Digital response to safety in educational institutions in Ibadan Metropolis, Oyo State, Nigeria

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ABSTRACT

The use of advanced technologies in digital safety responses aims to prevent, manage, and react to safety incidents in real-time. Nevertheless, educational institutions in developing regions frequently face issues such as violence, bullying, and emergencies, which ultimately jeopardize the safety of both students and staff. Consequently, this research investigated the role of digital safety measures in educational institutions located in Ibadan Metropolis, Oyo State, Nigeria, by identifying existing digital technologies, assessing the level of awareness and usage, and recognizing barriers to implementation. The research utilized a descriptive research design, focusing on the entire population of educational institutions within Ibadan Metropolis, Oyo State, Nigeria. A total of two hundred participants were purposively selected, and a self-constructed questionnaire was employed to gather data from the sampled respondents. The findings showed that digital safety tools, including metal detectors for entry, panic buttons, access control systems, fire alarm systems, and others, were not only sufficiently present but also had low levels of awareness and utilization in educational institutions in the Ibadan Metropolis. The findings additionally highlighted that factors such as limited ICT (Information Communication Technology) knowledge, low internet bandwidth, lack of access to ICT, inadequate ICT skills, high costs of technology, lack of training facilities, absence of technical resources, and insufficient infrastructure were significant obstacles to the availability and utilization of digital safety tools in educational institutions within the studied area. The study concluded that the availability of digital safety gadgets in educational institutions is a necessary condition for their awareness and usage.

Keywords: *Digital response, Digital technology, Educational institutions, Ibadan metropolis, Impeding factors to digital responses, Level of awareness, Safety education, Usage of digital technology.*

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Highlights of this paper

- The paper showed that educational institutions in Ibadan metropolis did not have adequate provisions of digital gadgets, resulting in low awareness of these digital responses to safety.
- There was also a low level of usage in the educational institutions.
- The paper also identified the impeding factors to the usage of digital gadgets for safety in educational institutions, such as weak ICT knowledge, low internet bandwidth, lack of ICT access, poor ICT skills, expensive technologies, unavailability of training capacities, lack of technical requirements, inadequate infrastructure, the digital divide, and the digital access gap.

1. INTRODUCTION

Every nation knows the value of educational institutions because they influence future generations and aid development at all levels. The functions of educational institutions span different categories. In Nigeria, there are both formal and informal educational institutions. There are also primary, secondary, and tertiary institutions. These can either be privately owned or government-owned institutions. Each category aims to prepare and equip learners with cognitive, psychomotor, and affective skills, which will, in turn, make them useful for the nation (Adebayo & Oyebade, 2022; Okeke & Ugwu, 2021).

However, the risk of sending children to schools in Nigeria has become widespread from the northern to the southern parts of Nigeria. With the growing spate of kidnapping, bullying, drug abuse, sexual abuse, and killing of all categories of learners from primary schools to the university, there is a need for a digital response to curb the tide. The problem of insecurity in the Nigerian educational system, which has claimed many innocent lives stemming from the movement of Boko Haram to various social disorders, requires a critical examination of various affordable digital gadgets to keep Nigerian educational institutions truly safe (Egunyomi, 2022). This has become urgent if the compulsory basic education policy of the Nigerian government, the Education for All programs, and the school-friendly campaigns of international organizations such as the United Nations Children's Fund (UNICEF) and the United Nations Educational, Scientific and Cultural Organization (UNESCO) are ever to become a reality (Olaniyan, 2021).

Safety is a factor that cannot be overemphasized, as propounded by Maslow's theory of needs. It forms part of the basic needs, which are at the base of the pyramid of needs (Maslow, 1943). Therefore, it is critical that students at educational institutions study in an environment that is safe and free of chaotic and unsafe occurrences (UNESCO, 2020). This will aid the effective learning process of the learners. It will also provide the teachers with a friendly and safe environment, which could lead to better performance not only for the teachers but for all the staff in the educational institutions (Organisation for Economic Co-operation and Development, 2019). Digital response refers to the use of digital technology to prevent, control, and reduce the occurrence of events that are detrimental to safety. It involves using digital devices to improve and ensure the safety of people and property in educational institutions. This aligns with Sustainable Development Goals (SDGs) 3, 4, and 8, which aim for good health and well-being, quality education, and decent work, respectively.

There are several safety digital devices that can be used in schools to enhance security and protect students. Some examples include security cameras for installing surveillance cameras in strategic locations within the school premises, which can help monitor activities and deter potential threats. There could be access control systems that use keycards, biometric scanners, or personal identification number (PIN) codes to control access to the school building, restricting entry to authorized individuals. Another digital safety gadget is visitor management systems, which allow schools to track and manage visitors by electronically registering their information, issuing visitor badges, and verifying their identities (Oyedele, 2020).

In addition to these, panic buttons could be placed in classrooms, offices, and common areas to enable immediate alerts to authorities in case of emergencies or dangerous situations. There could also be emergency communication systems, including tools such as intercoms, public address systems, and emergency notification apps or platforms to quickly disseminate important information to students, staff, and parents during emergencies, while fire alarm systems with advanced digital features can provide early detection of fires, trigger alerts, and activate evacuation protocols to ensure the safety of everyone in the school. Global Positioning System (GPS) tracking systems can be used to track the location of school buses, ensuring the safety of students during transportation. Internet filtering and monitoring software, including digital tools that filter and monitor internet usage in schools, can help protect students from accessing inappropriate content and ensure online safety. Cybersecurity software implementing robust cybersecurity measures, such as firewalls, antivirus software, and content filtering, can help protect school networks and sensitive data from cyber threats. Mobile safety apps afford schools the opportunity to leverage mobile applications that provide safety features like panic buttons, location tracking, and emergency alerts, enabling students and staff to quickly report incidents or seek help (Rogers, Sandoval, Jones, & Watson, 2020).

With the various available safety digital tools in schools, there ought to be a reduction in the level of exposure of students and other residents in educational institutions. However, the incidents and occurrences in various educational institutions show a high level of exposure to risks. There have been rising cases of schoolchildren kidnapping in Nigeria, which include the Chibok girls, Ekiti students' kidnapping, and Kaduna students' kidnapping, among others. Cases of child bullying, drugging, and rape have also increased. One example was that of Chrisland School, where a student's sex tape was released, a boy was bullied and died, and another student collapsed during an inter-house sports event and eventually died because adequate safety measures were not provided. These incidents call for preventive measures and quick responsive actions to curtail future occurrences.

There are several studies carried out on occupational health and safety, which include "Exploring the Potentials of Safety-Based Training for Building Workplace Safety Culture in the Manufacturing Industries" (Ojo, 2017) and "Perception of Influence of Digital Technology on Occupational Health Safety Training among Academic Staff in Nigerian Universities" (Akinyooye, 2021), with much emphasis on industrial workers. However, there is a dearth of literature on the digital response to safety in educational institutions. Therefore, this study examined the availability, awareness, and usage of digital safety devices in educational institutions in the Ibadan metropolis.

1.1. Statement of the Problem

The frequent occurrence of events that pose threats to safety in Nigerian educational institutions has raised serious concerns for all stakeholders. Government officials, parents, school administrators, and the general public have become increasingly worried about insecurity issues affecting various educational institutions. These institutions are primarily established to develop the nation's human capital, which is expected to serve as resources for the country. However, the rising cases of various risk factors need to be adequately addressed. One may wonder if digital technology can be utilized to prevent and reduce some of these security challenges. The availability, awareness, and frequency of usage of technological devices for safety, as well as the impeding factors to their usage, call for examination. Hence, the study aims to examine the digital response to safety in educational institutions in Ibadan Metropolis.

1.2. Objectives of the Study

i. The study's main objective was to examine the digital response to students' safety in schools. The specific objectives are to:

ii. Identify available digital technologies for student safety in schools.
iii. Ascertain the level of awareness of the available digital technologies suitable for addressing students' safety in schools.
iv. Find the frequency of usage of the available digital technologies suitable for addressing students' safety in schools.
v. Identify some of the impeding factors affecting the use of students' safety digital technology in schools.

1.3. Research Questions

The following questions were raised to guide the study.

i. What are the available digital technologies for safety in schools?
ii. What is the level of awareness of the available digital technologies suitable for addressing students' safety in schools?
iii. What is the frequency of usage of the available digital technologies suitable for addressing students' safety in schools?
iv. What are some of the impeding factors affecting the use of students' safety digital technology in schools?

2. LITERATURE REVIEW

2.1. Digital Technology

The act of converting analog data—such as text, video, and images—into digital format is known as digitization (Tilen & Andrej, 2019). According to Brennen and Kreiss (2016), the actual process of converting discrete analog information streams into digital bits is called digitization. Digital technology is the application of digital tools, systems, and equipment for electronic data processing, storage, and transmission. Computers, cell phones, software programs, the internet, and cutting-edge technologies like blockchain, artificial intelligence, and machine learning are just a few examples of the many technologies it includes (Tilen & Andrej, 2019).

The process of digitization necessitates a completely new way of thinking, a high level of resource availability for investment and digital transformation goals, and a different set of skills and knowledge held by the current workforce. For these reasons, a number of training programs are being offered to the workforce and consumers with the goal of helping them acquire digital competencies, which are important not only for jobs and work environments but also for service usage and managing personal and professional lives (Tilen & Andrej, 2019).

Digital technology, multimedia presentations, and social networking tools enhance learning outcomes in asynchronous online learning environments. In other words, the utilization of digital technology for Learning Management Systems (LMS) and the generation of fresh content facilitate students' academic success in an online environment (Kumi-Yeboah, Kim, Sallar, & Kiramba, 2020). There is strong evidence that digital tools, equipment, and resources, when utilized appropriately, may speed up and improve the quality of science and math instruction for primary and secondary school pupils. The same notion is supported by suggestive data for various literacy components, including writing and comprehension. Digital technologies appear to be a good approach to improving fundamental literacy and numeracy abilities, especially in elementary settings. While there are many benefits to adopting digital learning, the results are usually no different from previous successful pedagogical innovations in raising student achievement. The extent to which educators can utilize digital learning materials and technologies to enhance student learning may also influence the size of the effect (Scottish Government, 2015). Teachers may utilize digital teaching more successfully to raise achievement when they have both the technological knowledge and

comprehension, as well as the aptitude to identify how to use digital tools and resources to improve learning outcomes. This is true for all academic institutions. When students engage in digital learning for formal and informal activities in the classroom and at home, their academic performance improves. This improvement occurs as a result of extended learning time. This is particularly important for secondary education (Scottish Government, 2015).

2.2. Educational Institution in Nigeria

According to the Federal Republic of Nigeria (1981), the education system in Nigeria is essentially a public endeavor in which the government actively and fully intervenes. Nigeria's education strategy was created with the intention of using education to achieve national development. Nigeria's educational policies have changed as a result of many historical events since education is a vehicle for change.

There are four organizational levels in the Nigerian educational system. The first is informal, while the official education system consists of the other three. Education for early childhood care and development is regarded as early childhood education, although it is not official. Children between the ages of two and five are the target audience. Under Degree No. 16 of 1985 (National Minimum Standards and Establishment of Institutions), these schools were founded. They are operated by private organizations and individuals as daycare centers and nursery/kindergarten schools. The main goals are to develop and instill in the young child a proper school attitude and awareness (Birabil & Ogeh, 2018). In the formal educational system, elementary education is the first level. It provides a six-year curriculum for children aged six to twelve. This stage is regarded as the formal start of education and is vital to the overall system's success or failure. The goal is to achieve permanent and functional literacy, numeracy, and effective communication skills while preparing students for a broad-based education (Birabil & Ogeh, 2018). The kind of education that follows primary school is known as secondary education. There are two six-year phases to secondary school. Classes are run from J.S.S. 1 to J.S.S. 3 in the first stage. Students must take and pass the Junior Secondary School Certificate Exam (JSSCE) after completing J.S.S. 3. The majority of the pupils are between the ages of 12 and 15. It is required for those who struggle with formal schooling to pick up some occupational skills (Birabil & Ogeh, 2018). According to Birabil and Ogeh (2018), junior secondary school is actually a stage of talent hunting when kids are exposed to academic and prevocational subjects in an effort to discover their aptitudes and attitudes. Classes at the senior secondary level, from SS1 to SS3, are run by the second stage. Subject selection at this level takes the student's aptitude, disposition, and interests into account. Despite being directed by required coursework, the fields of technology, humanities, and business are studied. Certification and evaluation are predicated on external exams such as the National Examination Council (NECO) and the West African Examination Council (WAEC), as well as ongoing assessment. The age range of the students is fifteen to eighteen (Birabil & Ogeh, 2018).

Post-secondary education is provided to successful students in universities, colleges of education, polytechnics, and other relevant establishments in the tertiary education sector. Higher education should aim to increase students' intellectual capacity to comprehend and adapt to their surroundings, as well as help them acquire the necessary skills (Birabil & Ogeh, 2018).

2.3. Usage of Safety Digital Technology in Schools

In light of the global upsurge in insecurity situations, it is imperative to implement safety protocols that shield pupils from any malicious activities. Furthermore, the development of science and technology has made it simpler to integrate electronic devices with high-security systems that protect students and teachers. Some of the actions to be taken include engaging security experts, incorporating the learners' families into the security strategy, utilizing all

security equipment simultaneously, and catering to the particular needs of the school. These safety tools could guarantee the safety of young students both inside and outside of school buildings. A few of the devices include:

Entry Metal Detector: Interestingly, if there are any abnormalities, an entry metal detector notifies the school officials like a silent announcer would. The gadget, for instance, will soundlessly notify the school's security control room if someone enters the building brandishing a handgun or another potentially harmful metallic weapon. Updates to the software include automated premises lockdown, automatic video surveillance, isolation, and emergency communication with security forces. This gadget works well on school property because certain educational institutions have rigid rules prohibiting the carrying of metallic items like phones, computers, and knives, among others. An alert guarantees timely notifications when a student violates school policy; human action is required for the next steps.

Social Net Watcher: Moreover, offering pupils protection goes beyond just providing them with physical gadgets; social net watchers are computer programs that monitor what students do online. It is interesting that it keeps the monitor anonymous. An Indiana school's administrators have implemented computer software that allows them to keep an eye on the language that students use on social media sites like Facebook and to intervene on their behalf when they see inappropriate language being used. As more educational institutions for young learners continue to adopt this idea to protect their children, the software automatically notifies school officials in cases of cyberbullying or the use of unsuitable phrases.

Training lab simulators: Numerous accidents seem to have occurred in the school laboratory. Acquiring a training lab simulator is a sensible way to lessen the occurrences of these incidents. With the help of this device, young learners can practice selecting necessary lab supplies, appropriate lab attire, lab safety protocols, and handling objects during an experiment. By using this method, instructors can save time while introducing students to basic laboratory equipment and procedures. Additionally, as it is a useful tool that promotes learning, parents or guardians might urge the school where their child attends to acquire one as soon as possible.

Digital Map: Pupils may lose their way when going on excursions, visiting friends, or going on field trips. They can easily navigate their surroundings in challenging circumstances when they have a digital map at their fingertips, so they will not need to worry. The emergency map should also be easily comprehensible so that pupils will not have any trouble understanding the layout of the roads.

School Surveillance Camera: In the US, surveillance cameras are installed in more than 80% of elementary schools. Ensure that the surveillance equipment is located inside the school and in the surrounding areas, such as the gym, entrance, and hallways. The most recent surveillance cameras have an alert button that notifies security services immediately if there is any anomaly.

Screening backpacks and small bags for forbidden objects is the purpose of Astrophysics X-Ray Scanners. Administrators can receive an automatic threat alert from the program that can detect weapons, knives, and other threats in real time.

3. METHODOLOGY

3.1. Research Design

The study used a descriptive research approach. This approach plays a vital role in scientific inquiry, providing a comprehensive and systematic description of phenomena, individuals, or groups. This approach enables researchers to accurately portray and summarize existing conditions, identify patterns and trends, and establish a foundation for further investigation.

3.2. Population, Sample and Sampling Technique

The population comprised all the educational institutions in the Ibadan metropolis. The study used a sample of 200 students. The sample selection techniques employed were both probability and non-probability sampling techniques. The multistage sampling approach was utilized in the investigation. The strategy of purposeful sampling was used to choose Ibadan North Local Government due to the high concentration of educational institutions in that area. A stratified sampling technique was used to select two government-owned and two privately-owned primary and secondary schools, respectively, and two tertiary institutions, making a total of ten schools. This approach helped the researcher collect information across all levels of educational institutions. The learners in the penultimate and ultimate classes in the ten schools were considered because they had acquired experience and spent time on the school premises to provide information on the facilities in their schools. These included Primary Five and Six, Senior Secondary School Two and Three, Ordinary National Diploma (OND) II and Higher National Diploma (HND) II, as well as 300 Level and 400 Level. Lastly, a simple random sampling method was employed to choose the sample from each of the selected schools within the specified levels, as this gave each element in the sample frame an equal chance of being selected for the study.

3.3. Instrument

The instrument used to measure outcomes was a questionnaire. The study utilized a self-developed questionnaire titled "Digital Response to Safety in Educational Institutions Questionnaire" (DRSEIQ).

3.4. Validity and Reliability of Instrument

The scale's validity was checked by three educational experts, while the Cronbach Alpha technique was used for twenty students across three levels of educational institutions in Ogun State. This yielded reliability coefficients of 0.701, 0.722, 0.772, and 0.801 for the Digital Safety Gadget Availability Questionnaire (DSGAQ), Digital Safety Gadget Awareness Questionnaire (DSGAWQ), Digital Safety Gadget Usage Questionnaire (DSGUQ), and Digital Safety Gadget Impediment Factors Questionnaire (DSGIFQ), respectively.

3.5. Methods of Data Analyses

Descriptive statistics of simple percentages and frequency counts were used to analyze the data.

Table 1. Respondents' distribution based on gender, age, level, and school type, respectively.

	School type		Gender		Age		
School levels	**Private**	**Public**	**Male**	**Female**	**5-10 yrs.**	**11-16 yrs.**	**≥ 17 yrs.**
Secondary	20(24%)	62(76%)	41(50%)	41(50%)	0(0%)	58(71%)	24(29%)
Primary	35(52%)	32(48%)	27(40%)	40(60%)	51(76%)	17(24%)	0(0%)
	Public		Male	Female	5-10 yrs	11-16 yrs	≥ 17 yrs
Tertiary	40(100%)		30(75%)	10(25%)	0(0%)	0(0%)	40(100%)

4. RESULTS AND DISCUSSION

4.1. Demographic Characteristics of the Respondents

Table 1 indicated that out of eighty-two participants sampled from secondary schools within the study location, twenty (20), which represented twenty-four percent, were from private schools, while the remaining sixty-two (62) respondents, which accounted for seventy-two percent, were selected from public secondary schools. Forty-one of these respondents were male and female, respectively. With respect to age distribution, 58 (71%) and 24 (29%) of the

respondents were within the age bracket of 11-16 years and ≥ 17 years, respectively, while none of these participants was within the 5-10 years age range. It is further revealed that 35 (52%) and 32 (48%) of the selected respondents were from private and public primary schools within the study location. Twenty-seven (40%) of them were male, while the remaining 40 (60%) were female. Also, in terms of age distribution, 51 (76%) and 17 (24%) of these participants were within the 5-10 years and 11-16 years age ranges, while none was ≥ 17 years of age. With respect to the sample from tertiary institutions, it is indicated that all forty respondents sampled were taken from public tertiary institutions, with 30 (75%), 10 (25%), and 40 (100%) being male, female, and ≥ 17 years of age, respectively.

Research Question 1: What is the availability of digital safety gadgets in educational institutions in Ibadan Metropolis, Oyo State, Nigeria?

Table 2. Availability of digital safety gadgets in primary schools in Ibadan Metropolis, Oyo State, Nigeria.

Items	Public primary				Private primary			
	H A	AA	SA	NA	H A	AA	SA	NA
Entry metal detector	1(4%)	2(6%)	3(9%)	26(81%)	0(0%)	1(3%)	1(3%)	33(94%)
Panic buttons	0(0%)	0(0%)	2(6%)	30(94%)	0(0%)	0(0%)	5(14%)	30(86%)
Access control system	0(0%)	0(0%)	1(4%)	31(96%)	1(3%)	1(3%)	1(3%)	32(91%)
Fire alarm system	1(4%)	2(6%)	3(9%)	26(81%)	0(0%)	1(3%)	1(3%)	33(94%)
School surveillance camera	0(0%)	0(0%)	2(6%)	30(94%)	0(0%)	0(0%)	5(14%)	30(86%)
Internet filtering software	0(0%)	0(0%)	1(4%)	31(96%)	1(3%)	1(3%)	1(3%)	32(91%)
Mobile safety Apps	1(4%)	2(6%)	3(9%)	26(81%)	0(0%)	1(3%)	1(3%)	33(94%)
Visitor management system	0(0%)	0(0%)	1(4%)	31(96%)	0(0%)	0(0%)	5(14%)	30(86%)
Cyber security software	1(4%)	2(6%)	3(9%)	26(81%)	0(0%)	1(3%)	1(3%)	33(94%)
GPS tracking systems	0(0%)	0(0%)	2(6%)	30(94%)	0(0%)	0(0%)	5(14%)	30(86%)

Table 2 contained respondents' views on the availability of digital safety gadgets in both public and private primary schools in Ibadan Metropolis, Oyo State, Nigeria. The empirical findings indicated that digital safety gadgets, which comprised entry metal detectors, panic buttons, access control systems, fire alarm systems, school surveillance cameras, internet filtering software, mobile safety apps, visitor management systems, cybersecurity software, and GPS tracking systems, were not available in their schools, as claimed by the majority of the respondents.

Table 3. Availability of digital safety gadgets in secondary schools in Ibadan Metropolis, Oyo State, Nigeria.

Items	Public secondary				Private secondary			
	H A	AA	SA	NA	H A	AA	SA	NA
Entry metal detector	3(5%)	2(3%)	7(11%)	50(81%)	2(3%)	2(3%)	0(0%)	15(75%)
Panic buttons	2(3%)	4(6%)	3(5%)	53(86%)	1(5%)	2(10%)	1(5%)	16(80%)
Access control system	3(5%)	2(3%)	0(0%)	57(92%)	3(15%)	2(10%)	1(5%)	14(70%)
Fire alarm system	2(3%)	4(6%)	3(5%)	53(86%)	3(15%)	2(10%)	3(15%)	14(70%)
School surveillance camera	2(3%)	4(6%)	3(5%)	53(86%)	0(0%)	1(5%)	1(5%)	18(90%)
Internet filtering software	3(5%)	2(3%)	7(11%)	50(81%)	1(5%)	2(10%)	1(5%)	16(80%)
Mobile safety Apps	3(5%)	2(3%)	0(0%)	57(92%)	2(10%)	0(0%)	0(0%)	18(90%)
Visitor management system	5(7%)	5(7%)	8(13%)	45(73%)	0(0%)	0(0%)	2(10%)	18(90%)
Cyber security software	2(3%)	4(6%)	3(5%)	53(86%)	1(5%)	2(10%)	1(5%)	16(80%)
GPS tracking systems	3(5%)	2(3%)	7(11%)	50(81%)	1(5%)	2(10%)	3(15%)	14(70%)

Note: Hints: HA: Highly available, AA: Adequately available, SA: Sparsely available NA: Not available.

Table 3 contained respondents' perspectives regarding the availability of digital safety gadgets in the sampled private and public secondary schools. The empirical outcomes, as reiterated by the majority of the participants, indicated that the digital safety gadgets, which consisted of entry metal detectors, panic buttons, access control systems, fire alarm systems, school surveillance cameras, internet filtering software, mobile safety apps, visitor management systems, cybersecurity software, and GPS tracking systems, were not available in their schools.

Table 4. Availability of digital safety gadgets among tertiary institutions in Ibadan Metropolis, Oyo State, Nigeria.

Items	Tertiary institutions			
	H A	AA	SA	NA
Entry metal detector	20(50%)	5(12%)	5(12%)	10(25%)
Panic buttons	25(63%)	15(37%)	0(0%)	0(0%)
Access control system	30(75%)	10(25%)	0(0%)	0(0%)
Fire alarm system	30(75%)	10(25%)	0(0%)	0(0%)
School surveillance camera	25(63%)	10(25%)	5(12%)	0(0%)
Internet filtering software	20(50%)	10(25%)	5(12%)	5(12%)
Mobile safety Apps	10(25%)	20(50%)	5(12%)	5(12%)
Visitor management system	10(25%)	20(50%)	5(12%)	5(12%)
Cyber security software	5(12%)	5(12%)	10(25%)	20(50%)
GPS tracking systems	25(63%)	15(37%)	0(0%)	0(0%)

Note: Hints: HA: Highly available, AA: Adequately available, SA: Sparsely available NA: Not available.

Table 4 contained respondents' views with respect to the availability of digital safety gadgets in tertiary institutions within the study location. The empirical findings indicated that digital safety gadgets such as entry metal detectors, panic buttons, access control systems, fire alarm systems, school surveillance cameras, internet filtering, and GPS tracking systems were highly available, with the majority of the respondents supporting the claim. Meanwhile, the remaining digital safety gadgets, which comprised mobile safety apps, visitor management systems, and cybersecurity software, were adequately available, as supported by the majority of the participants, respectively.

Research Question 2: What is the level of awareness of digital safety gadgets in educational institutions in Ibadan Metropolis, Oyo State, Nigeria?

Table 5. Level of awareness of digital safety gadgets among primary school learners in Ibadan Metropolis, Oyo State, Nigeria.

Items	VA	A	SA	NA	NAA
Entry metal detector	30(45%)	20(30%)	10(15%)	5(7%)	2(3%)
Panic buttons	20(30%)	30(45%)	5(7%)	2(3%)	10(15%)
Access control system	20(30%)	30(45%)	2(3%)	10(15%)	5(7%)
Fire alarm system	30(45%)	20(30%)	10(15%)	5(7%)	2(3%)
School surveillance camera	30(45%)	20(30%)	10(15%)	5(7%)	2(3%)
Internet filtering software	10(15%)	5(7%)	2(3%)	20(30%)	30(45%)
Mobile safety apps	10(15%)	5(7%)	2(3%)	20(30%)	30(45%)
Visitor management system	30(45%)	20(30%)	10(15%)	5(7%)	2(3%)
Cyber security software	10(15%)	5(7%)	2(3%)	20(30%)	30(45%)
GPS tracking systems	10(15%)	5(7%)	2(3%)	20(30%)	30(45%)

Note: HA: Highly available, AA: Adequately available, SA: Sparsely available NA: Not available.

Table 5 contained respondents' opinions concerning the level of awareness of digital safety gadgets among primary school learners in Ibadan metropolis, Oyo State, Nigeria. The empirical outcomes indicated that 30 (45%), 20 (30%), 10 (15%), 5 (7%), and 2 (3%) were very aware, aware, somewhat aware, not aware, and not at all aware of the existence of entry metal detectors, fire alarm systems, school surveillance cameras, and visitor management systems, respectively, as some of the digital safety gadgets in schools. 20 (30%) and 30 (45%) of the respondents, which is the majority, were very aware and aware of the panic buttons and access control systems among the digital safety gadgets in schools. 20 (30%) and 30 (45%) of the entire participants, which is the majority, supported that they were not aware and not at all aware of the mobile safety apps, cybersecurity software, and GPS tracking systems as digital safety gadgets in schools, respectively.

Table 6. Level of awareness of digital safety gadgets among secondary school learners in ibadan metropolis, Oyo State, Nigeria.

Items	VA	A	SA	NA	NAA
Entry metal detector	25(31%)	25(31%)	15(18%)	7(9%)	10(11%)
Panic buttons	15(18%)	7(9%)	10(11%)	25(31%)	25(31%)
Access control system	25(31%)	25(31%)	15(18%)	7(9%)	10(11%)
Fire alarm system	15(18%)	7(9%)	10(11%)	25(31%)	25(31%)
School surveillance camera	25(31%)	25(31%)	15(18%)	7(9%)	10(11%)
Internet filtering software	15(18%)	7(9%)	10(11%)	25(31%)	25(31%)
Mobile safety apps	15(18%)	7(9%)	10(11%)	25(31%)	25(31%)
Visitor management system	25(31%)	25(31%)	15(18%)	7(9%)	10(11%)
Cyber security software	15(18%)	7(9%)	10(11%)	25(31%)	25(31%)
GPS tracking systems	25(31%)	25(31%)	15(18%)	7(9%)	10(11%)

Note: Hints: VA: Very aware, A; Aware, SA: Somewhat aware, NA: Not aware, NAA: Not at all aware.

Table 6 contained participants' views about their level of awareness of some digital safety gadgets in secondary schools. The empirical outcomes indicated that 25 (31%), 25 (31%), 15 (18%), 7 (9%), and 10 (11%) of the respondents claimed to be very aware, aware, sparsely aware, not aware, and not at all aware of the existence of entry metal detectors, access control systems, school surveillance cameras, visitor management systems, and GPS tracking systems, respectively, as digital safety gadgets in schools. Hence, the majority of the respondents were aware of the existence of the aforementioned digital safety gadgets in schools. The study further revealed that 15 (18%), 7 (9%), 10 (11%), 25 (31%), and 25 (31%) of the participants were very aware, aware, somewhat aware, not aware, and not at all aware of the existence of panic buttons, fire alarm systems, internet filtering software, mobile safety apps, and cybersecurity software, respectively, as some of the digital safety platforms for schools.

Table 7. Level of awareness of digital safety gadgets among students in tertiary institutions in Ibadan metropolis, Oyo State, Nigeria.

Items	VA	A	SA	NA	NAA
Entry metal detector	33(83%)	2(5%)	2(5%)	1(2%)	2(5%)
Panic buttons	28(70%)	7(18%)	2(5%)	1(2%)	2(5%)
Access control system	33(83%)	2(5%)	2(5%)	1(2%)	2(5%)
Fire alarm system	27(68%)	8(20%)	2(5%)	1(2%)	2(5%)
School surveillance camera	30(75%)	8(20%)	0(0%)	0(0%)	2(5%)
Internet filtering software	27(68%)	8(20%)	2(5%)	1(2%)	2(5%)
Mobile safety apps	30(75%)	8(20%)	0(0%)	0(0%)	2(5%)
Visitor management system	30(75%)	8(20%)	0(0%)	0(0%)	2(5%)
Cyber security software	27(68%)	8(20%)	2(5%)	1(2%)	2(5%)
GPS tracking systems	28(70%)	7(18%)	2(5%)	1(2%)	2(5%)

Note: Hints: VA: Very aware, A; Aware, SA: Somewhat aware, NA: Not aware, NAA: Not at all aware.

Table 7 contained the level of awareness of digital safety gadgets among students in tertiary institutions in Ibadan Metropolis, Oyo State, Nigeria. The empirical findings indicated that the awareness level of digital safety gadgets among students of tertiary institutions in Ibadan Metropolis was very high, as the majority of them claimed that they were aware of entry metal detectors, panic buttons, access control systems, fire alarm systems, school surveillance cameras, internet filtering software, mobile safety apps, visitor management systems, cybersecurity software, and GPS tracking systems as digital safety tools in tertiary institutions to a very high extent.

Research Question 3: What is the usage of digital safety gadgets in educational institutions in Ibadan Metropolis, Oyo State, Nigeria?

Table 8. Usage of digital safety gadgets in educational institutions in Ibadan Metropolis, Oyo State, Nigeria.

Items	AA	O	ST	SE	N
An entry metal detector is used to check people gaining entrance to the school premises to ensure they are not in possession of guns or other dangerous tools.	4(2%)	30(16%)	10(5%)	5(3%)	140(74%)
Panic buttons are installed in classrooms, offices, and common areas to allow authorities to be notified without delay in the event of an emergency or serious situation.	11(6%)	10(5%)	12(6%)	7(4%)	149(79%)
Access control systems use key cards, biometric scanners, or PIN codes to manage entry to the school building, restricting access to authorized individuals.	7(4%)	12(6%)	11(6%)	10(5%)	149(79%)
Fire alarm system with advanced digital features provides early detection of fires, triggers alerts, and activates evacuation protocols to ensure the safety of everyone in the school.	4(2%)	30(16%)	10(5%)	5(3%)	140(74%)
School surveillance cameras are installed in strategic locations within the school premises to monitor activities and deter potential threats.	13(7%)	8(4%)	10(5%)	1(1%)	156(83%)
Internet filtering and monitoring software filters and monitors internet usage, thereby protecting students from accessing inappropriate content and ensuring online safety.	13(7%)	8(4%)	10(5%)	1(1%)	156(83%)
Mobile safety apps afford schools the opportunity to leverage mobile applications that provide safety features like panic buttons, location tracking, and emergency alerts, enabling students and staff to quickly report incidents or seek help.	10(5%)	1(1%)	13(7%)	8(4%)	156(83%)
A visitor management system allows schools to track and message visitors by electronically registering their information, using visitor badges, and verifying their identities.	7(4%)	12(6%)	11(6%)	10(5%)	149(79%)
Cybersecurity software used to implement robust cybersecurity measures, such as firewalls, antivirus software, and content filtering, helps protect school networks and sensitive data from cyber threats.	2(1%)	2(1%)	3(2%)	10(5%)	172(91%)
GPS tracking systems are used to monitor the location of school buses, ensuring the safety of students during transportation.	7(4%)	12(6%)	11(6%)	10(5%)	149(79%)

Note: AA: Almost always, O: Often, ST: Sometimes, SE: Seldom and N: Never.

Table 8 contained the respondents' views regarding the usage of digital safety tools in educational institutions within the study location. The empirical findings indicated that entry metal detectors, panic buttons, access control systems, fire alarm systems, school surveillance cameras, internet filtering, GPS tracking systems, mobile safety apps, visitor management systems, and cybersecurity software were never in use in the educational institutions under consideration, as supported by the majority of the sampled participants. However, a handful of these respondents claimed that these digital safety tools were almost always, often, sometimes, and seldom in use in their educational institutions for the safety of the students and staff.

Research Question 4: What are the impending factors of digital safety gadgets in educational institutions in Ibadan Metropolis, Oyo State, Nigeria?

Table 9 contained participants' views concerning some of the impending factors militating against the availability and usage of digital safety tools in educational institutions within the study location. The empirical findings indicate that 105 (56%), 50 (26%), 20 (11%), and 14 (7%) of the participants strongly agree, agree, strongly disagree, and disagree, respectively, that weak ICT knowledge, expensive technologies, and the digital access gap were some of the impending factors affecting the availability and usage of digital safety tools in educational institutions in the Ibadan metropolis. Additionally, 120 (63%), 30 (16%), 20 (11%), and 9 (5%) strongly agree, agree, strongly disagree, and

disagree, respectively, that a lack of technical requirements, unavailability of training capacities, and inadequate infrastructure were impending factors affecting both the availability and usage of digital safety tools in schools. Furthermore, low internet bandwidth, lack of ICT access, unavailability of training capacities, and poor ICT skills were identified as impending factors, with 20 (11%), 14 (7%), 50 (26%), and 105 (56%) of the respondents strongly agreeing, agreeing, strongly disagreeing, and disagreeing with the statements, respectively. It is indicated that the digital divide contributed immensely to the non-availability and usage of digital safety tools in the educational institutions under investigation, as 109 (58%), 48 (25%), 17 (9%), and 15 (8%) of the participants strongly agree, agree, strongly disagree, and disagree, respectively.

Table 9. Impending factors of digital safety gadgets in educational institutions in the Ibadan metropolis, Oyo State, Nigeria.

Items	SA	A	SD	D
Weak ICT knowledge	105(56%)	50(26%)	20(11%)	14(7%)
Low internet bandwidth	20(11%)	14(7%)	50(26%)	105(56%)
Lack of ICT access	20(11%)	14(7%)	50(26%)	105(56%)
Poor ICT skills	20(11%)	14(7%)	50(26%)	105(56%)
Expensive technologies	105(56%)	50(26%)	20(11%)	14(7%)
Unavailability of training capacities	20(11%)	14(7%)	50(26%)	105(56%)
Lack of technical requirements	120(63%)	30(16%)	20(11%)	9(5%)
Inadequate infrastructure	120(63%)	30(16%)	20(11%)	9(5%)
Digital divide	109(58%)	48(25%)	17(9%)	15(8%)
Digital access gap	105(56%)	50(26%)	20(11%)	14(7%)

Note: SA: Strongly agree, A: Agree, SD: Strongly disagree and D: Disagree.

4.2. Discussion of Findings

The empirical outcomes indicated that digital safety gadgets, which comprised entry metal detectors, panic buttons, access control systems, fire alarm systems, school surveillance cameras, internet filtering software, mobile safety apps, visitor management systems, cybersecurity software, and GPS tracking systems, were not only adequately available but also had a low level of awareness and usage in the educational institutions in Ibadan metropolis. This suggests that educational institutions in developing societies, such as the ones under review, did not recognize that schools are a high-risk category of facilities in an emergency. This, in part, explains why it is necessary to implement safety measures, which include operational and administrative measures to reduce the likelihood of any dangerous accidents occurring both inside and outside of schools. Schools are known to have a variety of combustibles, many of which are easily ignited and can spread quickly to become fires.

Mohammad, Khan, and Hassan (2022) Created a system to evaluate fire safety in school buildings to reinforce safety precautions. The purpose of this framework is to provide guidance to facilities managers on the necessary duties involved in evaluating the fire safety of any school building. These include gathering all records pertaining to school buildings, locating potential fire sources, determining the fire safety regulations, creating a checklist for fire safety inspections, reviewing the gathered records, conducting a fire safety inspection, analyzing and reporting the results, and suggesting an improvement action plan. Dina, Ibrahim, Base, Maha, and Hanadi (2022) Provided more support, pointing out that the impact of IT is felt strongly in all real-time systems in the current computer technology environment. The firm has put in place a number of management systems to aid in achieving standards, profit, and future commercial expansion. The visitor management system is crucial for keeping track of the number of visitors, the purpose of their visit, and the individuals who will be added to the block list for breaking rules. The general security of the structure is also safeguarded by this technology. Effective and efficient organizational security will be ensured by the provision of a visitor management system. The electronic logbook provides for the confidentiality of the visiting list, which is accessible to all guests, in contrast to a manual logbook where guests become accustomed to entering their personal information, which is frequently erroneous and merely for the purpose of filling out. In

order to decrease the number of false visitor entries, the visitor management system will verify every visitor's data by delivering a one-time password (OTP) together with the exact appointment time (Dina et al., 2022).

The empirical outcomes revealed that weak Information and Communication Technology (ICT) knowledge, low internet bandwidth, lack of ICT access, poor ICT skills, expensive technologies, unavailability of training capacities, lack of technical requirements, inadequate infrastructure, the digital divide, and the digital access gap were some of the impending factors affecting the availability and usage of digital safety tools in educational institutions within the study location. This is consistent with the assertion made by Afzal, Khan, Daud, Ahmad, and Butt (2023) that the digital gap creates differences in students' and teachers' access to and usage of technology, hence posing a serious threat to education. Moses, Nghipandulwa, and Shikusho (2022) discovered that certain schools were without electricity and had an excessive number of broken computers that had accumulated over time. They also discovered that staff members lacked the technical know-how to get these broken computers fixed so that staff and students could use them. Similarly, Sanni and Aransi (2024) concluded that despite the potential of technology to transform education and enhance safety, developing societies like Nigeria face numerous challenges such as inadequate infrastructure, limited access to safety devices and internet connectivity, and insufficient digital literacy, among others, which was in consonance with the outcomes of this study.

5. CONCLUSION AND RECOMMENDATIONS

The study concluded that the availability of digital safety gadgets in educational institutions is a necessary condition for awareness and usage in ensuring the safety of students in schools. However, there are impending factors that hinder the availability of key safety digital gadgets in schools. As a result, the following recommendations are raised for concerned stakeholders:

i. Educational authorities should raise more awareness of the need to incorporate digital safety devices in schools at all levels: primary, secondary, and higher institutions in both private and public schools.
ii. School management should organize frequent training sessions for students, teachers, and school administrators on the effective use of safety digital devices.
iii. Appropriate educational agencies should enforce compliance with the use of safety digital devices to reduce risks and promote security and safety in schools.
iv. NUC should make the availability of these safety digital devices a part of their accreditation criteria for tertiary institutions.
v. Government and tertiary institution management should make funds available for the purchase and effective use of these devices to further increase the safety of students and residents in higher education institutions.

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