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Original Article

Investigating the Impacts of E-learning on Kindergarten Pupils' Learning at Rev. Wilson B Basic School in the Mfantseman Municipality, Ghana

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Abstract

The COVID-19 pandemic significantly altered daily activities, posing unprecedented challenges globally. In response, governments worldwide closed schools, impacting over 90% of enrolled learners. To ensure educational continuity, emergency remote learning strategies, often involving online solutions, were widely deployed. E-learning has since become an integral part of the curriculum in many Ghanaian schools. This study specifically investigated the impacts of e-learning on kindergarten pupils' learning at Rev. Wilson B Basic School. Employing a descriptive survey design, data was collected using questionnaires from 24 respondents, comprising all pupils and teachers in the school. Key positive impacts identified included improvements in the quality of pupils' learning, enhanced convenience and flexibility in learning (M=3.9, SD=1.0), and increased pupil motivation (M=3.9, SD=1.0). Conversely, negative impacts involved limiting human interaction between pupils and teachers, the lack of human contact affecting learning quality, and imposing financial burdens on parents and guardians. The study recommends that basic schools, especially kindergartens, leverage e-learning benefits by exposing pupils to the system. Furthermore, the Ghana Education Service and the Ministry of Education must ensure the provision of appropriate teaching and learning materials to support e-learning implementation in Ghanaian basic schools.

KEYWORDS: E-learning, Kindergarten Pupils, Positive Impacts, Negative Impacts, Mfantseman Municipality and Technological Expertise

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1.0 INTRODUCTION

Education plays a critical role in transforming societies and is indispensable for human and national development (Powell & McGrath, 2019). It serves as the primary means through which societal norms, knowledge, skills, and habits are transmitted across generations. Traditionally, education has been delivered through face-to-face interactions within physical classrooms, involving teachers and students meeting in real time. However, this conventional model has experienced a revolutionary transformation with the advent of computer technology and the internet. The COVID-19 pandemic dramatically accelerated this shift, forcing universities to journey from face-to-face to online learning such as e-learning (Mpungose, 2020), establishing online education as the new way of instruction (Stevens et al., 2021). This transformation represents the conclusion of decades of evolution in distance learning that has progressively moved toward Internet-delivered instruction (Reisman, 2006).

The emergence of e-learning as a protagonist for change in the education sector predates the COVID-19 pandemic, driven by increasing student enrollments and limited physical classroom capacities. The necessity of e-learning became even more paramount with the Coronavirus Pandemic, which led to widespread closures of educational institutions globally. By April 21, 2020, over 80% (approximately 1.723 billion) of the world's students were not attending school, with 191 countries implementing nationwide closures. These closures profoundly impacted various stakeholders, including students, teachers, and families, leading to exacerbated learning disparities, particularly among vulnerable students (UNESCO, 2021).

In response, organizations like UNESCO endorsed distance learning programmes, utilizing computers, accessories, and open educational applications and platforms to facilitate remote learning and minimize educational disruption. In Ghana, schools intensified their implementation of e-learning strategies following these recommendations. E-learning has now become the prevailing curriculum paradigm in Ghana due to the COVID-19 pandemic, deemed crucial for the continuation of the classroom learning cycle and enhancement of educational quality (Amankwa, 2022).

E-learning, also known as online learning or electronic learning, is essentially the acquisition of knowledge through electronic technologies and media. It is commonly conducted over the Internet, allowing students to access learning materials online at any place and time. This form of learning leverages advancements in information and multimedia technology, enabling a new learning environment through electronic media like computer videoconferencing, audio, internet, interactive TV, and satellite. It supports multi-directional communication and has evolved to include interactive tools. Furthermore, technology, including social media platforms like Facebook, WhatsApp, and Twitter, plays a significant role in attracting students and connecting them globally with diverse educational terms and fields of study. (Appiah, 2019).

The widespread availability of the internet means that e-learning can eliminate traditional barriers such as time, distance, and socio-economic status. It empowers students to take greater responsibility for their lifelong learning and introduces new possibilities for educational practice (Marfo & Okine, 2018). E-learning is particularly useful in situations where traditional alternatives

are limited, such as in rural schools unable to offer broad courses or advanced subjects, for remedial courses, or for home-schooled students. Unlike instructor-centric traditional classrooms, e-learning allows students to access a wide range of experts and resources that may not be locally available. Studies suggest that e-learning can lead to greater knowledge acquisition, skills, and attitudes compared to traditional methods. It also fosters social contacts for shy or introverted individuals and helps teachers cater to individual learning needs and styles. Beyond convenience and accessibility, e-learning offers high efficiency in knowledge acquisition and an attractive technical environment, especially for young people.

Despite these numerous advantages, the rapid shift to e-learning from traditional classroom instruction has raised concerns regarding its quality and effectiveness. Critics note issues such as minimal interactivity, lack of pedagogical considerations, and its perceived inferiority to traditional learning. Negative impacts on young pupils include shortened attention spans and the rise of "selfie culture". The ubiquitous use of digital tools also poses risks to the development of social, emotional, and critical thinking skills in young people. Disparities in digital literacy and online access, such as lack of Wi-Fi or shared devices, create significant obstacles for some pupils, potentially exacerbating the learning gap among disadvantaged students. The mental health toll of distance learning has also been documented, with increased rates of depression, anxiety, eating disorders, and feelings of isolation among children.

While e-learning adoption has generated considerable research interest, leading to studies on its implementation and potential to enhance schooling quality, consequential effects on young pupils have been identified. These include drops in physical exercise, weight gain, headaches, poor sleep, and eyestrain due to excessive screen time, along with increased exposure to domestic violence. Furthermore, challenges like inadequate ICT staff, low teacher motivation for blended learning, insufficient bandwidth, poor financing for ICT infrastructure, and low educational awareness of e-learning systems persist.

The study is structurally nested within the positivist paradigm, which necessitated a quantitative research approach and measurable statistical analysis, while its findings on technology-enhanced learning are woven together by the Connectivism learning theory, which explains how e-learning develops pupils' technological expertise by emphasizing learning through digital networks and productive engagement. Despite a plethora of studies on e-learning's impacts, there remains a specific gap in literature regarding kindergarten pupils at Rev. Wilson B Basic School in the Mfantseman Municipality of Ghana. As the modern age increasingly demands the integration of new technology into education, institutions are actively exploring the benefits of the internet and other e-learning platforms. This study was thus set up to address this gap and investigate how e-learning can improve pupils' learning at this specific kindergarten. The main purpose of this study was to investigate the impacts of e-learning on kindergarten pupils of Rev. Wilson B Basic School in the Mfantseman Municipality in the Central Region of Ghana.

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1.1 Research Questions

This study was guided by the following research questions:

1. What are the positive impacts of e-learning on the learning of kindergarten pupils of Rev. Wilson B Basic School in the Mfantseman Municipality in the central region of Ghana?
2. What are the negative impacts of e-learning on kindergarten pupils of Rev. Wilson B Basic School?
3. In what ways can e-learning among kindergarten pupils be improved in Rev. Wilson B Basic School?

2.0 METHODS

2.1 Research Design

The study adopted a quantitative research approach, specifically utilizing a descriptive survey design. A research design serves as a blueprint for conducting research, determining the methods and procedures based on the research problem and objectives. This approach, also known as statistical research, describes phenomena as they exist, making it suitable for identifying characteristics of a particular issue within a community or group. The decision to use quantitative research was based on its strength in providing statistical conclusions from numerical data, allowing for a broader study with larger samples and offering a better perspective for making critical decisions (Strunk & Mwavita, 2024). Quantitative data was collected to ascertain the impacts of e-learning on the academic performance of kindergarten children through the perceptions of parents and teachers at Rev. Wilson B Basic School. The choice of the positivist paradigm underpinned this quantitative approach.

The positivist paradigm asserts that only empirically observable phenomena are important and that science is the sole true source of knowledge. It assumes that human behaviour is rule-governed and can be described by predictability and causality, making it observable and measurable. This contrasts with the interpretive paradigm, which views reality as socially constructed and emphasizes the researcher's intertwined relationship with the subject of investigation, relying on naturalistic methods like interviews and observations. The critical/transformative paradigm, on the other hand, focuses on social justice issues and seeks to address oppression and power structures, employing a dialogic methodology. The pragmatic paradigm advocates for mixed methods, viewing reality as non-singular and choosing methods most appropriate for the phenomenon at hand. Given the study's purpose of investigating impacts, the positivist approach was deemed most appropriate as it facilitated the application of quantitative methods and techniques.

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2.2 Population and Sampling

The population for a study encompasses the characteristics of objects, people, or elements from which generalizations can be made. It is also referred to as the "target population," representing the entire group of individuals or elements with common attributes relevant to the study. In this study, the target population included all kindergarten pupils and basic school teachers in the Mfantseman Municipality in the Central Region of Ghana. The accessible population refers to the portion of the target population that is actually available and can be reached during the study. For this research, the accessible population consisted of all 24 teachers at Rev. Wilson Basic School.

Sampling is the process of selecting a smaller group from a larger population in a way that accurately represents the characteristics of the entire group. The census survey technique was employed to select the respondents. A census involves collecting information from all units within the population, or a "complete enumeration". This technique was appropriate because the researcher intended to include all 24 teachers in the school as respondents. Advantages of the census technique include the availability of data for small areas and sub-populations (given satisfactory response rates), and the absence of sampling error in the estimates.

2.3 Data Collection Instruments

The primary research instrument used for data collection was a questionnaire. A questionnaire is a tool for collecting data that involves asking subjects to respond to a set of oral or written questions. An advantage of questionnaires is their ease of analysis and visualization. However, a potential disadvantage is the chance that some questions may be ignored or left unanswered. The questionnaire was structured into four sections:

> *Section A:* Sought demographic characteristics of the respondents, including sex, age, and teaching experience.
>
> *Section B:* Contained items on a five-point Likert scale (Strongly Agree, Agree, Undecided, Disagree, Strongly Disagree) to gather responses on the positive impacts of e-learning on kindergarten pupils' learning.
>
> *Section C:* Also used a five-point Likert scale to collect data on the negative impacts of e-learning on kindergarten pupils' learning.
>
> *Section D:* Contained questions on a five-point Likert scale to solicit responses on how e-learning among kindergarten pupils can be improved.

To ensure the validity and reliability of the instrument, several steps were taken. Face validity, which assesses whether a measure appears related to a specific construct in the judgment of non-experts, was ensured by having colleagues test-run the instrument to confirm clarity, relevance, and unambiguousness of questions. Content validity, which ensures the instrument reflects the content universe and includes a representative set of essential items, was established by submitting

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the instrument to the supervisor for review and correction before data collection. For reliability, which concerns the consistency and repeatability of measurements, a pre-testing phase was conducted. The instrument was trial-tested in two schools (Methodist A Basic School and SDA Basic School) within the Mfantseman Municipality, chosen for their similar characteristics to the study area. Seven respondents participated in the pre-testing, representing approximately 10-30% of the sample, as suggested by Cooper and Schilder (2011). The overall Cronbach's Alpha estimate of 0.82, well above the acceptable range of 0.7 to 0.8, indicated good internal consistency and reliability of the instrument.

2.4 Data Collection Procedure

The data collection process involved several methodical steps to ensure ethical conduct and data integrity. The researcher, being a teacher at the school, first sought and obtained permission from the headteacher, explaining the study's purpose. Subsequently, the teachers were approached, and the study's objectives were clearly explained to them. A date was then scheduled for the administration of the questionnaire. During the administration, all respondents were assured of the confidentiality and privacy of their data. They were also explicitly given the choice to withdraw from the study at any point without consequence. In instances where respondents were occupied with their duties, the researcher rescheduled the sessions to accommodate their availability. To maintain focus and coherence in responses, the questions were organized logically, with demographic data collected initially before proceeding to the main research questions. Every step of the research process was meticulously documented chronologically. This practice served to create an audit trail, enhancing the reliability of the findings. Cross-referencing responses with available documents also facilitated a deeper understanding of the collected data.

2.6 Data Analysis Procedure

Upon collection, the data underwent a thorough process of checking and correcting for errors. Responses from the questionnaires were then organized and processed using the Statistical Package for Social Sciences (SPSS). For the analysis of the data, descriptive statistics were primarily employed. This included the use of frequencies, percentages, mean scores, and standard deviations. These measures were instrumental in summarizing and presenting the data related to the positive impacts, negative impacts, and improvement measures of e-learning. Specifically, for Likert scale items, a mean score of 3 or above was interpreted as agreement, while a mean score below 3 indicated disagreement. In addition to descriptive statistics, inferential statistics were utilized to assess the significance of the findings, though the specific inferential tests are not detailed. The analysis and interpretation of data were systematically carried out based on the results obtained for each of the three research questions. The analysis was based on a 100% return rate from the 24 selected respondents.

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2.7 Ethical Considerations

Adhering to ethical principles was paramount throughout the study. Permission from the school authority was formally sought before commencing data collection. Participants were provided with a comprehensive explanation of the study's purpose, and their approval and cooperation were solicited before their participation. All participants received an oral invitation to participate, during which they were introduced to the study and informed about the questionnaire administration process. A key ethical principle maintained was confidentiality. Respondents were explicitly assured that their names would remain anonymous, and they were not required to provide any identifying information. This assurance was intended to encourage participants to express their opinions freely and honestly. Furthermore, participation was entirely voluntary. Participants were informed that they had the right to participate or withdraw from the study at any time without facing disadvantages or losses. Considerable care was taken to ensure that no respondent felt pressured into participating. An open and positive relationship was fostered with each participant, allowing them ample time to respond, voice concerns, and ask questions.

3.0 RESULTS

3.1 Demographic Characteristics of Respondents

The demographic profile of the respondents, including sex, age, and teaching experience, was examined as these variables were considered to influence their perceptions of e-learning.

Table 3.1: Demographics of Respondents (n=24)

Variable	Sub-scale	Frequency	Percentage
Sex of Respondents	Male	13	54.2
	Female	11	45.8
Ages of Respondents	20 – 29 years	14	58.3
	30 – 39 years	7	29.2
	40 – 49 years	2	8.3
	50 – 59 years	1	4.2
Teaching experience	**1 – 5 years**	**10**	**41.7**
	6 – 10 years	**9**	**37.5**
	11 – 15 years	**3**	**12.5**
	16 and above	**2**	**8.3**

Source: Field data (2024)

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As shown in Table 3.1, the majority of respondents were male (13, 54.2%), with females constituting 45.8% (11 respondents). In terms of age, the largest group was between 20 and 29 years (14, 58.3%), followed by those aged 30-39 years (7, 29.2%). Smaller proportions were in the 40-49 years (2, 8.3%) and 50-59 years (1, 4.2%) age brackets. Regarding teaching experience, the most represented group had 1 to 5 years of experience (10, 41.7%), closely followed by those with 6-10 years (9, 37.5%). Teachers with 11-15 years of experience accounted for 12.5% (3 respondents), while only 8.3% (2 respondents) had 16 years or more. This demographic profile suggests that the respondents possess a considerable amount of teaching experience, making them well-informed on the subject of e-learning.

3.2 Research Question One: What are the positive impacts of e-learning on the learning of kindergarten pupils of Rev. Wilson B Basic School in the Mfantseman Municipality in the central region of Ghana?

To address this question, respondents rated various statements on a five-point Likert scale (1=Strongly Disagree, 5=Strongly Agree). A mean score of 3 or above indicates agreement.

Table 3.2: Positive Impacts of E-learning on Kindergarten Pupils' Learning

S/N	Impact of e-learning on kindergarten pupils' learning	Mean	Standard Deviation
1.	E-learning improves the quality of pupils' learning	3.3	1.2
2.	E-learning has made pupils' learning convenient and flexible	3.9	1.0
3.	E-learning motivates pupils	3.9	1.0
4.	It improves pupils' communication skills	4.1	1.1
5.	Pupils learn at their own pace	4.3	0.2
6.	Pupils can now retain more information	4.2	1.0
7.	It develops technological expertise of pupils	4.5	0.9
8.	It improves hand-eye coordination skills, mathematical skills and social competence	4.3	1.1
9.	It encourages curiosity through productive engagement	4.3	1.1
10.	Mean of means	3.6	0.9

(Source: Field data (2024)

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Table 3.2 presents the positive impacts of e-learning on the learning of kindergarten pupils as perceived by the 24 respondents at Rev. Wilson B Basic School. Positive impacts of e-learning on the learning of kindergarten pupils as perceived by the 24 respondents at Rev. Wilson B Basic School. To address Research Question One, which asked for these positive impacts, respondents rated various statements on a five-point Likert scale, where a mean score of 3 or above indicates general agreement with the listed impact. The data was analysed using descriptive statistics, specifically mean scores and standard deviations, based on the collected field data. Overall, respondents agreed to all listed positive impacts of e-learning, as indicated by a mean of means of 3.6 (SD=0.9). The strongest agreement was for e-learning developing the technological expertise of pupils (M=4.5, SD=0.9). Respondents also highly agreed that e-learning improves hand-eye coordination, mathematical skills, and social competence (M=4.3, SD=1.1), and that it encourages curiosity through productive engagement (M=4.3, SD=1.1).

Furthermore, there was strong agreement that e-learning allows pupils to learn at their own pace (M=4.3, SD=0.2) and helps them retain more information (M=4.2, SD=1.0). E-learning was also perceived to improve pupils' communication skills (M=4.1, SD=1.1). Respondents agreed that it motivates pupils (M=3.9, SD=1.0) and offers flexibility and convenience in learning (M=3.9, SD=1.0). Finally, respondents agreed that e-learning improves the quality of pupils' learning (M=3.3, SD=1.2). In summary, the study found that e-learning positively impacts kindergarten pupils by improving learning quality, offering convenience and flexibility, motivating pupils, enhancing communication skills, allowing self-paced learning, improving information retention, developing technological expertise, improving hand-eye coordination, mathematical skills, social competence, and fostering curiosity through productive engagement.

3.3 Research Question Two: What are the negative impacts of e-learning on kindergarten pupils of Rev. Wilson B Basic School?

For this question, respondents rated negative impacts on a five-point Likert scale, with a mean of 3 or above indicating agreement.

Table 3.3 outlines the measures suggested to improve e-learning among kindergarten pupils at Rev. Wilson B Basic School. To answer Research Question Two, which sought these improvement methods, the accessible population of 24 respondents evaluated various measures on a five-point Likert scale. In the analysis, a mean score of 3 or above indicates agreement that the specific measure is relevant for improving e-learning, with data summarized using mean scores and standard deviations. The mean of means (M=3.5, SD=1.4) indicates general agreement with the majority of negative impacts listed. Respondents strongly agreed that a lack of technical expertise among parents, teachers, and pupils adversely affects the quality of teaching and learning (M=4.2, SD=1.3).

Table 3.2: Negative Impacts of e-learning on Kindergarten Pupils

S/N	Negative impacts of e-learning	Mean	Standard Deviation
1.	E-learning limits human interaction between pupils and the teacher	4.1	1.5
2.	Lack of human contact affects quality of learning	4.0	1.2
3.	It puts financial burden on parents and guardians	4.1	1.5
4.	It negatively affects the culture of the society	1.7	1.3
5.	Lack of technical expertise on the parts of parents, teachers and pupils affects the quality of learning	4.2	1.3
6.	Difficulty in assessing pupils effectively	3.8	1.6
7.	Causes mental issues for the child	1.7	1.4
8.	Technical challenges such as unstable internet affects quality	3.8	1.5
9.	Causes sense of isolation among pupils	3.9	1.5
10.	Mean of means	3.5	1.4

Source: Field data (2024)

There was also agreement that e-learning limits human interaction between teachers and pupils (M=4.1, SD=1.5) and imposes a financial burden on parents and pupils (M=4.1, SD=1.5). Furthermore, respondents agreed that the lack of human contact affects learning quality (M=4.0, SD=1.2) and that e-learning can cause a sense of isolation among pupils (M=3.9, SD=1.5). Difficulty in effectively assessing pupils was also agreed upon (M=3.8, SD=1.6), as were technical challenges like unstable internet connections affecting quality (M=3.8, SD=1.5). However, respondents disagreed that e-learning negatively affects the culture of society (M=1.7, SD=1.3). Similarly, they disagreed that e-learning causes mental issues for the child (M=1.7, SD=1.4).

In summary, the negative impacts identified include limited human interaction, lack of human contact affecting learning quality, financial burden on parents/guardians, lack of technical expertise, difficulty in assessing pupils, technical challenges like unstable internet, and a sense of isolation. It was not found to cause mental issues or negatively affect societal culture.

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3.4 Research Question Three: In what ways can e-learning among kindergarten pupils be improved in Rev. Wilson B Basic School?

Respondents assessed potential improvement measures on a five-point Likert scale, with a mean of 3 or above indicating agreement.

Table 3.4: Measures to Improve e-learning among Kindergarten Pupils

S/N	Measure to improve e-learning	Mean	SD
1.	Teachers need to be involved in its planning	3.8	1.5
2.	Provision of the right teaching and learning materials to support it	3.8	1.5
3.	Constant monitoring and supervision from parents and teachers	3.9	1.5
4.	Teachers and pupils should be properly trained to use the system	3.9	1.7
5.	Students should be encouraged to use the internet productively	3.8	1.8
6.	Mean of Means	3.8	1.6

Source: Field data (2024)

Table 3.4 presents the negative impacts of e-learning on kindergarten pupils at Rev. Wilson B Basic School. This table addresses Research Question Three, which aimed to identify the negative effects of e-learning on kindergarten pupils. The 24 respondents rated these impacts using a five-point Likert scale, and the data, analysed using mean scores and standard deviations, shows that a mean score of 3 or above indicates general agreement with the listed negative impact. Overall, the mean of means (M=3.8, SD=1.6) indicates general agreement on the proposed measures for improvement. Respondents agreed that constant monitoring and supervision from parents and teachers is crucial (M=3.9, SD=1.5). Similarly, there was strong agreement that teachers and pupils should receive proper training to use the e-learning system (M=3.9, SD=1.7). Respondents also agreed that teachers need to be involved in the planning of e-learning (M=3.8, SD=1.5). The provision of appropriate teaching and learning materials to support e-learning was also identified as an important measure (M=3.8, SD=1.5). Finally, respondents agreed that students should be encouraged to use the internet productively (M=3.8, SD=1.8). The study revealed that key measures for improving e-learning among kindergarten pupils include involving teachers in planning, providing adequate teaching and learning materials, ensuring constant monitoring and

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supervision from parents and teachers, proper training for both teachers and pupils, and encouraging productive internet use among students.

4.0 DISCUSSION

The findings of this study provide valuable insights into the multifaceted impacts of e-learning on kindergarten pupils and highlight crucial areas for improvement. The discussion is structured around the three research questions, integrating empirical evidence from the study with existing literature and theoretical perspectives.

4.1 Positive Impacts of E-learning

The study identified several significant positive impacts of e-learning on kindergarten pupils. Foremost among these is the finding that e-learning improves the quality of pupils' learning. This aligns with previous research which posits that new multimedia technologies and the internet enhance accessibility, efficiency, and overall quality of learning by facilitating access to resources and promoting remote collaboration (Fayomi, Ayo, Ajayi, & Okorie, 2019). E-learning is seen as a new educational paradigm that can significantly contribute to knowledge-based societal development, especially in developing countries.

Another key finding is that e-learning makes pupils' learning convenient and flexible. The ability for kindergarten pupils to learn from home provides unparalleled convenience and flexibility, allowing them to engage with educational content at their preferred time and pace. This flexibility is supported by the accessibility of e-learning tools like the internet, television, and radio. Yusnilita (2020) similarly concluded that online learning offers a practical and flexible way of learning, fostering creativity and activity among students. Collis (2013) also noted that technology increases students' access and convenience to instructional materials. The advantages of e-learning, including flexibility, accessibility, satisfaction, and cost-efficiency, have been widely acknowledged (Bader & Ko¨ttstorfer, 2013). Lawless (2018) further emphasizes that this flexibility motivates learners to pursue academic goals. The concept of students learning at their own pace is crucial, as individual differences are accommodated, a key aspect of differentiation advocated by the Standard Based Curriculum (Tamm, 2020).

The study also revealed that e-learning motivates pupils. The interactive nature of digital tools, smartboards, and computers engages young learners, making the learning process more enjoyable and stimulating. Arkorful and Abaidoo (2014) also found that digital tools in e-learning motivate students to interact, exchange views, and respect different perspectives. Lawless (2018) linked e-learning's efficiency to improved performance and increased motivation. This aligns with Connectivism, a learning theory suggesting that learning occurs through connections between "nodes" of information. E-learning platforms, by providing diverse, interactive "nodes" (e.g., videos, quizzes, games), inherently promote engagement and motivation, as learners can create their own learning experiences and navigate information at their pace.

Furthermore, e-learning was found to improve pupils' communication skills. Effective communication is a cornerstone of classroom interaction. This finding is consistent with Khan and Setiawan (2022) who reported that e-learning improved student perceptions, communication, and critical thinking. Arkorful and Abaidoo (2014) highlighted that e-learning eases communication and fosters relationships that sustain learning, enhancing collaboration and academic standards. The interactive tools within e-learning platforms, as described by Lutkevich (2020), enable multi-directional communication, fostering this skill.

A significant positive impact is the development of pupils' technological expertise. E-learning, by its very nature, exposes children to computers, smartphones, and the internet, building their familiarity and proficiency with these devices. Steinhoff (2016) strongly supports this, asserting that computer education embedded within e-learning positively influences child development by facilitating skills in programming and graphic design, including intelligence, emotional intelligence, hand-eye coordination, mathematical skills, and social competence. Children growing up in the computer age are inherently more technologically inclined, and early exposure improves their future life prospects. This aligns with the Connectivist view that learning happens outside of an individual through online networks and information databases, emphasizing technology as a core part of the learning process.

The study also confirmed that e-learning improves hand-eye coordination skills, mathematical skills, and social competence. These are fundamental skills for kindergarten learners. Steinhoff (2016) emphasizes these skills as crucial for future web-oriented businesses, which will require employees to support complex business systems. The interactive nature of e-learning, with its games and simulations (e.g., DuoLingo, Virtual Reality House), directly contributes to the development of these skills. Connectivism supports this by promoting learning through engaging experiences and collaborative processes.

Finally, e-learning encourages curiosity through productive engagement. The Orchid International School (2020) elaborates on this, explaining that online teachers can make complex subjects fun and interactive, cultivating curiosity in young children and enabling them to retain information when their minds are actively engaged. This breaks the monotony of traditional classroom settings and aligns with the visual nature of e-learning platforms, aiding memory recollection (Bright Path Preschool, 2021). Given that 80% of children are visual learners, the highly visual nature of e-learning significantly aids recognition and recollection (The Visual Learning Centers of America, 2019). The virtual world becoming natural for children also fosters social engagement in a controlled manner, helping define their personalities and problem-solving approaches (Orchid International School, 2020). Miller (2019) notes that online programmes connect students globally, broadening perspectives and cultural awareness. Khan and Setiawan (2022) conclude that online learning, with its flexibility and use of diverse tools like PDFs, videos, and podcasts, enhances knowledge and student achievement beyond traditional textbook methods (The Science Prog, 2020).

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4.2 Negative Impacts of E-learning

Despite the advantages, the study revealed several negative impacts of e-learning. A prominent finding is that e-learning limits human interaction between pupils and teachers, and this lack of human contact affects the quality of learning. This corroborates criticisms that web-based training, while suitable for independent learners, limits usefulness for others due to technical issues and the absence of human contact (Lutkevich, 2020). Tamm (2022) underscores contemplation, remoteness, and lack of interaction as major negative impacts, potentially leading to social isolation. Khan and Setiawan (2022) also highlighted the "face-to-face" relationship as crucial, particularly for social sciences students, and noted the disadvantage of groups lacking social and professional experience in e-learning environments. The Connectivist framework, while promoting collaboration through networks, implicitly acknowledges the need for educators to "create learning ecologies" and foster community, which can be challenging in purely virtual settings if human interaction is minimized.

The study also found that e-learning puts financial burden on parents and guardians. This contradicts some literature that suggests e-learning is less expensive due to reduced need for printed materials or travel (Blakely, Shetty, & Jacobs, 2018; Lawless, 2018; Lutkevich, 2020; Tamm, 2020). The discrepancy may stem from the specific context in Ghana, where the cost of technology like computers and smartphones remains a significant financial hurdle for families, particularly at the kindergarten level.

A critical negative impact identified is the lack of technical expertise among parents, teachers, and pupils, which severely affects the quality of e-learning. This is supported by Rana, Rajiv, and Lal (2014) who emphasized technical challenges like internet failure. Leila et al. (2018) argued that successful e-learning implementation hinges on addressing skill, technical, and cultural challenges, noting that those accustomed to traditional learning might struggle to adapt. Islam, Beer, and Slack (2015) also highlighted technical training challenges. Linked to technical expertise is the issue of technical challenges such as unstable internet affecting quality. The study's findings are consistent with Ayuni et al. (2021), who reported difficulties in signal access in hilly areas, forcing students to seek crowded places for internet access, thereby hindering effective implementation.

Furthermore, the study highlighted the difficulty in effectively assessing pupils as a negative impact. Safrizal, Yulia, and Suryana (2021) concurred, stating that a major challenge for kindergarten teachers in online learning is assessing children's physical, motor, social, and cognitive development, making it difficult to meet desired expectations. The effectiveness of learning time and assignments at home also posed difficulties.

E-learning was also found to cause a sense of isolation among pupils. This aligns with Tamm (2022), who noted that extensive online time can lead to social isolation, heightened stress, and anxiety due to a lack of human communication. Thompson (2021) also suggests that online

learning can create a sense of isolation for students who prefer community and easy access to professors or peers. Vanbuskirk (2021) documented the mental health toll of distance learning, including increased rates of depression, anxiety, and eating disorders, and a rise in feelings of isolation and suicide risk. The Science Prog (2020) similarly reported that minimal interaction in online learning can make pupils introverted and expose them to social anxiety. Interestingly, the current study did not find evidence that e-learning causes mental health issues or negatively affects societal culture, contradicting some broader claims in the literature. This divergence might be due to the specific context of kindergarten pupils or the localized nature of the study. Other noted issues in literature, such as eyestrain and obesity from screen time, were also not explicitly found as negative impacts in this specific study's results, though they are acknowledged in the background literature.

4.3 Ways to Improve E-learning

The study identified several crucial measures to improve e-learning among kindergarten pupils. Firstly, it is vital that teachers are involved in its planning. Effective educational system planning is fundamental, and teacher involvement serves as a source of motivation, ensuring commitment to successful implementation. Hamzeh (2021) supports this, recommending that teachers must be involved in planning to ensure technology aligns with instructional needs, highlighting the need for teachers to upskill in facilitation and assessment techniques for online modes.

Secondly, the provision of the right teaching and learning materials to support e-learning is essential. Without adequate materials such as computers, internet connections, radios, smartphones, and smartboards, effective implementation is severely hindered. Heather (2018) emphasizes that incorporating technology like interactive whiteboards and mobile devices engages students by allowing visualization of concepts, physical engagement, and instant research, thereby developing autonomy. These materials are critical for making e-learning effective. UNESCO's focus on solidifying distance learning systems by providing resources and supporting openly licensed teaching materials further underscores this point.

Thirdly, constant monitoring and supervision from parents and teachers are crucial. While digital devices offer numerous learning benefits, they also present risks of exposure to negative content. Therefore, vigilant monitoring is necessary to ensure productive and effective implementation. The Science Prog (2020) specifically advises parents to monitor pupils to limit online time. This highlights the importance of the home environment in supporting distance learning, an area where difficulties were previously noted, such as parent cooperation.

Fourthly, teachers and pupils should be properly trained to use the system. The reliance on e-learning systems necessitates that all users possess the requisite technical skills. This aligns with the understanding that transitioning to online learning requires addressing digital divides and ensuring both educators and learners have access to and proficiency with necessary devices. Thompson (2021) notes that online learning demands additional training for instructors to create

successful online courses and utilize the full advantages of e-learning tools. Tamm (2022) suggests that proper training for instructors in video/audio recording, virtual classroom software, and Learning Management Systems (LMS) is crucial for quality assurance.

Finally, students should be encouraged to use the internet productively. This measure reinforces the idea of maximizing the positive potential of e-learning while mitigating risks. Slamat (2020) suggests structured online learning through schedules, active student engagement via games, and ensuring interaction between students and teachers, even without face-to-face contact. Teachers, as initial initiative makers and guides, must possess professional, pedagogical, personality, and social competencies to support this productive engagement. The Connectivism theory supports this by advocating for teachers to guide students to be effective agents of their own learning, engaging them in decision-making and enhancing their learning networks through digital opportunities like online courses and social networks. Peer-to-peer activities and online lectures requiring communication are also suggested to develop essential communication skills.

4.4 CONCLUSIONS

Based on the findings of this study, the following conclusions can be drawn:

1. E-learning platforms possess the capacity to significantly enhance the quality of teaching and learning in kindergarten settings. These platforms offer pupils crucial flexibility and convenience in their learning, concurrently fostering the development of their communication skills and providing sustained motivation for engagement.
2. The effective implementation of e-learning systems is instrumental in building pupils' technological expertise from an early age. Furthermore, e-learning can cultivate curiosity in young learners, and notably improve their hand-eye coordination, mathematical abilities, and overall social competence.
3. The efficacy of an e-learning system is demonstrably limited by the absence of adequate human interaction between pupils and teachers. This lack of direct human contact negatively affects the quality of learning. Additionally, the financial burden placed on parents and guardians serves as a substantial barrier to the successful and equitable implementation of e-learning.
4. An effective e-learning system in schools is severely hampered by a lack of technical expertise among parents, teachers, and pupils alike. This challenge is compounded by difficulties in effectively assessing pupil progress and persistent technical issues, such as unstable internet connectivity.
5. To successfully improve the quality and impact of e-learning, it is imperative to involve teachers in its foundational planning stages. This must be accompanied by the provision of appropriate teaching and learning materials. Moreover, consistent monitoring and supervision from both parents and teachers, coupled with comprehensive training for all users and the encouragement of productive internet use among students, are critical for optimizing e-learning outcomes.

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4.5 RECOMMENDATIONS

Based on the key findings and conclusions, the following recommendations are put forth:

1. Basic schools, particularly kindergartens, should actively exploit the myriad benefits of e-learning by ensuring that pupils are consistently exposed to and integrated into the system.
2. The Ghana Education Service, in collaboration with the Ministry of Education, must prioritize and ensure the supply of appropriate teaching and learning materials that are necessary to support the effective implementation of e-learning in all basic schools across Ghana.
3. Comprehensive training programmes must be provided for teachers, parents, and pupils alike on how to effectively use various e-learning devices and platforms to support and enhance both teaching and learning processes.

4.6 LIMITATION

Several challenges were encountered during the data collection phase, which may impact the study's generalizability and the absolute representation of the true situation. The primary data collection instrument was a questionnaire, which inherently carries the tendency for non-response from respondents. Consequently, the responses obtained may not fully represent the actual situation on the ground, potentially affecting the validity and reliability of the findings. Furthermore, some teachers expressed reluctance to participate in the study due to the absence of financial remuneration for their involvement. This reluctance led to certain individuals declining participation, which could have implications for the comprehensiveness of the collected data.

DECLARATION

Data Availability: The datasets generated and analysed during the current study are not publicly available due to institutional data protection policies and the sensitive nature of individual-level information on students' digital access, performance, and perceptions. However, de-identified and anonymized data may be made available upon reasonable request from the corresponding author. Requests will be assessed based on ethical, legal, and academic integrity standards.

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Ethics Statement: This research adhered to the ethical standards set by the University of Education, Winneba, and complied with global best practices for research involving human participants. All data were stored securely, anonymized during analysis, and used solely for academic purposes. Special care was taken to ensure digital equity, inclusivity, and respect for participant rights, in alignment with Sustainable Development Goal 4 (inclusive and equitable quality education for all).

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