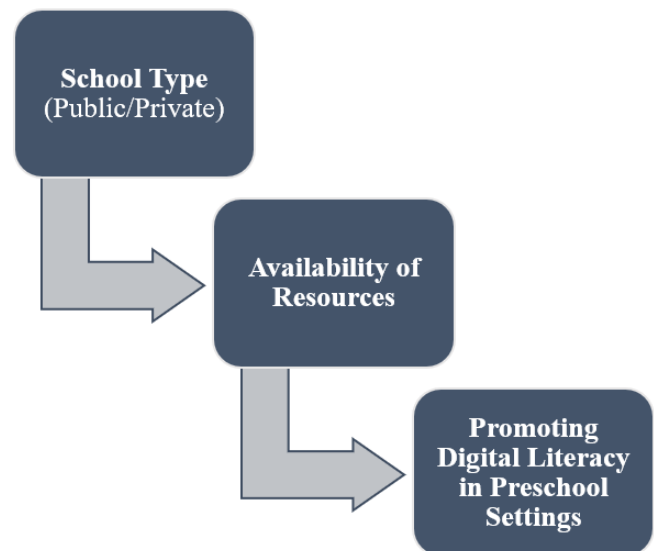


Figure 1. Conceptual framework showing relationship among variables in the study (Source: Author's own elaboration)

LITERATURE REVIEW

This study is based on the Technology Acceptance Model (TAM) and the Resource-Based View (RBV) of institutions. The Technology Acceptance Model by Davis. The theory explains how people accept and use technology. It says that two things matter: how useful the technology is and how easy it is to use (Xue et al., 2026). In schools, teachers are more likely to use digital tools if they find them helpful and simple. However, before teachers can use them, the tools must be available. That is why this study looks at the resources first. The Resource-Based View by Barney focuses on the resources that an institution has. It says that schools with more and better resources can achieve better results (Iliyas & Barca, 2025). This includes resources like computers, tablets, internet access, and trained teachers. If one type of school has more resources than another, it may do better in developing digital skills. These two theories work together in this study. TAM helps explain why digital tools are important in learning. RBV helps explain why some schools may have more tools than others. Together, they support the idea that resource availability can affect learners' digital literacy.

Figure 1 shows the conceptual framework used in the study. The framework illustrates how the type of school impacts the availability of resources in preschool settings. The availability of these resources, in turn, affects how digital literacy is promoted in early childhood education. It is conceptualized from this framework that whether a school is public or private influences the extent to which digital resources are available. Together, these two factors, school type and resource availability, also shape the efforts of teachers in developing digital literacy skills among learners.

Research on digital literacy development in Ghanaian schools has grown considerably in recent years, yet it has consistently concentrated on higher educational levels while leaving early childhood settings largely unexamined. At the basic and senior high school levels, studies have moved beyond simply confirming that teachers value technology to interrogating why that value does not translate into practice. Mensah et al. (2025), working within the theory of planned behaviour and

employing a quantitative-dominant mixed-methods design with 140 basic school teachers of indigenous languages in the Nsawam-Adoagyiri Municipality, used partial least squares structural equation modelling to show that teachers' attitudes, subjective norms, and self-efficacy predicted their behavioural intention to develop learners' digital literacy, yet this intention failed to translate into actual classroom practice, a gap their qualitative data attributed to inadequate technological resources and technophobia. This disconnect between favourable disposition and constrained practice recurs across methodologically distinct studies: Dzidzornu and Xu (2025), using a cross-sectional survey of 532 student teachers drawn from all 46 Ghanaian public Colleges of Education and assessing competency across three tiers (Knowledge Acquisition, Deepening, and Creation), similarly found strong foundational knowledge but marked weaknesses in pedagogical integration and innovation, with poor internet connectivity and financial constraints identified statistically as the dominant barriers. Murithi and Yoo (2021), grounding their work in constructivist learning theory and the Technology Acceptance Model and surveying 351 teachers online, reported the same pattern: most had received only basic ICT training and struggled to use available tools effectively despite recognising their importance.

Beyond the classroom itself, other institutional resources show a similar profile of promise undermined by infrastructural deficit. Konlan et al. (2025), using a qualitative case study approach with 30 accidentally sampled teachers in Northern Ghana and drawing on interviews, document analysis, and direct observation, demonstrated that school libraries can function as valuable hubs for digital access and collaborative skill-building, but that funding and infrastructure constraints limit their reach. At the conceptual level, Anani et al. (2021), adopting a position-paper methodology built on a structured review of existing literature rather than primary data collection, and writing against the backdrop of literacy's expanding meaning in a technology-driven knowledge society, reinforced why resource availability matters so much: digital literacy is not an incidental by-product of device exposure but a competency that must be deliberately cultivated, meaning that resource gaps translate directly into skill gaps rather than being compensated for by learners' own device use. This point was echoed empirically by Adu-Marfo and Asamoah (2025), who, situating their work in the post-COVID-19 push for technology integration, used a qualitative multiple case study design with 24 purposively selected teachers from two public and two private basic schools in Accra, gathering data through semi-structured interviews analysed via Braun and Clarke's thematic approach; they found that teachers perceived students as digital natives, yet recognised this familiarity was largely confined to social media rather than broader digital competencies, with inadequate infrastructure, limited training, resistance to change, and time constraints cited as the principal barriers. Ayisi et al. (2024) offered a partial counterpoint using a quantitative survey design guided by the Explore, Engage, Empower (EEE) model, employing multi-stage sampling to reach 598 senior high school students across five schools and a purpose-built Media and Information Literacy scale; they found that 83% of respondents had device access outside school, and that this access significantly enhanced students' ability to access, evaluate, and create digital content, underscoring that resource availability, not motivation or exposure, is the more decisive variable.

This pattern of infrastructure and training as the binding constraint becomes especially pronounced in the sparse literature that touches

early childhood education. Bondah (2021), using a cross-sectional survey design with structured questionnaires administered to early childhood educators, found that although teachers recognised the value of digital tools, the absence of basic infrastructure, computers, projectors, and reliable internet, along with minimal training, prevented meaningful implementation, exposing a gap between policy expectations and classroom realities. Owusu and Govender (2023), using a qualitative approach combining teacher interviews and field-based observations in rural Ghanaian preschools and presenting their findings at an educational development conference, reached a comparable conclusion: teachers viewed digital games positively but could not use them effectively due to poor infrastructure, limited device access, unreliable electricity, and inadequate training.

Taken together, these studies establish two things clearly. First, across every level of the Ghanaian education system studied so far, regardless of whether the design was quantitative, qualitative, or conceptual, favourable teacher attitudes toward digital literacy are consistently undermined by the same recurring resource deficits: inadequate devices, unreliable connectivity and electricity, and insufficient training. Second, and more importantly for the present study, this body of evidence is overwhelmingly concentrated at the basic, secondary, and teacher-training levels; only two studies (Bondah, 2021; Owusu & Govender, 2023) address early childhood settings at all, and both are limited in scope and design, one a general cross-sectional survey of early years educators and the other a small qualitative study confined to game-based learning in rural preschools, neither offering an explicit or comparative assessment of the actual resources available for building digital literacy. Notably absent from the literature is any study that systematically assesses and compares the state of digital literacy resources between public and private preschools, despite the well-documented reality that ownership type shapes resource access at other levels of the Ghanaian education system, as seen in Adu-Marfo and Asamoah's (2025) inclusion of both public and private basic schools. It is this gap, an evidential vacuum regarding the comparative resource landscape for digital literacy development in early childhood, specifically within public and private preschools in the Effutu Municipality, that the present study seeks to address.

MATERIALS AND METHODS

As shown in **Figure 2**, this study was a descriptive cross-sectional survey conducted to assess the state of available resources for developing learners' digital literacy skills in public and private preschool settings in Effutu, a municipality in the Central Region of Ghana. The study involved 69 public and 45 private preschool teachers. These teachers were sampled using stratified random sampling. In getting teachers from these schools, the researcher grouped the teachers in preschool settings in the area under two strata; public and private. After this, a random sampling was to get samples of teachers from each stratum. The teachers were made to complete a structured questionnaire to rate the availability and condition of the resources for developing learners' digital literacy skills in their respective schools. The questionnaire was structured to allow teachers rate the availability using the scale 1 (Not Available), 2 (Available but Spoilt), 3 (Available but Insufficient), 4 (Available and Adequate), 5 (Available, Adequate and Working). The items on the instrument were self-developed by the researcher and validated by a lecturer who is an expert in ICT and IT

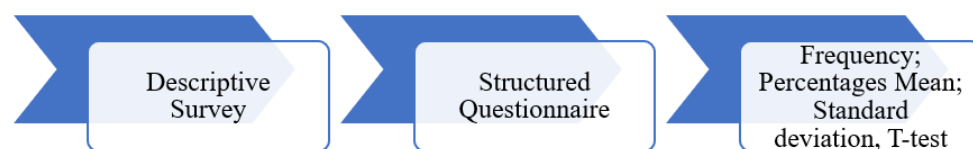


Figure 2. Methodology flowchart (Source: Author's own elaboration)

Table 1. State of available resources for digital literacy (public preschools)

Statements	Frequency (%)						M/SD	
	N	NA	AS	AI	AA	AAW	M	SD
What is the status of these devices in your school?								
Normal TV	69	39 (57)	3 (4)	15 (22)	12 (17)	0 (0)	1.42	1.23
Smart TV	69	42 (62)	3 (4)	14 (20)	10 (14)	0 (0)	1.48	1.44
Mobile phone	69	6 (9)	3 (4)	15 (22)	27 (39)	18 (26)	3.70	1.17
Laptop	69	21 (31)	12 (17)	12 (17)	6 (9)	18 (26)	2.83	1.60
Desktop/ PC	69	37 (54)	12 (17)	17 (25)	3 (4)	0 (0)	2.26	1.27
Projector	69	39 (57)	12 (17)	15 (22)	0 (0)	3 (4)	1.41	1.07
Wifi connectivity	69	55 (80)	14 (20)	0 (0)	0 (0)	0 (0)	1.21	1.03
MP3 players	69	27 (40)	12 (17)	9 (13)	9 (13)	12 (17)	2.52	1.54
Tablets/Ipads	69	67 (97)	2 (3)	0 (0)	0 (0)	0 (0)	1.14	1.13
Overall Mean =2.00; SD=0.85								

Key: NA (Not Available), AS (Available but Spoilt), AI (Available but Insufficient), AA (Available and Adequate), AAW (Available and Working); Mean (M), Standard deviation (SD)

education in the University of Education, Winneba. After this, a pilot test was conducted using 20 early childhood teachers from a Gomoa East District, a nearby district to Effutu. The reliability of the instrument was computed, yielding a coefficient of 0.785, an attestation of how reliable and acceptable the instrument was. After seeking the teachers' consent, the researchers assured the teachers of voluntary participation and confidentiality, and subsequently distributed the questionnaires in person to them. Data were analyzed with the help of SPSS, using frequency, percentages, mean, standard deviation, and independent samples t-test.

RESULTS

Research Objective 1: The State of Available Resources For Developing Learners' Digital Literacy Skills in Public Preschool Settings In Effutu

The aim of this objective was to assess the current state of available resources for developing learners' digital literacy skills in public preschool settings in Effutu. Teachers were made to rate the state of these resources using the scale: 1 (Not Available), 2 (Available but Spoilt), 3 (Available but Insufficient), 4 (Available and Adequate), 5(Available, Adequate and Working). The data were analysed using frequency, percentage, mean and standard deviation. The mean scores were interpreted as follows: 1.00-1.49 (Not Available), 1.50-2.49 (Available but Spoilt), 2.50-3.49 (Available but Insufficient), 3.50-4.49 (Available and Adequate), and 4.50-5.00 (Available, Adequate and Working). 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 1**.

The data presented in **Table 1** show that normal televisions were largely unavailable in public preschools. More than half of the teachers, 39 (57%), reported they were not available, 3 (4%) said they were spoilt, 15 (22%) indicated they were insufficient, and 12 (17%) said they were adequate. None indicated they were available and working. The mean score of 1.42 falls within the "Not Available" range (1.00–1.49).

Similarly, the standard deviation of 1.23 indicates variation in responses across schools. This suggests that while a few schools may have functional televisions, access remains extremely limited and uneven. For smart TVs, a large number of teachers, 42 (62%) reported them as not available, and 3 (4%) said they were spoilt. Fourteen (20%) indicated they were insufficient, while 10 (14%) said they were adequate. None reported them as available and working. The mean score of 1.48 falls within the "Not Available" range. Similarly, the standard deviation of 1.44 indicates high variation in responses. This shows that smart TVs are largely lacking in public preschools, with only a few schools having any in usable condition. Mobile phones were the most accessible digital tool in public preschools. Only 6 teachers (9%) said they were not available, 3 (4%) reported them as spoilt, 15 (22%) said insufficient, 27 (39%) said adequate, and 18 (26%) said they were available and working. The mean score of 3.70 falls within the "Available and Adequate" range (3.50–4.49). Similarly, the standard deviation of 1.17 indicates variation in responses. This implies that mobile phones are widely used across public schools and may be serving as a substitute where more advanced digital tools are lacking. With regard to laptops, 21 teachers (31%) said they were not available, and 12 (17%) reported them as spoilt. Another 12 (17%) said they were insufficient, 6 (9%) indicated adequate, and 18 (26%) reported them as available and working. The mean score of 2.83 falls within the "Available but Insufficient" range. Similarly, the standard deviation of 1.60 indicates significant variation in responses. This suggests that although laptops are present in some schools, they are not sufficient nor evenly distributed across the public preschool system. For desktop/PCs, over half of the teachers, 37 (54%) reported them as not available, while 12 (17%) said they were spoilt. Additionally, 17 teachers (25%) said they were available but insufficient, and only 3 (4%) indicated they were adequate. None reported them as available and working. The mean score of 2.26 falls within the "Available but Spoilt" range (1.50–2.49). Similarly, the standard deviation of 1.27 suggests variation in responses across schools. This indicates that although some schools may have access to desktop computers, most are either non-functional or insufficient, limiting their usefulness for digital literacy development.

Table 1. State of available resources for digital literacy (private preschools)

Statements	Frequency (%)						M/SD	
	N	NA	AS	AI	AA	AAW	M	SD
What is the status of these devices in your school?								
Normal TV	45	22 (49)	4 (9)	0 (0)	8 (18)	11 (24)	2.60	1.68
Smart TV	45	4 (9)	4 (9)	0 (0)	14 (31)	23 (51)	4.09	1.20
Mobile phone	45	3 (7)	5 (11)	4 (9)	7 (16)	26 (57)	4.22	1.88
Laptop	45	3 (7)	8 (18)	0 (0)	15 (33)	19 (42)	3.87	1.31
Desktop/ PC	45	41 (91)	0 (0)	4 (9)	0 (0)	0 (0)	1.27	0.57
Projector	45	33 (73)	3 (7)	0 (22)	9 (20)	0 (0)	1.91	0.85
Wifi connectivity	45	43 (96)	2 (4)	0 (0)	0 (0)	0 (0)	1.04	0.21
MP3 players	45	4 (9)	0 (0)	24 (53)	7 (16)	10 (22)	3.42	1.11
Tablets/Ipads	45	45 (100)	0 (0)	0 (0)	0 (0)	0 (0)	1.00	0.00
Overall Mean =2.00; SD=0.85								

Key: NA (Not Available), AS (Available but Spoilt), AI (Available but Insufficient), AA (Available and Adequate), AAW (Available and Working); Mean (M), Standard deviation (SD)

In the case of projectors, a majority of teachers, 39 (57%) said they were not available, while 12 (17%) reported they were spoilt. Another 15 (22%) said they were insufficient, and none indicated they were adequate. Only 3 teachers (4%) said the projectors were available and working. The mean score of 1.41 falls within the "Not Available" range (1.00–1.49), and the standard deviation of 1.07 suggests variation in availability. These findings imply that projectors are largely absent or unusable in most public preschools in the Effutu Municipality. Regarding Wi-Fi connectivity, an overwhelming majority of teachers, 55 (80%) indicated it was not available, and the remaining 14 (20%) reported it as spoilt. No teacher reported it as insufficient, adequate, or available and working. The mean score of 1.21 falls within the "Not Available" range, and the standard deviation of 1.03 suggests variation across schools. This indicates that internet access is virtually non-existent in the public preschool system, posing a major obstacle to implementing digital learning strategies. For MP3 players, 27 teachers (40%) reported they were not available, 12 (17%) said they were spoilt, and 9 (13%) considered them insufficient. An additional 9 (13%) indicated they were adequate, while 12 (17%) said they were available and working. The mean score of 2.52 falls within the "Available but Insufficient" range, and the standard deviation of 1.54 reflects variation in access and functionality. This suggests that while some schools are using MP3 players to support teaching, they are not consistently available or reliable. Finally, the situation is most severe for tablets/iPads. Nearly all teachers, 67 (97%) reported they were not available, and the remaining 2 (3%) said they were spoilt. None of the respondents indicated that tablets were insufficient, adequate, or available and working. The mean score of 1.14 falls squarely within the "Not Available" category, and the standard deviation of 1.13 indicates variation, though most schools share the same experience. These results clearly show that tablets are virtually absent in public preschools, severely limiting interactive or app-based digital learning opportunities.

Based on the overall mean score of 2.00, the findings indicate that public preschools in Effutu are generally under-resourced for developing learners' digital literacy skills, with most devices either unavailable, spoilt, or insufficient. The data reveal a general lack of digital teaching and learning resources in public preschools. Apart from mobile phones, which were rated relatively high across all availability categories, over 60% of teachers reporting that devices like smart TVs, projectors, tablets, and Wi-Fi are not available. This implies that public preschools in Effutu are not adequately supported by the digital tools needed to develop foundational digital literacy skills. This limited access

to essential devices such as smart TVs, tablets, projectors, and internet connectivity restricts teachers' ability to integrate technology into learning.

Research Objective 2: The State of Available Resources for Developing Learners' Digital Literacy Skills in Private Preschool Settings in Effutu

This objective assessed the current state of available resources for developing learners' digital literacy skills in private preschool settings in Effutu. Teachers were made to rate the state of these resources using the scale: 1 (Not Available), 2 (Available but Spoilt), 3 (Available but Insufficient), 4 (Available and Adequate), 5 (Available, Adequate and Working). The data were analysed using frequency, percentage, mean and standard deviation. The mean scores were interpreted as follows: 1.00-1.49 (Not Available), 1.50-2.49 (Available but Spoilt), 2.50-3.49 (Available but Insufficient), 3.50-4.49 (Available and Adequate), and 4.50-5.00 (Available, Adequate and Working). 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 2.

The data presented in **Table 2** show that normal televisions were moderately available in private preschools. Almost half of the teachers, 22 (49%), indicated they were not available, while 4 (9%) said they were spoilt. None reported them as insufficient, but 8 (18%) said they were adequate and 11 (24%) said they were available and working. The mean score of 2.60 falls within the "available but insufficient" range (2.50–3.49), and the standard deviation of 1.68 indicates variation in access across schools. This indicates that while some schools had functioning televisions, many lacked them altogether or had ones that were not working. In contrast, smart TVs were the most available resource. Only 4 teachers (9%) reported them as not available, and 4 (9%) said they were spoilt. A significant number, 14 (31%), reported them as adequate, while 23 (51%) said they were available and working. The high mean score of 4.09 falls in the "available and adequate" range (3.50–4.49), while the standard deviation of 1.20 reflects variability. This shows that smart TVs were present in most schools and were mostly functional, making them a relatively reliable digital resource. With regard to mobile phones, 3 teachers (7%) indicated they were not available, 5 (11%) said spoilt, 4 (9%) said insufficient, 7 (16%) said adequate, and 26 (58%) reported them as available and working. The mean score of 4.22 falls within the "available and adequate" category. This suggests that most schools have them in quantity or quality to meet classroom needs. The high standard deviation of 1.88 shows variation in access. This suggests that mobile phones were generally well available and functional, though

Table 3. Test of normality

	Type of School	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Teachers' views on the state of available resources	Public	.242	69	.607	.852	69	.075
to develop learners' digital literacy skills	Private	.538	45	.072	.272	45	.802

a. Lilliefors Significance Correction

Table 4. Descriptive statistics

Variable	Type of School	N	Mean	Std. Deviation	Std. Error Mean
Teachers' views on the state of available resources	Public	69	2.00	.852	.103
to develop learners' digital literacy skills	Private	45	2.60	.252	.038

their presence varied significantly between schools. For laptops, access was fairly good. Only 3 (7%) of the teachers said not available, while 8 (18%) reported them as spoilt. Fifteen teachers (33%) said adequate, and 19 (42%) said available and working. No one reported them as insufficient. The mean score of 3.87 lies within the "available and adequate" range, and the standard deviation of 1.31 shows varying availability among private preschools. This implies that while many schools had laptops in good condition, others had limited or non-functional ones.

In the case of desktop computers, most teachers, 41 (91%), reported that they were not available, and only 4 (9%) said they were adequate but insufficient. None reported desktops as spoilt, adequate, or working. The mean score of 1.27 clearly falls within the "not available" category (0.00–1.49), with a very low standard deviation of 0.57, indicating widespread unavailability. This clearly shows that desktop computers are largely absent in private preschools, with almost no functional units available. Projectors were also reported as largely unavailable. Thirty-three teachers (73%) said they were not available, 3 (7%) said spoilt, and 9 (20%) said adequate. None said they were insufficient or working. The mean score of 1.91 again falls within the "available but spoilt" category, with a standard deviation of 0.85, showing little variation. This means that projectors were uncommon and mostly non-functional, making them an unreliable teaching aid in most schools. Wi-Fi connectivity was even more limited. A striking 43 teachers (96%) reported it was not available, and 2 (4%) said spoilt. None indicated that it was insufficient, adequate, or working. The mean score of 1.04, with a very low standard deviation of 0.21, reflects a near-total lack of internet access in private preschools. This indicates that private preschools face significant digital connectivity challenges due to the absence of internet access. For MP3 players, availability was moderate. Only 4 teachers (9%) reported not available, while 24 (53%) said insufficient. Seven (16%) said they were adequate, and 10 (22%) reported them as working. The mean score of 3.42 falls in the "available but insufficient" range, indicating they are present in many schools but not in enough. The standard deviation of 1.11 shows differences in availability. This suggests that while MP3 players were found in some schools, they were often insufficient to serve all learners effectively. Lastly, Tablets/iPads were completely absent in private preschools. All 45 teachers (100%) reported them as not available, with none reporting them under any other category. The mean score of 1.00 falls solidly within the "not available" range, and the standard deviation of 0.00 confirms total agreement across all schools. This confirms that no private preschool in the study had access to tablets or iPads, making them entirely unavailable as a teaching resource.

Based on the overall mean score of 2.60, the findings indicate that private preschools in Effutu are moderately resourced for developing

learners' digital literacy skills. While devices such as mobile phones, smart TVs, and laptops were reported as relatively available, particularly mobile phones, other essential tools such as desktop computers, projectors, tablets, and Wi-Fi connectivity were found to be largely lacking. For instance, 100% of teachers reported tablets as unavailable, and over 90% indicated a lack of internet access. This suggests that although private preschools are somewhat better positioned than public ones, they still face significant resource gaps. The limited access to critical tools like tablets and Wi-Fi poses a challenge to fully embedding digital literacy into early learning environments.

Research Hypothesis (H₀): There is no Statistically Significant Difference in the State of Available Resources for Developing Learners' Digital Literacy Skills Between Public and Private Preschool Settings in Effutu

This section presents the results of an independent samples t-test conducted to examine whether there is a statistically significant difference in the state of available resources for developing learners' digital literacy skills between public and private preschool settings in Effutu.

Before performing an inferential test to compare public and private preschools, a normality test was conducted using both the Kolmogorov-Smirnov and Shapiro-Wilk tests to determine whether the data were normally distributed. The results are shown on **Table 3**.

Table 3 shows that for public schools, the Shapiro-Wilk value was .075. For private schools, it was .802. Both values are greater than 0.05. This means the data are normally distributed. The Kolmogorov-Smirnov test also showed values above 0.05. This supports the same conclusion.

Since the data are normal, a t-test can be used for further analysis.

Descriptive statistics comparing resource availability in public and private preschools are presented in **Table 4**.

Table 4 reveals that the mean score for public preschool teachers was 2.00 (SD = 0.852) while that of private preschool teachers was 2.60 (SD = 0.252). This suggests that, on average, private school teachers rated the availability of resources higher than public school teachers. However, the standard deviation is larger for public schools, showing more variation in their responses. This accounted for a difference in means. hence, an independent samples t-test is needed to determine if this difference is statistically significant.

Table 5 shows the results of a t-test comparing public and private preschool teachers' views on the state of available resources for digital literacy. The Levene's test value is $F = 76.173$, with a significance level of .0822. Since this is greater than 0.05, equal variances can be assumed. The t-test result under equal variances shows $t(112) = 5.455$, $p = .000$. Because the p-value is less than 0.05, the difference in mean scores is

Table 5. Independent samples t-test results

Levene's test for equality of variances				t-test for equality of means			95% confidence interval of the difference	
F	Sig.	t	df	Sig. (2-tailed)	Mean difference	Std. error difference	Lower	Upper
76.173	.0822	5.455	112	.000	.606	.110	.381	.819

statistically significant. The mean difference is 0.606, with a 95% confidence interval ranging from 0.381 to 0.819, which does not include zero. This suggests that there is a real and significant difference in the state of available resources for developing learners' digital literacy skills between public and private preschool settings in Effutu. Hence, the study rejects the null hypothesis and conclude that there is a statistically significant difference in the state of available resources for developing learners' digital literacy skills between public and private preschool settings in Effutu.

DISCUSSION

The findings reveal that public preschools in Effutu are significantly under-resourced in terms of digital teaching and learning tools. Most devices, such as smart TVs, projectors, tablets, and Wi-Fi connectivity, were either unavailable, spoilt, or insufficient. Over 60% of teachers reported these tools as entirely unavailable, with only mobile phones reported as relatively accessible. This finding aligns with the broader pattern emerging from recent Ghanaian scholarship, where teacher disposition toward technology consistently outpaces the infrastructure available to act on it. Mensah et al. (2025), applying the theory of planned behaviour to basic school teachers of indigenous languages, found that positive attitudes, subjective norms, and self-efficacy predicted teachers' intention to develop learners' digital literacy, but this intention did not translate into classroom practice, a gap their qualitative data traced to inadequate resources and technophobia. A similar disconnect was reported by Dzidzornu and Xu (2025) among student teachers across Ghana's Colleges of Education, whose strong foundational ICT knowledge did not extend to pedagogical integration, largely due to poor connectivity and financial constraints. Murithi and Yoo (2021), working from constructivist learning theory and TAM, likewise found that teachers who valued digital tools were still constrained by minimal training and limited access. The present findings extend this pattern to the early childhood level, showing that the intention-practice gap identified at basic and senior high school levels is, if anything, more pronounced in public preschools, where the resource base is thinner still.

The absence of projectors, tablets, and internet connectivity in public preschools also reflects the institutional resource deficits documented by Konlan et al. (2025), who found that even school libraries, potential hubs for digital access and collaborative skill-building, are constrained by the same funding and infrastructure shortfalls. Anani et al. (2021) argue that digital literacy cannot be treated as an incidental by-product of device exposure; it is a competency that must be deliberately cultivated, meaning that resource gaps in public preschools translate directly into skill gaps for learners rather than being offset by informal exposure elsewhere. From the Resource-Based View, as articulated by Iliyas and Barca (2025), institutions with greater access to valuable resources are better positioned to achieve superior outcomes; the near-total absence of core digital infrastructure in public preschools therefore represents a structural disadvantage rather than a matter of teacher will. Despite the government's emphasis on digital

literacy in the Standards-Based Curriculum (MoE, 2019), these findings confirm that many public preschools remain practically unequipped to meet digital learning goals, leaving the vision of preschool-level digital literacy largely unrealized in public settings. This points to a clarion call for the Government of Ghana to equip public schools with the minimum required digital infrastructure. Without this, Ghana's digital literacy policy goals, particularly under SDG 4's commitment to inclusive and equitable education, risk remaining aspirational.

Private preschools were found to be moderately better resourced than their public counterparts. Devices such as smart TVs, laptops, and mobile phones were relatively available, with over 57% of teachers reporting mobile phones as available and working. However, access to projectors, tablets, desktop computers, and Wi-Fi remained limited: notably, 100% of teachers reported that tablets were unavailable, and over 90% reported the absence of Wi-Fi. This shows that even institutions presumed better funded fall short of full digital readiness. The finding resonates with Ayisi et al. (2024), whose survey of senior high school students found that device access, rather than motivation or exposure, was the more decisive variable in determining students' ability to access, evaluate, and create digital content; the near-universal absence of tablets and connectivity in private preschools suggests that this resource ceiling constrains outcomes even at the early childhood level, where foundational digital habits are formed. Adu-Marfo and Asamoah (2025), comparing public and private basic schools in Accra, similarly found that inadequate infrastructure, limited training, resistance to change, and time constraints were the principal barriers to meaningful digital integration, regardless of school type. This suggests that the public-private divide identified in the present study, while real, sits within a broader system in which no category of school is fully equipped. Viewed through TAM as articulated by Xue et al. (2026), which holds that perceived usefulness and ease of use drive technology adoption, private preschool teachers may well perceive digital tools as both useful and easy to use, but that perception cannot translate into actual usage when tablets and connectivity are structurally absent. The Resource-Based View again clarifies this outcome: private preschools hold a comparative resource advantage over public ones, but the continued absence of critical infrastructure, tablets and internet access in particular, still caps the potential impact of digital learning even where resources are comparatively stronger.

Finally, the study found a statistically significant difference in the state of resources available for developing learners' digital literacy skills between public and private preschools in Effutu, leading to the rejection of the null hypothesis and confirming that private preschools are significantly better resourced than their public counterparts. This has critical implications for equity in early childhood education. Bondah (2021) found that although early childhood educators recognised the value of digital tools, the absence of basic infrastructure and minimal training prevented meaningful implementation, exposing a persistent gap between policy expectations and classroom realities, a gap this study's findings show is unevenly distributed across school type. Owusu and Govender (2023), working in rural Ghanaian preschools, reached a comparable conclusion: teachers viewed digital tools positively but

could not use them effectively due to poor infrastructure, unreliable electricity, and inadequate training. Taken together with the present findings, this suggests that if public preschool learners consistently lack access to digital resources relative to their private-school peers, they are disadvantaged early in their educational trajectory, potentially widening the digital divide as they progress through the education system. The Resource-Based View again explains why this matters institutionally: schools with stronger resource endowments, in this case, private preschools, are structurally better positioned to implement digital innovations. TAM, in turn, clarifies why this resource gap has behavioural consequences: teacher motivation and positive attitudes toward technology, however genuine, cannot produce actual use when the underlying tools are simply not present in the classroom.

CONCLUSIONS AND RECOMMENDATIONS

The study assessed the state of available resources for developing learners' digital literacy skills in Ghanaian preschool settings. The findings revealed a general scarcity of digital devices, particularly in public preschools. The study concludes based on the first objective that learners in public preschools risk falling behind in foundational digital skills, limiting their ability to meet future academic and technological demands. As a matter of urgency, the Ghana Education Service in collaboration with the Education Directorate in Effutu should procure and supply public preschools with essential digital devices such as tablets, projectors, and smart TVs. Such schools could also benefit from a national initiative such as "One Preschool, One Tablet". Also, private schools in Ghana, despite better access to some tools, the absence of reliable internet and age-appropriate devices hinders the full implementation of digital learning strategies. Hence, proprietors of private school in Effutu should be encouraged, possibly through tax incentives or grants, to invest in age-appropriate digital infrastructure and internet connectivity. They could partner with telecom companies to pilot affordable internet access in their preschools. Lastly, there is a growing digital inequality that may perpetuate educational disparities between learners in different school types. As such, educational policymakers in Effutu should develop equity-based digital resource distribution frameworks to ensure all children have equal access regardless of school type. A future study that explores the strategies and challenges involved in promoting digital literacy in Ghanaian preschools would help extend this study's findings.

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