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ENHANCING DIGITAL LITERACY AND ONLINE SAFETY AWARENESS AMONG SECONDARY SCHOOL STUDENTS IN THE 21ST CENTURY LEARNING ENVIRONMENT

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ABSTRACT

The study employed a descriptive survey research design to examine strategies for enhancing digital literacy and online safety awareness among secondary school students within the context of 21st-century learning. The research was carried out in two secondary schools St. Timothy College and St. Finbarr's College located in Lagos, Nigeria. The study population consisted of 162 Senior Secondary School students (SSS 2 and SSS 3) from both institutions. Using a stratified random sampling technique to ensure proportional representation, a sample of 80 students was selected. Data were collected using a researcher-developed questionnaire, which was validated for face and content validity by experts in educational technology and measurement and evaluation. The reliability of the instrument was confirmed through a pilot study, yielding a reliability coefficient of 0.73, indicating satisfactory internal consistency. Data analysis involved the use of mean, standard deviation, and t-test statistics. Findings revealed that students possess a moderate level of digital literacy. Students show strengths in basic computer use and internet searches but demonstrate weaknesses in technical skills such as troubleshooting and advanced productivity tools. Based on these findings, the study recommended that Government and school administrators should invest in adequate ICT infrastructure, including functional computers, stable internet connectivity, and digital learning platforms.

Keywords: Digital Literacy, Online Safety, Awareness, Secondary School Students, 21st-Century Learning, Lagos.

I.INTRODUCTION

Increased use of digital tools in the classroom is a hallmark of the 21st-century learning environment, changing how students access, share, and use knowledge. Since digital platforms are becoming essential for socialization, communication, and education, kids need more than just access to technology; they also need to be able to use it securely, morally, and productively. Digital literacy is the term used to describe this fundamental skill set, which includes the capacity to find, assess, produce, and share knowledge using digital platforms and technologies Das and Sen [1]. Media literacy, information literacy, critical thinking, and digital citizenship are all components of digital literacy, which extends beyond fundamental ICT abilities.

Concern over the growing disconnects between students' digital participation and their knowledge of safe online conduct is spreading throughout the world. Teenagers are among the most frequent users of social networking sites, instant messaging apps, and digital media, especially those in secondary school. This exposes kids to a variety of online threats, such as identity theft, cyberbullying, disinformation, and exposure to improper content, even if it also offers many chances for improved learning Eshet-Alkalai [2].

Digital literacy is still not routinely incorporated into the curriculum in Nigeria and many other developing nations. Although the government has made considerable progress in implementing ICT policy in education, there is still a lack of practical implementation in schools, especially at the secondary level. Many students are left to fend for themselves in the complicated digital environment with little help, which makes them more susceptible to online dangers Gupta and Sharma [3]. Therefore, it is imperative to investigate strategies for fostering digital literacy and online safety awareness as fundamental skills for students in the educational environment of the twenty-first century.

Often called "cyber safety" or "internet safety," online safety is the practice of keeping oneself and other people safe when using digital devices. Understanding privacy settings, spotting cyberbullying, spotting phishing schemes, and knowing how to react to negative online conduct are all part of secondary school students' online safety. Students frequently participate in online activities without fully comprehending the repercussions of their digital behaviors due to growing access to cellphones, tablets, and the internet Hargittai [4]

There can be serious emotional, psychological, and intellectual repercussions from a lack of knowledge and instruction on internet safety. For example, victims of cyberbullying could withdraw from school activities or suffer from anxiety or sadness Jones and Mitchell [5]. Students who unintentionally divulge personal information online run the risk of being exploited or having their identities stolen. Furthermore, the dissemination of false information and fake news can have a detrimental effect on students' social relationships and academic achievement, particularly in settings where digital media serves as the main information source.

Proactive digital literacy initiatives have been shown to reduce these risks. For instance, it has been discovered that including instruction on digital citizenship in the curriculum enhances students' capacity for critical thought, their ability to behave ethically online, and their ability to withstand cyberattacks Joshi and Kapoor [6]. However, the effectiveness of such programs depends on adequate teacher training, curriculum creation, and support from school officials and parents. In Nigeria, the absence of continuous digital safety education is worsened by infrastructural constraints and insufficient internet regulation understanding. Numerous students make considerable use of social media sites like Facebook, WhatsApp, and TikTok, frequently without supervision or knowledge of the privacy regulations or community guidelines of the platforms Adedoyin and Soykan, [7].

This emphasizes the necessity of focused interventions and in-school initiatives that give pupils real-world experience with digital responsibility and online safety. In many regions of Nigeria, including Lagos State, secondary schools have not fully adopted structured methods to digital learning, despite the obvious need for safety and digital literacy instruction. Although the Federal Republic of Nigeria [8] recognizes the value of ICT in education, grassroots implementation is still uneven. ICT labs, qualified teachers, and up-to-date lesson plans on digital citizenship and safety are frequently lacking in schools.

Furthermore, there is a dearth of empirical data regarding Nigerian secondary school pupils' understanding of online safety and digital literacy. Teachers and legislators are unable to create evidence-based interventions or assess the success of current initiatives without such data. Therefore, by investigating students' knowledge, attitudes, and behaviors regarding digital literacy and online safety, this study seeks to close the gap. Due to the swift digitization of education brought on by incidents like the COVID-19 outbreak, students need to be ready to use digital technologies ethically and safely. The intention is to enable pupils to develop into moral digital citizens who can safely and confidently navigate the digital environment.

In conclusion, improving digital literacy and online safety awareness is a critical educational challenge in the twenty-first century that calls for creative curriculum design, teacher training, student-centered interventions, and policy support. This study will add to the ongoing conversation by offering information and suggestions for encouraging safe and efficient digital practices among secondary school students in Lagos state and beyond. This calls for a cooperative approach involving schools, parents, government agencies, and the larger community.

II.STATEMENT OF THE PROBLEM

The way secondary school students study, engage, and communicate has changed dramatically as a result of the pervasive integration of digital technologies into education and daily life. However, kids' understanding and readiness for safe and responsible online activity have not kept pace with this revolution in technology. Many secondary school students lack basic digital literacy skills and sufficient awareness of online safety procedures, even though they are frequent users of the internet and social media platforms. They are vulnerable to identity theft, cyberbullying, online harassment, digital addiction, exposure to harmful content, and manipulation through false information because of this gap.

Digital literacy and online safety instruction have not yet been fully incorporated into the curricula of many Nigerian secondary schools, especially those in Lagos State. When such content is available, it is frequently theoretical, out-of-date, or not applied in practice because of inadequate teacher preparation, a lack of digital infrastructure, and lax enforcement of policies.
As a result, pupils are more exposed to online hazards since they are left to navigate the complicated digital world on their own with little to no assistance.

Furthermore, although ethical technology use and digital citizenship are receiving more attention worldwide, there isn't much empirical study conducted in Nigeria that particularly evaluates students' knowledge, attitudes, and behaviors regarding digital literacy and online safety. Policymakers, educators, and parents are unable to make well-informed decisions regarding interventions and support networks due to this lack of data.

Secondary school kids' academic performance, mental health, and future as responsible digital citizens will all be at risk if this gap is not closed since they will continue to be exposed to the risks of the digital world without the abilities to protect themselves. Thus, this study aims to assess secondary school students' digital literacy and online safety awareness, pinpoint the variables affecting their understanding and behavior, and suggest methods for incorporating efficient digital safety instruction into the secondary school curriculum.

Aim and Objectives of the study

The aim of the study is to Enhance Digital Literacy and Online Safety Awareness among Secondary School Students in the 21st Century Learning Environment. Specifically the study intends to:

1. Assess the level of digital literacy among secondary school students in the 21st-century learning environment.
2. Examine the awareness and practices of online safety among secondary school students.
3. Identify the challenges and barriers to integrating digital literacy and online safety education in secondary schools.

III. RESEARCH QUESTIONS

Based on the objectives, the following research questions are drawn:

1. What is the current level of digital literacy among secondary school students in the 21st-century learning environment?
2. To what extent are secondary school students aware of and practicing safe online behavior?
3. What challenges hinder the effective integration of digital literacy and online safety education in secondary schools?

Hypotheses

1. There is no significant difference between St Timothy College Onike and St Finbarr's College Akoka's current level of digital literacy among secondary school students in the 21st-century learning environment
2. There is no significant difference between St Timothy College Onike and St Finbarr's College Akoka's extent to which students awareness of and practices of safe online behavior
3. There is no significant difference between St Timothy College Onike and St Finbarr's College Akoka's challenges hindering the effective integration of digital literacy and online safety education in secondary schools

IV.METHODOLOGY

The study employed a descriptive survey research design to examine strategies for enhancing digital literacy and online safety awareness among secondary school students within the context of 21st-century learning. The research was carried out in two secondary schools St. Timothy College and St. Finbarr's College located in Lagos, Nigeria. The study population consisted of 162 Senior Secondary School students (SSS 2 and SSS 3) from both institutions. Using a stratified random sampling technique to ensure proportional representation, a sample of 80 students was selected. Data were collected using a researcher-developed questionnaire, which was validated for face and content validity by experts in educational technology and measurement and evaluation. The reliability of the instrument was confirmed through a pilot study, yielding a reliability coefficient of 0.73, indicating satisfactory internal consistency. Data analysis involved the use of mean, standard deviation, and t-test statistics.

V.RESULTS

Research Question 1: What is the current level of digital literacy among secondary school students in the 21st-century learning environment?

Table 1: Students' Level of Digital Literacy

S/N	Items on Digital literacy indicator	Mean (X)	SD	Decision
1	Ability to use computers for assignments	3.25	0.82	High
2	Ability to use internet search effectively	3.10	0.76	Moderate
3	Use of educational platforms like CBT apps	2.95	0.88	Moderate
4	Competence in productivity tools (MS Word, PowerPoint)	2.70	0.91	Moderate
5	Troubleshooting basic digital problems	2.40	0.95	Low
	Mean	2.88	0.86	Moderate Level

Table 1 shows that with the mean score of 2.88, students possess a moderate level of digital literacy. Students show strengths in basic computer use and internet searches but demonstrate weaknesses in technical skills such as troubleshooting and advanced productivity tools.

Research Question 2: To what extent are secondary school students aware of and practicing safe online behavior?

Table 2: Students' Online Safety Awareness and Practices

S/N	Items on **Online Safety Indicators**	Mean (X)	SD	Decision
1	Awareness of cyberbullying and risks	3.20	0.80	High
2	Use of strong passwords	2.85	0.74	Moderate
3	Avoiding sharing personal information online	2.90	0.90	Moderate
4	Ability to report unsafe online behavior	2.60	0.93	Moderate
5	Knowledge of safe online communication	3.00	0.84	Moderate
	Mean	**2.91**	**0.84**	**Moderate Level**

Table 2 shows that with the mean score of 2.91, students exhibit a moderate level of awareness and practice of online safety measures. While they are knowledgeable about cyberbullying risks, their ability to report and consistently practice online safety is moderate.

Research Question 3: What challenges hinder the effective integration of digital literacy and onlinesafety education in secondary schools?

Table 3: Challenges Affecting Integration of Digital Literacy and Online Safety

S/N	Items on **Challenge Indicators**	Mean (X)	SD	Decision
1	Insufficient ICT facilities	3.35	0.78	Major challenge
2	Lack of trained ICT teachers	3.10	0.82	Major challenge
3	Poor internet connectivity	3.20	0.75	Major challenge
4	Inadequate time allocation for ICT lessons	3.05	0.88	Major challenge
5	High cost of digital devices for students	3.25	0.79	Major challenge
	Mean	**3.19**	**0.80**	**High challenge Level**

Table 3 shows that secondary schools face high challenges in implementing digital literacy and online safety education. Major problems include lack of ICT facilities, poor internet services, inadequate teacher training, and cost barriers for students.

Hypotheses

Hypothesis 1: There is no significant difference between male and female students in their level of digital literacy and online safety awareness.

Table 4: t-test Analysis of Male and Female Students' Digital Literacy and Online Safety Awareness

Gender	N		SD
Male	120	2.92	0.84
Female	130	2.86	0.86

t-test (Digital Literacy and Online Safety)

Variable	t-Cal	t-Crit (0.05)	Decision
Digital literacy and Online Safety	1.08	1.96	**Not Significant**

The calculated t-value (1.08) is less than the critical value (1.96). Therefore, the null hypothesis is accepted. This means male and female students do not differ significantly in their levels of digital literacy and online safety awareness. Both genders show similar exposure and competence.

HO_2: There is no significant difference between male and female students in their online safety awareness and practices.

Table 5: t-test Analysis of Male and Female Students' Online Safety Awareness

	N	**Mean ($\bar{X}$)**	SD
Male	120	2.94	0.83
Female	130	2.89	0.85

t-test (Online Safety Awareness)

Variable	t-Cal	t-Crit (0.05)	Decision
Online Safety Awareness	0.92	1.96	**Accepted**

Since t-cal (0.92) < t-crit (1.96), the null hypothesis (HO_2) is accepted. There is no significant difference between male and female students in their awareness and practice of online safety behaviors. Both genders demonstrate similar levels of awareness regarding cyberbullying, password use, safe communication and avoidance of risky behaviors online.

HO_3: There is no significant difference between male and female students in the challenges affecting the integration of digital literacy and online safety education.

Table 6: t-test Analysis of Male and Female Students' Perceived Challenges

Gender	N	**Mean ($\bar{X}$)**	SD
Male	120	3.21	0.79
Female	130	3.17	0.82

t-test (Perceived Challenges)

Variable	t-Cal	t-Crit (0.05)	Decision
Perceived Challenges	0.68	1.96	**Not Significant**

Since t-cal (0.68) < t-crit (1.96), the null hypothesis (HO_3) is accepted. Male and female students do not differ significantly in the challenges they face. Both groups experience similar difficulties, including inadequate ICT facilities, lack of trained ICT teachers, poor connectivity, high cost of devices, and insufficient time for ICT instruction.

VI.DISCUSSION OF FINDINGS

Research Question 1: What is the current level of digital literacy among secondary school students in the 21st-century learning environment?

The majority of secondary school pupils show a moderate level of proficiency in fundamental digital skills including using search engines, social media platforms, and cellphones. These abilities, which are frequently acquired through unofficial digital interaction, show how comfortable students are with technology but may not always correspond to critical or academic digital literacy Kafai and Burke [9]. According to studies by Kumar and Singh [10], a large number of students are unable to participate effectively in digital learning settings because they are unable to critically evaluate sources or participate in meaningful digital collaboration. Students in urban and rural environments differ significantly in their degrees of digital literacy.

Students in urban areas typically have easier access to digital resources and internet connectivity, which improves their ability to learn new skills. On the other hand, the lack of infrastructure in rural areas frequently prevents pupils from developing digital capabilities Livingstone [11]. The gap between urban and rural areas makes it difficult to achieve equity in education in the twenty-first century.

According to several researches, there are gender-based disparities in digital literacy. Female students typically perform better on digital communication and collaboration activities, but male students frequently express higher levels of self-efficacy while using digital technology Livingstone and Helsper [12]. These discrepancies, however, are often influenced by cultural and contextual variables. Effective incorporation of digital tools in classrooms substantially influences students' digital literacy. Schools that invest in ICT infrastructure, give teacher training, and incorporate digital literacy into the curriculum likely to create more digitally literate pupils. In order to help students use technology in an ethical and useful way, teachers are essential. It has been demonstrated that platforms like YouTube, WhatsApp, and TikTok help students develop their digital literacy in an informal way. However, while these platforms assist students develop operational abilities; they rarely promote critical and academic digital literacy unless appropriately harnessed for instructional objectives Margaryan, Littlejohn, & Vojt, [13]

Research Question 2: To what extent are secondary school students aware of and practicing safe online behavior?

Secondary school pupils often have a moderate awareness of online safety guidelines, according to research. To McGrew, Ortega, Breakstone, & Wineburg [14], most teenagers knew the fundamentals of online dangers, like the need to protect personal information and passwords, but they had little knowledge of more complex cyberthreats, such as phishing or digital privacy management.

In a similar vein, Mehta and Agarwal [15] discovered that while more than 60% of students in urban secondary schools in Nigeria were able to accurately identify certain hazards related to social media use, they lacked thorough understanding of the more complex facets of cybersecurity. Students frequently do not regularly practice safe online behavior, even with a moderate level of understanding. Ng, [16] found a substantial disparity between students' real-life conduct and their understanding of online threats. For instance, a significant percentage of students accepted friend requests from strangers on social networking sites despite being aware of the dangers of communicating with strangers online.

This conclusion is supported by Patel and Desai, [17] research, which found that despite receiving instruction on digital safety in schools, many teenagers persisted in risky behaviors such clicking on unknown links, creating weak passwords, and publishing excessive amounts of information on social media. Age and gender disparities in internet safety awareness and behavior are documented in a number of studies. Rao and Reddy, [18] found that while male students may engage in more risky behaviors, especially when it comes to online gaming and content sharing, female students are frequently more circumspect and conscious of social dangers like cyberbullying and online harassment. Furthermore, older teenagers typically exhibit greater awareness and safer behaviors than younger ones, most likely as a result of increased exposure and instruction.

Online safety education has not been sufficiently incorporated into the curricula of many secondary schools. Students at schools with formal digital citizenship programs reported far greater levels of online safety practices, according to research by Sharma and Kapoor, [19]. On the other hand, when schools lack official regulations or instruction on the subject, students frequently turn to their peers or social media for information, which may be inaccurate or lacking. There is frequently little parental participation in encouraging online safety. According to research by Sharma and Sharma [20], many parents lack the digital literacy necessary to properly supervise their children's online behavior, despite their concern. This leads to little supervision or conversation about safe internet use at home, particularly in low- and middle-income environments.

Digital platforms perform a dual role: they both expose pupils to risk and offer means for safety. However, a lot of students don't make use of platform-based security measures like reporting/blocking tools, privacy settings, or two-factor authentication. Singh and Mishra [21] claim that this underutilization results from a lack of knowledge or trouble using safety mechanisms that are integrated into apps.

Research Question 3: What challenges hinder the effective integration of digital literacy and online safety education in secondary schools? The absence of proper ICT infrastructure is one of the main issues. Many secondary schools suffer from infrastructure issues like erratic internet connectivity, a lack of computers, and antiquated software, especially in low- and middle-income nations Spires, Paul, & Kerkhoff, [22]. For example, it is challenging to execute digital literacy and online safety programs where more than 70% of schools lack reliable internet connectivity and enough ICT gadgets to enable digital learning Van Deursen and Van Dijk, [23]

When it comes to teaching digital literacy and online safety, teachers are essential. Nonetheless, research indicates that a large number of educators lack adequate training in ICT and online safety principles. Less than 40% of secondary school teachers in South-West Nigeria had any official training in digital literacy or cyber safety instruction, according to a study by Adegoke [24]. Additionally, some educators are unconfident while utilizing digital tools, which might result in resistance or poor instruction Verma and Singh, [25].

The lack of a clear and unified curriculum for digital literacy and online safety is another significant obstacle. Instead of incorporating digital literacy into the core curriculum, many schools view it as an elective or extracurricular activity. Only a small portion of secondary schools have time and resources set out for systematic instruction on digital citizenship, claim Voogt and Roblin, [26]. There is frequently a disconnection between policy and implementation, despite the fact that many national education programs acknowledge the importance of developing digital skills. Digital literacy policies are in place on paper, but they are not well implemented because of a lack of money, oversight, and accountability at the school level, according to studies by Elsayary, [27]

Empirical evidence by Kanyarat, [28] demonstrates that these differences deepen the digital divide and hinder students' ability to gain digital literacy and cyber safety awareness. As Bhatia and Sharma [29] remark, parental opposition and lack of awareness about the necessity of digital education have been impediments to school-level adoption. This causes digital safety education to stagnate and become irrelevant, as Thomas and Sun, [30] point out.

VII.CONCLUSION

Based on the findings, the study concludes that:

1. Secondary school students possess a moderate level of digital literacy, but their skills are insufficient for full participation in 21st-century digital learning.
2. Students have fair online safety awareness, though their practical application of safe online practices is not optimal.
3. Significant infrastructural and pedagogical challenges hinder effective digital literacy and online safety education.
4. Gender is not a determinant of digital literacy, online safety awareness, or perceived challenges. Both male and female students exhibit similar levels in all dimensions.

Recommendation

Based on the findings, the following recommendations were made:

1. Government and school administrators should invest in adequate ICT infrastructure, including functional computers, stable internet connectivity, and digital learning platforms.
2. Continuous professional development should be provided to ICT teachers to strengthen their competence in teaching digital literacy and online safety.
3. ICT curricula should be updated to include practical components such as digital problem-solving, cyber security education, digital citizenship, and emerging technologies.

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