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ABDULFATTAH, KHASHIYAH; ASIYANBOLA, CALEB; ABIJOGUN, MARY TIJAFA & RAJI, FAROUK ABIODUN
Department of Educational Technology, Faculty of Education, University of Ilorin, Ilorin, Nigeria.
Abdulfattah.k@unilorin.edu.ng

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Abstract

The study aimed to evaluate the awareness and perception of cyber hygiene among primary school teachers in Ilorin metropolis, Kwara State. Given the increasing dependence on digital systems and networks, cyber hygiene has become essential in today's interconnected world, where cyber threats continue to evolve. A quantitative descriptive survey design was adopted, utilizing a researcher-designed questionnaire to collect data. The questionnaire was administered to 120 participants, and the responses were analyzed to determine their level of cyber hygiene awareness and perception. Descriptive statistics, including frequency counts and simple percentages, were used to summarize demographic data, while mean scores were employed to address the research questions. The study's findings revealed that primary school teachers demonstrated a moderate level of cyber hygiene awareness, with the highest awareness observed in areas such as online safety measures and data backups. However, gaps in understanding cyber hygiene concepts were identified. While teachers generally recognized the importance of cyber hygiene, their confidence in comprehending and applying these practices remained moderate. The study concluded that primary school teachers in Ilorin metropolis possess a moderate level of cyber hygiene awareness and hold a positive perception of its importance. It was recommended that targeted training programs and awareness initiatives be introduced to strengthen teachers' knowledge of cyber hygiene. Additionally, schools should invest in improving their security infrastructure to facilitate the effective implementation of cyber hygiene practices.

Introduction

Primary education serves as the cornerstone of formal education and is a fundamental part of every nation's educational system. It is the foundational stage upon which all other levels of education and academic achievements are built, as students must first pass through primary school before advancing to higher levels (Abdulqudus, 2020). According to the Federal Government of Nigeria (2004), primary education is designed for children aged 6 to 11 years, meaning that a child must

be at least six years old upon entry. The government also emphasized that since the entire education system is built upon primary education, its effectiveness determines the overall success or failure of the system in Nigeria. At this stage, children acquire foundational skills essential for adulthood, the workforce, and active participation in society.

Primary school teachers play a critical role in shaping young learners' educational development. They work with children at the beginning of their academic journey, teaching fundamental subjects such as science, mathematics, language arts, and social studies. Beyond academics, primary school teachers also focus on fostering creativity, social skills, and a passion for learning. They collaborate with parents, assess student progress, and create a supportive learning environment to ensure a well-rounded education. As key drivers of the learning process, teachers significantly influence students' academic experiences and achievements (Ukeje & Aisiku, 2022; Bala et al., 2024). The integration of technology in education involves the deliberate incorporation of digital tools, resources, and platforms into teaching and learning processes at all educational levels, from early childhood to higher education and lifelong learning. Technology offers numerous multimedia tools, interactive simulations, and virtual environments that enhance traditional learning methods. Digital textbooks, instructional videos, and online tutorials provide dynamic content that accommodates diverse learning preferences and styles (Timotheou et al., 2023; Yılmaz, 2021).

Educational technology is commonly implemented through digital learning platforms such as learning management systems (LMS), virtual classrooms, and online course platforms. These systems utilize cyber infrastructure to provide students and teachers with access to educational materials, assignments, and communication tools (Samaila et al., 2017). While technology greatly enhances teaching and learning, it also presents challenges, including cybersecurity threats, cybercrime, and the need for protective measures to ensure a safe and secure digital learning environment. Cyber hygiene refers to the practices and measures individuals take to ensure the security and health of their digital systems. The European Union Agency for Network and Information Security (ENISA) likens cyber hygiene to personal hygiene, emphasizing the importance of routine actions and regular checkups to maintain a secure online environment. These practices serve as protective measures against cyber threats, helping users safeguard their sensitive data from breaches and attacks (Vishwanath et al., 2020). Just as personal hygiene prevents illnesses caused by viruses and infections, cyber hygiene helps protect internet-connected devices from malware and cyber threats (Howell, 2021).

Cyber hygiene encompasses the strategies and habits that individuals and organizations adopt to maintain a secure digital presence. It involves precautionary steps such as using strong and unique passwords, regularly updating software and antivirus programs, avoiding suspicious links and emails, and staying informed about evolving cybersecurity threats (Singh et al., 2020). As cybercrimes like hacking, phishing, identity theft, and malware attacks become more sophisticated, maintaining proper cyber hygiene has become increasingly important (Moallem, 2024). The consequences of cyber threats can be severe, ranging from financial losses to reputational damage and legal issues. Combating cybercrime requires a collective effort, including advancements in cybersecurity technology, law enforcement interventions, public awareness initiatives, and education on safe online practices. Research indicates that many cyber-attacks occur due to a lack of awareness about cyber hygiene and poor cybersecurity habits among individuals (Alharbi, 2021). By fostering good cyber hygiene practices, individuals and organizations can mitigate the

risks associated with cyber threats and enhance the security of their data, devices, and networks (Mednikarov, 2022).

With Nigeria's rapidly growing population of internet users (Nigerian Bureau of Statistics, 2020), a vast amount of information is being shared and stored in cyberspace, making it vulnerable to exploitation. Protecting this data is crucial for both user security and economic stability. Therefore, raising awareness about cybersecurity is essential in preventing cyberattacks and ensuring a safer online environment (Eluwah, 2021). Awareness refers to the ability to recognize and understand events and situations (Eluwah, 2021). Cyber hygiene awareness involves knowledge and adaptive behaviors aimed at reducing online risks, particularly in digital learning environments (Isa et al., 2021). The importance of cyber hygiene awareness has gained global recognition, especially in online education following the COVID-19 pandemic (Barakovic et al., 2023).

According to Neigel et al. (2020) and Bada et al. (2019), cyber hygiene awareness includes all efforts taken to enhance users' understanding of cybersecurity risks and equip them with the necessary skills to navigate the digital space safely. Educating individuals on cyber hygiene is a crucial step in protecting against cyber threats (Edeh et al., 2021). However, studies indicate that a significant lack of awareness about cyber risks extends to app usage and the handling of information on social media platforms due to insufficient cybersecurity practices (Zwilling et al., 2020). Research by Adeyemi (2019) revealed that 97% of organizations in Africa allocate less than $10,000 to cybersecurity, with Nigeria leading in this trend. Additionally, 64% of organizations lack cybersecurity training for employees, 83% have no cybersecurity management in place, and 97% lack the necessary skills to counter cyberattacks, highlighting a significant gap in cyber hygiene awareness across the country.

Perception refers to how individuals process, interpret, and understand information within their environment (Iedunote, 2021). People naturally form opinions on issues that concern them, influenced by factors such as culture, personal experiences, and societal norms (Odey et al., 2021). Cyber hygiene perception relates to how individuals and organizations view the importance of cybersecurity practices, including their beliefs and attitudes toward mitigating online risks (Cain et al., 2018). Human behavior is often the weakest link in cybersecurity, making individuals more susceptible to cyber threats (Odey et al., 2021). Many people assume that cybersecurity is the responsibility of government agencies, security software, and protective hardware like firewalls and antivirus programs (Odey et al., 2021). Additionally, some believe that while cyber threats exist, they are unlikely to become victims, assuming that hackers primarily target financial institutions, governments, and high-profile individuals (Smith, 2017). Others downplay cyber risks, believing they are less significant compared to other societal threats, as they do not cause direct physical harm (Lawson et al., 2016). This false sense of security contributes to a widespread lack of cybersecurity precautions among the general public (Smith, 2017).

With the increasing adoption of technology in education, primary school teachers are increasingly using digital tools and online platforms for teaching and learning. However, this also exposes them and their students to potential cybersecurity threats. Understanding teachers' awareness and perceptions of cyber hygiene is essential for ensuring a safe and secure digital learning environment.

Purpose of study

The main purpose of this study was to assess the level cyber hygiene awareness and perception among primary school teachers. Specifically, the study was to:

1. determine the level of cyber hygiene awareness among primary school teachers in Ilorin Metropolis, Kwara State
2. identify primary school teachers' perceptions and beliefs regarding cyber hygiene in Ilorin Metropolis Kwara State
3. determine the difference in the level of cyber hygiene awareness among male and female primary school teachers in Ilorin Metropolis, Kwara State

Research Questions

1. What is the level of cyber hygiene awareness among primary school teachers in Ilorin Metropolis Kwara State?
2. What are primary school teachers' perceptions on cyber hygiene and cybersecurity risks in Ilorin Metropolis, Kwara State?
3. What is the difference in the level of cyber hygiene awareness among male and female primary school teachers in Ilorin Metropolis, Kwara State?

Methodology

The study utilized a descriptive survey research design, which was deemed appropriate as it allows for broad population accessibility and enables an accurate examination of real-world events. Data collection was carried out using a researcher-designed questionnaire to assess cyber hygiene awareness and perception among primary school teachers in Ilorin Metropolis, Kwara State. The target population comprised all primary school teachers within the metropolis. A random sampling technique was employed to select 120 teachers from various primary schools in Ilorin. A total of 120 questionnaires were distributed and successfully retrieved. The questionnaire was titled “Cyber Hygiene Awareness and Perception among Primary School Teachers in Ilorin Metropolis, Kwara State” which was divided into three sections: Section A collected demographic details such as school affiliation, gender, and teaching experience; Section B focused on assessing teachers' awareness of cyber hygiene; and Section C gathered information on their perception of cyber hygiene. Sections B and C utilized a Likert-type scale, where respondents rated statements as Strongly Agree (SA) = 4, Agree (A) = 3, Disagree (D) = 2, or Strongly Disagree (SD) = 1. The data collected were analyzed using descriptive and inferential statistics to address the research questions.

Result

The following section presents a comprehensive analysis of the collected data in alignment with the objectives of the study.

Table 1: Demography Characteristics of Respondents

Variable	Frequency	Percentage
Gender		
Male	52	43.3
Female	68	56.7
Teaching experience		
0-5 years	34	28.3
6-10 years	51	42.5
11 years and above	35	29.2

The sample consists of slightly more female teachers than male teachers, with females representing 56.7% of the sample compared to 43.3% males. This indicates a balanced yet female-dominated representation among the respondents. The distribution of teaching experience shows that the largest group of teachers has 6-10 years of experience, making up 42.5% of the sample. Teachers with 0-5 years of experience constitute 28.3%, while those with 11 years and above represent 29.2%. This suggests that the sample includes a diverse range of teaching experiences.

Research Question one: *What is the level of cyber hygiene awareness among primary school teachers in Ilorin Metropolis Kwara State?*

To answer research question one, data were collected to investigate the level of cyber hygiene awareness among primary school teachers in Ilorin Metropolis Kwara State. Mean were used to analyzed the data collected.

Table 2: Level of Awareness of Cyber Hygiene among Primary School Teachers.

S/N	Items	Mean
1	I understand the term of "cyber hygiene"	1.86
2	I am knowledgeable about current online threats and relevant safety strategies to prevent them	1.7
3	I am aware of the potential consequences of poor cyber hygiene practices, and this influences my behavior online	1.42
4	I am aware of the various types of cyber threats that exist, such as malware, phishing, and identity theft	1.73
5	I have received adequate training or professional development sessions related to cyber security or cyber hygiene practices	1.28
6	I know the steps to take if I suspect a cyber-attack or security breach on my school's network	1.58
7	I employ specific measures to ensure students' safety while using the internet in the classroom	2.03
8	I know the importance of using strong, unique passwords for online account	1.74
9	I understand the importance of regularly backing up data to protect against data loss from cyber attacks	2.03
	Grand Mean	1.71

The analysis of Table 2 shows the awareness of cyber hygiene among primary school teachers in Ilorin Metropolis. The mean scores for each item reveal varying levels of awareness. The item with the lowest mean score (1.28) is related to receiving adequate training indicating that many teachers may not be familiar with the concept itself. However, there is slightly better awareness of current online threats and safety strategies (1.7) and the potential consequences of poor cyber hygiene practices (1.42). Teachers show moderate awareness of various types of cyber threats (1.73), Knowledge of steps to take during a suspected cyber attack is also moderately low (1.58). Interestingly, teachers are more aware of the importance of specific online safety measures for students (2.03), strong passwords (1.74), and data backups (2.03). The grand mean of 1.71 indicates an overall moderate level of awareness of cyber hygiene among the teachers which is below the benchmark grand mean score of 2.50. This indicates certain areas requiring improvement, particularly in understanding the concept of cyber hygiene and receiving adequate training.

Research Question Two*:* *What are primary school teachers' perceptions on cyber hygiene and cybersecurity risks in Ilorin Metropolis Kwara State?*

To answer research question two, data were collected to investigate primary school teachers' perceptions on cyber hygiene and cybersecurity risks in Ilorin Metropolis Kwara State. Mean were used to analyzed the data collected.

Table 3: Cyber Hygiene Perception among Primary School Teachers.

S/N	Items	Mean
1	I perceive cyber hygiene as an important aspect of teaching in the digital age.	2.01
2	I believe that maintaining good cyber hygiene practices can enhance the safety and security of both teachers and students.	2.45
3	I believe I am susceptible to cyber attacks	1.88
4	I feel personally responsible for promoting cyber hygiene practices in my classroom.	1.71
5	I find cyber hygiene practices to be difficult to implement and maintain in my daily routine	1.58
6	I am confident in my understanding of cyber hygiene principles and best practices.	1.69
7	I believe cyber hygiene is not only the school management responsibility but also the teachers	1.73
8	I sometimes overlook cyber hygiene practices because I don't think I'm a target for cyber attacks	1.43
	Grand Mean	1.81

Table 3 provides insights into the perceptions of cyber hygiene among primary school teachers in Ilorin Metropolis. The mean scores suggest varying levels of perception regarding the importance and implementation of cyber hygiene practices. The highest mean score (2.45) reflects a strong belief that maintaining good cyber hygiene practices enhances the safety and security of both teachers and students. This is followed by a recognition of the importance of cyber hygiene in teaching in the digital age, with a mean score of 2.01. However, teachers seem to have mixed feelings about their susceptibility to cyber attacks (1.88) and their personal responsibility in promoting cyber hygiene (1.71). The mean score of 1.58 indicates some difficulty in implementing and maintaining these practices in their daily routines, and confidence in understanding cyber hygiene principles is relatively low (1.69). Moreover, there is a perception that cyber hygiene is

not solely the responsibility of school management but also of teachers (1.73). Interestingly, the lowest mean score (1.43) is related to overlooking cyber hygiene practices due to a belief of not being a target for cyber attacks, suggesting some teachers may underestimate the risks. The overall grand mean of 1.81 which is bellow the benchmark of 2.50, it indicates a moderate level of perception towards cyber hygiene, with areas such as confidence in understanding and the perceived difficulty of implementation needing attention.

Table 4: Level of Awareness of Cyber Hygiene among Primary School Teachers by Gender

T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
				Lower	Upper
-8.477	91.664	0	-0.44734	-0.55214	-0.34253

The p-value (Sig. 2-tailed) is 0.000, which is less than the conventional alpha level of 0.05. This indicates that the difference in cyber hygiene awareness between male and female gender is statistically significant. In other words, there is a very low probability that this difference is due to random chance. The mean difference of -0.44734 represents the average difference in awareness scores between male and female teachers. The negative value indicates that, on average, female teachers have lower awareness scores compared to male teachers.

Discussion of Findings

The findings of this study provide significant insights into the current state of cyber hygiene awareness, perception, and practices among primary school teachers in Ilorin Metropolis. The demographic profile of the respondents shows a slightly higher representation of female teachers (56.7%) compared to male teachers (43.3%). This finding aligns with the general trend in education sectors where female teachers are often more prevalent, particularly in primary education (UNESCO, 2021). The distribution of teaching experience, with the majority having 6-10 years of experience, suggests a mature and experienced teaching workforce. This diversity in experience is crucial as it could influence their perceptions and practices regarding cyber hygiene (Bada et al., 2019). The study revealed a moderate level of awareness of cyber hygiene among teachers, with a grand mean of 1.71. The lowest awareness was related to receiving adequate training or professional development sessions related to cyber security or cyber hygiene practices which aligns with findings from previous research indicating that educators often lack foundational training in cyber security concepts (Hart et al., 2020). This gap highlights the need for enhanced training and professional development in this area, as foundational knowledge is critical for effective practice. Teachers showed better awareness of specific online safety measures and data backups, which are more practical and tangible aspects of cyber hygiene (Aloul, 2012).

The perception of cyber hygiene among the teachers is generally positive, especially regarding its importance for safety and security in the digital age. However, the relatively lower confidence in their understanding and the difficulty in maintaining these practices indicate that while teachers recognize the importance of cyber hygiene, there are challenges in fully integrating these practices

into their routines (Hadlington, et al., 2017). The grand mean of 1.81 suggests that more support is needed to translate awareness into confident and consistent practice.

Conclusion

This study provides valuable insights into the state of cyber hygiene among primary school teachers in Ilorin Metropolis. The findings reveal that while there is a moderate level of awareness and positive perception of cyber hygiene, significant gaps remain in understanding and applying these practices, particularly due to external barriers like lack of resources and training. Addressing these challenges is crucial to ensuring a safer digital environment in schools, which is increasingly important in today's technology-driven world.

Recommendations

1. There is a need for targeted training programs and awareness campaigns to improve teachers' foundational knowledge of cyber hygiene. Such training should be regularly updated to reflect the evolving nature of cyber threats.

2. Schools should allocate resources to enhance their cyber security infrastructure, including firewalls, antivirus programs, and secure networks. This investment is critical to enabling teachers to implement effective cyber hygiene practices.

3. Given the gender disparities in cyber hygiene awareness, there should be gender-specific interventions aimed at improving female teachers' confidence and skills in this area.

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