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Digital Platforms' Adoption by Educational Stakeholders in Private Secondary Schools During and after the Lockdown in Port Harcourt Local Government Area, Rivers State

Adoption Des Plateformes Numériques Par Les Acteurs De L'éducation Dans Les Écoles Secondaires Privées Pendant Et Après Le Confinement Dans La Commune De Port Harcourt, État De Rivers

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Abstract

This study aimed to investigate the digital platforms used by teachers, students, and administrators in private secondary schools during and after the lockdown period necessitated by the COVID-19 pandemic. The research methodology employed was a descriptive survey. A multi-stage sampling procedure was utilised to select a sample size of seven hundred and forty-two (742) participants, comprising four hundred and nine (409) students, two hundred and ninety-seven (297) teachers, and thirty-six (36) administrators from thirty-two (32) private secondary schools in Port Harcourt, Rivers State. To collect data, three distinct questionnaires and an observation checklist were administered. The data analysis was done using frequency, ranking, and bar charts. The results revealed that a combination of digital platforms, including social media platforms, meeting applications, and learning management systems, were widely adopted for teaching, learning, and administrative purposes. It was observed that the social media platform, WhatsApp, emerged as the most adopted by teachers, students, and administrators during the lockdown period. However, post-lockdown, there was a discernible shift among teachers towards the adoption of learning management systems, especially Google Classroom. Administrators displayed a consistent reliance on social media platforms for their administrative duties. As a result of these findings, the researchers

recommended that teachers, students, and administrators should further explore and fully leverage the features and capabilities of digital platforms to optimise their respective tasks and responsibilities.

Keywords: *Digital platform, Teacher, Student, Administrator, Secondary education*

Résumé

Le but de cette étude était d'étudier les plateformes numériques utilisées par les enseignants, les élèves et les administrateurs dans les écoles secondaires privées pendant et après la période de confinement rendue nécessaire par la pandémie de Covid-19. La méthodologie de recherche utilisée était une enquête descriptive. Une procédure d'échantillonnage en plusieurs étapes a été utilisée pour sélectionner un échantillon de sept cent quarante-deux (742) participants, comprenant quatre cent neuf (409) élèves, deux cent quatre-vingt-dix-sept (297) enseignants et trente-six (36) administrateurs parmi trente-deux (32) Les écoles secondaires privées de Port Harcourt, dans l'État de Rivers. Pour recueillir les données, trois questionnaires distincts et une liste de contrôle d'observation ont été administrés. L'analyse des données a été effectuée à l'aide de la fréquence, du classement et du graphique à barres. Les résultats ont révélé qu'une combinaison de plateformes numériques, y compris des plateformes de médias sociaux, des applications de réunion et des systèmes de gestion de l'apprentissage, a été largement adoptée à des fins d'enseignement, d'apprentissage et d'administration. On a observé que la plateforme de médias sociaux, WhatsApp, est devenue la plus adoptée par les enseignants, les élèves et les administrateurs pendant la période de confinement. Cependant, après le confinement, il y a eu un changement perceptible parmi les enseignants vers l'adoption de systèmes de gestion de l'apprentissage, en particulier Google Classroom. Les administrateurs ont toujours fait appel aux plateformes de médias sociaux pour leurs tâches administratives. En raison de ces résultats, les chercheurs ont recommandé que les enseignants, les étudiants et les administrateurs continuent d'explorer et d'exploiter pleinement les caractéristiques et les capacités des plateformes numériques afin d'optimiser leurs tâches et responsabilités respectives.

Mots-clés : *Plateforme numérique, Enseignant, Étudiant, Administrateur, Enseignement secondaire*

Introduction

Over the years, a wide array of digital platforms has been developed for various purposes, and some have found relevance in education. This development has given rise to numerous advocacies for technology integration into education. As a result, frameworks and standards have emerged to enlighten and prepare educational stakeholders for their roles and responsibilities in this digital society. One such framework is the Technological Pedagogical and Content Knowledge (TPACK) framework which underscores the importance of teachers having a solid foundation in technological knowledge, pedagogical knowledge, and content knowledge to become empowered teachers. There are standards established by the International Standard for Technology in Education (ISTE) for teachers, students, administrators, and other stakeholders.

The ISTE standards for teachers encourage teachers to continuously improve their practices by learning from and with others, using effective technology-based strategies to enhance student learning. They should seek opportunities to support student success and empower students, while also improving teaching and learning. Teachers should help students participate responsibly and positively in the digital world. They should work with colleagues and students to share ideas and resources for problem-solving, create authentic, learner-centred activities and environments, and foster rich learning opportunities for creativity, critical thinking, and innovation. Additionally, teachers should use data to guide instruction and support students in achieving learning goals (ISTE, 2017).

The ISTE standards for students encourage students to use technology to set, achieve, and demonstrate their learning goals. They should understand their rights, responsibilities, and opportunities in the digital world and act ethically and safely. Students should critically curate a range of resources using digital tools and technology to create innovative solutions to problems. They should develop and use strategies to solve problems with technology, clearly express themselves in various formats and contexts using different platforms

and tools, and work with others locally and globally to broaden perspectives and enhance learning (ISTE, 2016).

The ISTE standards for administrators encourage administrators to promote inclusiveness, equity, and responsible digital citizenship using technology. They should engage stakeholders in creating and evaluating systems to transform learning through technology. Administrators should foster a culture that encourages innovative use of technology by teachers and students, build and sustain systems that support continuous technological improvement in learning, and model and promote continuous professional learning for themselves and others (ISTE, 2018).

The preceding discussions highlight the need for teachers, students and administrators to stay abreast of different digital technologies and harness their features to help them carry out their responsibilities effectively and efficiently. This need became particularly evident during the lockdown that was necessitated by the COVID-19 pandemic when face-to-face and blended learning opportunities were no longer feasible. Teachers, students and administrators needed to demonstrate digital citizenship. Consequently, the implementation of online learning was recommended by the United Nations Educational Scientific and Cultural Organisation (UNESCO) as a means of reaching learners remotely and reducing the impact of the disruption caused by the COVID-19 pandemic (Stanistreet, 2020). Additionally, the Nigeria Centre for Disease Control (NCDC) and the Federal Government of Nigeria (FGN) also issued guidelines that advocated the adoption of online learning during the lockdown period. During this period, schools that sought to continue their operations had no choice but to transition to digital platforms for online learning. The experiences attainable through digital platforms during online operations are determined by various factors, including the available tools on the digital platform and the user's expertise.

Evolution of Technology in Education

The concept of educational technology in Nigeria has evolved significantly over time, transitioning from basic instructional media to sophisticated digital platforms (Adebisi, 2013). The global Visual Instructional Movement of the early 20th century reached Nigeria with a delay due to resource limitations (Reiser & Dempsey, 2017). However, by the mid-20th century, Nigerian schools began incorporating visual aids such as charts and simple projectors (Adeyemi, 2015; Abubakar, 2016). As global technological advancements accelerated, questions about technology's role in education were debated. Debates emerged regarding whether technology would complement or replace teachers (Cuban, 2001). However, contemporary evidence suggests that technology plays a crucial supportive role, assisting educators in meeting evolving professional demands (Olaore, 2014). Furthermore, the integration of new technologies has amplified the need for comprehensive teacher training, presenting a significant challenge for Nigeria's educational system (Nagasubramani & Raja, 2018).

The subsequent Audio-Visual Movement arrived in Nigeria post-independence, introducing sound-based technologies to urban schools (Saettler, 2004). Notably, radio became a vital tool for education, particularly in rural areas (Olumorin et al., 2013). Television for educational purposes was introduced in Nigeria during the 1960s, later than in Western nations (Molenda, 2008). The Nigerian Television Authority (NTA) played a significant role in broadcasting educational content, though access remained largely confined to urban areas (Abimbade, 2015). The computer revolution of the 1980s had a significant impact on Nigerian education, albeit with a delay compared to more developed nations (Yusuf, 2005). While Nigerian educators showed interest in computer technology, they faced substantial challenges in access and training (Okebukola, 1997). The advent of the Internet in Nigeria during the 1990s marked a pivotal moment for e-learning implementation (Aduke, 2008).

E-learning refers to the fusion of technology and learning, with technology acting as an enabler (Aparicio et al., 2016). However,

unique challenges and opportunities shape its implementation in the Nigerian context. Due to pervasive internet connectivity issues, many Nigerian educational institutions depend heavily on offline resources for e-learning (Eze et al., 2018). This reliance is evident in the widespread use of CD-ROMs and other non-cloud-based storage devices to distribute learning content, highlighting a significant divergence from more internet-reliant e-learning models (Clark & Mayer, 2016). The distinction between computer-based and web-based e-learning is particularly relevant in Nigeria (Sebastian, 2021). Computer-based e-learning, which does not require continuous internet access, is more prevalent in areas with limited connectivity. In contrast, web-based learning, which offers greater flexibility and reach, faces substantial implementation barriers due to infrastructure challenges. Despite these barriers, urban areas and private institutions increasingly leverage digital platforms to provide e-learning, offering self-paced learning opportunities that cater to the diverse needs of learners (Garrison & Vaughan, 2008).

Technology as an Enabler in E-Learning

As earlier noted, technology is simply an enabler of processes in e-learning. In other words, technology does not replace instructional design using the appropriate content (Reiser & Dempsey, 2017). Technology includes both hardware and software components. Hardware components are the physical gadgets that one can touch and operate, such as computers, smartphones, tablets, and so on (Higgins et al., 2012). On the other hand, software includes applications that run on hardware. Software technology covers both installed packages and packages accessed over the internet (Selwyn, 2011). There are different platforms on which learning content of different media formats (e.g., text, audio, video, image) can be uploaded and accessed. Some examples are WhatsApp, Skype, Zoom, YouTube, Instagram, Snapchat, Twitter, Telegram, Blogger, Tumblr, TikTok, Pinterest, and Facebook. These are mainly social media platforms and meeting applications. However, for a holistic educational experience, a learning management system (LMS) is recommended. LMSs allow instructors and administrators to generate, dispense, track learning materials, and manage their continuous use over time (Sangrà et al., 2012). They also

incorporate some features obtainable on social media platforms (Maloney, 2007).

Learning Management Systems (LMS) support web-based (online) teaching and learning (Marina, 2013). LMSs support holistic remote learning (Malizar et al., 2021). Based on deployment, LMSs can be categorised as Cloud-Based LMS and On-Premises LMS. Cloud-based LMSs are hosted on external servers and accessed through the Internet. This allows for easy scalability and accessibility from anywhere as well as reduced maintenance. On the other hand, on-premise LMSs are installed and run on a local server within a school's infrastructure. They offer more control over data and security but require more maintenance (Rosenberg, 2001). Based on pricing, LMSs can be categorised as Open-Source LMSs and Proprietary LMSs. Open-source LMSs are typically free to use and can be customised, but they require technical expertise for setup and maintenance. On the other hand, proprietary LMSs are paid LMS solutions offered by vendors with various pricing models, including licensing, subscription, or pay-as-you-go (Kats, 2010). Some examples of open-source proprietary and cloud-based LMSs are listed in Table 1.

Table 1: Examples of Open Source, Proprietary and Cloud LMSs

CATEGORY	EXAMPLES
OPEN SOURCE	ATutor, Canvas, Chamilo, Dokeos, eFront, Eliademy, Forma LMS, ILIAS, LAMS, MOODLE, OpenOLAT, Opigno, Sakai, Totara LMS
PROPRIETY	Blackboard, Desire2Learn, eCollege, Engrade, WizIQ, GlobalScholar, HotChalk, Informetia, JoomlaLMS, Kannu, LearnUpon, Schoology, SSLearn, Spongelab, Skillsoft, QuestionMark, Uzity
CLOUD-BASED	Absorb, BizLibrary, Digital Chalk, Docebo LMS, eFront, Google Classroom, Halogen, Informetica, iSpring Learn, Kannu, Latitude Learning, LearnUpon, Litmos, Mindflash MoodleCloud, TalentLMS ParadisoLMS, TOPYX, Teachable, TrainCaster LMS, WizIQ, Vitalect

Source: Adapted from https://www.elearningindustry.com

Digital platforms be it social platforms or LMSs can be used for implementing one form of e-learning or the other. Digital platforms offer a wide array of features to enhance e-learning experiences. Real-time file editing for various document types enables collaborative work (Smith et al., 2019). Data collection tools and wiki creation facilitate knowledge sharing (Johnson, 2020). Integrated email services and task management features improve the organisation (Brown, 2018). Document review history allows instructors to monitor student engagement (Lee & Park, 2021). Originality reports help maintain academic integrity (Garcia, 2022). Platforms often include notification systems and social presence features like displaying pictures and status updates (Taylor, 2017). Enhanced security measures such as two-step verification protect user data (Wilson, 2020). Communication is enriched through chat, voice, and video calls, as well as the use of multimedia elements (Roberts, 2019). Group collaboration is supported through features like video conferencing, breakout rooms, and screen

sharing (Chen et al., 2021). Assessment and feedback tools are integrated to streamline the grading process (Anderson, 2018). Accessibility features ensure inclusive learning environments for students with disabilities (Lopez, 2020).

The COVID-19 pandemic has been a critical inflexion point for e-learning in Nigeria, significantly accelerating the adoption of digital platforms (Adedoyin & Soykan, 2020). The Federal Ministry of Education announced the closure of all secondary schools on March 19, 2020, as part of the nationwide effort to curb the spread of the virus (Adedoyin & Soykan, 2021). The reopening process for secondary schools began gradually in September and October 2020, with different states implementing varying timelines for resumption based on their local COVID-19 situation and readiness to comply with safety protocols (Ogunode et al., 2020). The Rivers State Government announced the reopening of schools for exit classes (JSS3 and SS3) from August 5, 2020, while other classes resumed on October 5, 2020 (The Punch, 2020). In essence, the lockdown of secondary schools lasted over 6 months in Rivers State.

During the lockdown (March 19, 2020-October 5, 2020), schools had the opportunity to explore and harness the different tools available on various digital platforms for online learning. When face-to-face sessions resumed after the lockdown, schools also had the opportunity to use these digital platforms to implement blended learning. The pandemic highlighted both the potential of digital platforms to transform education and the substantial challenges that need to be addressed.

Statement of the Problem

The COVID-19 pandemic brought about an unprecedented disruption in educational systems worldwide, with Nigeria being no exception. In response to the escalating health crisis, the Nigerian government mandated the closure of schools as a containment measure against the spread of the coronavirus. This abrupt closure necessitated an urgent transition to online education. However, the readiness and capacity of schools to implement effective online learning during the lockdown

period remain unclear. Specific interest was on private secondary schools as the feasibility of transition to online modality for public schools was very low from observations. This uncertainty raises critical questions about the types of digital platforms adopted and the sustainability of their use beyond the immediate crisis period.

The identification and analysis of the digital platforms adopted by private secondary schools during this time are crucial for several reasons. Firstly, it provides insight into the nature and quality of learning experiences offered to students, as different categories of digital platforms possess specific tools that inherently shape the educational experience. Secondly, understanding the adoption patterns of these platforms can inform future educational technology policies and investments in the Nigerian context. Moreover, the question of whether the utilisation of these digital platforms extended beyond the lockdown period is of significant interest. This aspect of the research problem addresses the potential long-term impact of the pandemic on educational delivery methods in Nigerian private secondary schools. In essence, this study seeks to address the gap in our understanding of how private secondary schools in Nigeria responded to the educational challenges posed by the COVID-19 pandemic, specifically focusing on their adoption of digital platforms for online learning during and after the lockdown.

Aim and Objectives

This paper aimed to ascertain the digital platforms adopted for e-learning by private secondary schools in Port Harcourt during (March 19, 2020-October 5, 2020) and after (1 year 6 months after) the lockdown period as a result of the Covid-19 pandemic and their state of continuity after face-to-face sessions resumed. The specific objectives were to:

1) Find out the digital platforms that were adopted by private secondary school teachers, students and administrators during the lockdown period.
2) Determine if there were changes in trends of digital platform adoption after the lockdown period (1 year and 6 months later).

3) Ascertain the teachers, students and administrators state of continuity with the use of digital platforms after the lockdown period (1 year 6 months later).

Research Questions

The following research questions guided this paper:

1) What digital platforms were adopted by private secondary school teachers, students and administrators during the lockdown period (March 19, 2020-October 5, 2020)?
2) What changes in trends of digital platform adoption emerged after the lockdown period (1 year and 6 months later)?
3) What was the state of continuity of the stakeholders' use of digital platforms after the lockdown period (1 year and 6 months later)?

Materials and Methods

The study was conducted within Port Harcourt Local Government Area (PHALGA), one of the 23 local government areas in Rivers State, Nigeria. PHALGA comprises twenty (20) electoral wards and is considered a metropolitan area of Rivers State, boasting numerous private secondary schools. The research design employed in this study was a descriptive survey. The study's independent variable was the lockdown (during and after). The period referred to as "during the lockdown " was March 19, 2020 - October 5, 2020. The period referred to as "after the lockdown period" was 1 year and 6 months after the lockdown was called off. The dependent variable was the adoption of digital platforms. The moderating variable was educational stakeholders which comprised teachers, students, and administrators. To obtain a sample size of seven hundred and forty-two (742) participants, which included four hundred and nine (409) students, two hundred and ninety-seven (297) teachers, and thirty-six (36) administrators from thirty-two (32) government-approved private secondary schools in Port Harcourt Local Government Area (PHALGA), multi-stage sampling procedure utilising various sampling techniques was implemented. In the first stage, a stratified sampling technique was used to designate each of the 20 electoral

wards as a stratum. Subsequently, in the second stage, simple random sampling was carried out through balloting to select eight (8) electoral wards. In the third stage, a purposive sampling technique was applied to select four (4) schools from each ward that had implemented online learning during the lockdown period, resulting in a total of thirty-two (32) private secondary schools. Within each school, a purposive sampling technique was further employed to select teachers, students, and administrators who had utilised digital platforms for teaching, learning, and administrative purposes during the lockdown period.

Data collection involved the use of three questionnaires titled Teachers' E-learning Practice Questionnaire (TEPQ), Students' E-learning Practice Questionnaire (SEPQ), and Administrators' E-learning Practice Questionnaire (AEPQ). Section A of the questionnaires were used to collect demographic data. Sections B were used to collect data on the digital platform used during the lockdown period. Section B contained 3 items. Item 1 was a checkbox question with 9 options and an open-ended option (i.e. Others (Please specify which)) prompting the stakeholders to indicate and/or state the digital platform(s) that was used for teaching, learning and administrative purposes during the lockdown period. Sections C were used to collect data on the digital platform used after the lockdown period. Section C contained 3 items. Item 1 was a checkbox question with 9 options and an open-ended option prompting the stakeholders to indicate and/or state the digital platform(s) that was used for teaching, learning and administrative purposes after the lockdown period. Sections D were used to collect data on the continuity of e-learning after the lockdown period was over. This section contained 4 items. Item 1 was a dichotomy question inquiring about stakeholders' current use of the digital platform(s) for teaching, learning and administrative purposes. Item 2 was a contingency checkbox question linked to the Yes option of item 1. Item 3 was a contingency multiple-choice question linked to the No option of item 1. Item 4 was an open-ended question requiring stakeholders to explain why they stopped using the digital platform(s) for teaching, learning and administrative purposes. An observation checklist titled Digital Platform Checklist (DPC) was also used. The instruments were validated by experts in Measurement and Evaluation. The researchers collaborated with five (5) research assistants to

identify and obtain permissions from the secondary schools participating in the study. An introductory video was employed to brief schools on the research's purpose (Link: https://shorturl.at/xBGM3). Hard copies of the questionnaires were distributed to the schools, and an online version of the questionnaires was made available (Link: https://forms.gle/TjkkUTQLbLh8rLQJ8) along with the introductory video. In some instances, hard copies of the questionnaires were distributed to additional stakeholders in schools when only a few teachers or administrators completed the online version of the questionnaire. The collected data were analysed using statistical techniques, including frequency, ranking, and bar charts, using the Statistical Package for the Social Sciences (SPSS).

Results

Digital Platforms Adopted by Teachers, Students and Administrators during the Lockdown Period.

Teachers, students and administrators' responses to the items on the questionnaire that addressed the type of digital platform adopted for online learning revealed several digital platforms which guided the categorisation of the digital platforms into nine categories labelled A-I. This is shown in Table 2.

Table 2: Categories of Digital Platforms

S/n	Category	Digital platform(s)	Description
1.	A	WhatsApp only	Social media platform
2.	B	Zoom only	Meeting app
3.	C	Google Classroom only	Learning Management System
4.	D	Telegram only	Social media platform
5.	E	WhatsApp and Telegram	Social media platforms
6.	F	WhatsApp or Telegram and Zoom	Social media platforms and meeting app
7.	G	Zoom and Google Classroom	Meeting app and Learning Management System
8.	H	WhatsApp or Telegram and Google Classroom	Social media platform and Learning Management System
9.	I	WhatsApp or Telegram, Zoom and Google Classroom	Social media platform, meeting app and Learning Management System

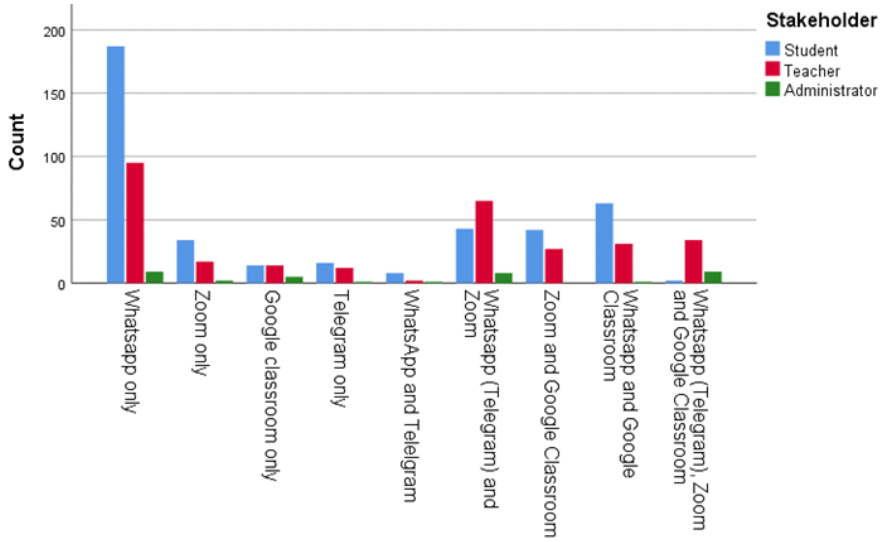
Table 2 shows that single digital platforms as well as combinations of digital platforms were adopted for e-learning purposes. Categories A, B, C and D are single digital platforms while categories E, F, G, H and I are combinations of two to three different digital platforms. Category G (Zoom and Google Classroom) did not apply to administrators.

The digital platforms were further ranked based on the number of student, teacher and administrator users. This is shown in Table 3 and Figure 1.

Table 3: Digital Platforms Used by Private Secondary Schools during the Lockdown Period

Digital Platform		**Stakeholders**			**Total**	**Rank**
Platform Category	**Platform(s)**	**Student (Rank)**	**Teacher (Rank)**	**Administrator (Rank)**		
A	WhatsApp only	187 (1st)	95 (1st)	9 (1st)	291	1st
B	Zoom only	34 (5th)	17 (6th)	2 (5th)	53	5th
C	Google Classroom only	14 (7th)	14 (7th)	5 (4th)	33	7th
D	Telegram only	16 (6th)	12 (8th)	1 (6th)	29	8th
E	WhatsApp & Telegram	8 (8th)	2 (9th)	1 (6th)	11	9th
F	WhatsApp or Telegram & Zoom	43 (3rd)	65 (2nd)	8 (3rd)	116	2nd
G	Zoom and Google Classroom	42 (4th)	27 (5th)	0 (9th)	69	4th
H	WhatsApp or Telegram & Google Classroom	63 (2nd)	31 (4th)	1 (6th)	95	3rd
I	WhatsApp or Telegram, Zoom & Google Classroom	2 (9th)	34 (3rd)	9 (1st)	45	6th
Total		**409**	**297**	**36**	**742**	

Digital Platforms Used by Stakeholders



Categories of Digital Platforms

Fig. 1: Digital Platforms Used by Private Secondary Schools Teachers, Students and Administrators during the Pandemic for E-learning

Table 3 shows the ranking of the categories of the digital platforms for learning from 1st to 9th positions based on the number of student users category:

1) A (WhatsApp only)
2) H (WhatsApp or Telegram & Google Classroom)
3) F (WhatsApp or Telegram & Zoom)
4) G (Zoom & Google Classroom)
5) B (Zoom only)
6) D (Telegram only)
7) C (Google Classroom only)
8) E (WhatsApp & Telegram)
9) I (WhatsApp or Telegram, Zoom & Google Classroom)

The ranking of the digital platform for teaching from 1st to 9th positions based on the number of teacher users is:

1) A (WhatsApp only)
2) F (WhatsApp or Telegram & Zoom)

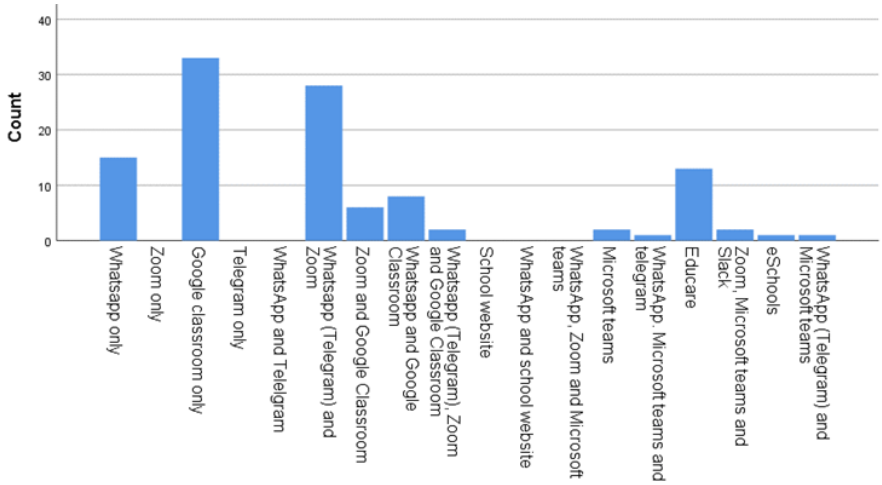
3) I (WhatsApp (or Telegram), Zoom & Google Classroom)
4) H (WhatsApp or Telegram & Google Classroom)
5) G (Zoom and Google Classroom)
6) B (Zoom only)
7) C (Google Classroom only)
8) D (Telegram only)
9) E (WhatsApp & Telegram)

The ranking of the digital platforms for administrative purposes from 1st to 9th positions based on the number of administrator users is:
1) A (WhatsApp only)
2) I (WhatsApp or Telegram, Zoom & Google Classroom)
3) F (WhatsApp or Telegram & Zoom)
4) C (Google Classroom only)
5) B (Zoom only)
6) D (Telegram only)
7) E (WhatsApp & Telegram)
8) H (WhatsApp or Telegram & Google Classroom).

The ranking of the digital platforms from 1st to 9th positions when considering all the stakeholders (teachers, students and administrators) as a group is:
1) A (WhatsApp only)
2) F (WhatsApp or Telegram & Zoom)
3) H (WhatsApp or Telegram & Google Classroom)
4) G (Zoom and Google Classroom)
5) B (Zoom only)
6) I (WhatsApp or Telegram, Zoom & Google Classroom)
7) C (Google Classroom only)
8) D (Telegram only)
9) E (WhatsApp & Telegram)

Digital Platform Adoption after the Lockdown Period

After the lockdown period, some of the schools still made use of digital platforms for implementing blended learning. This is shown in Figure 2.

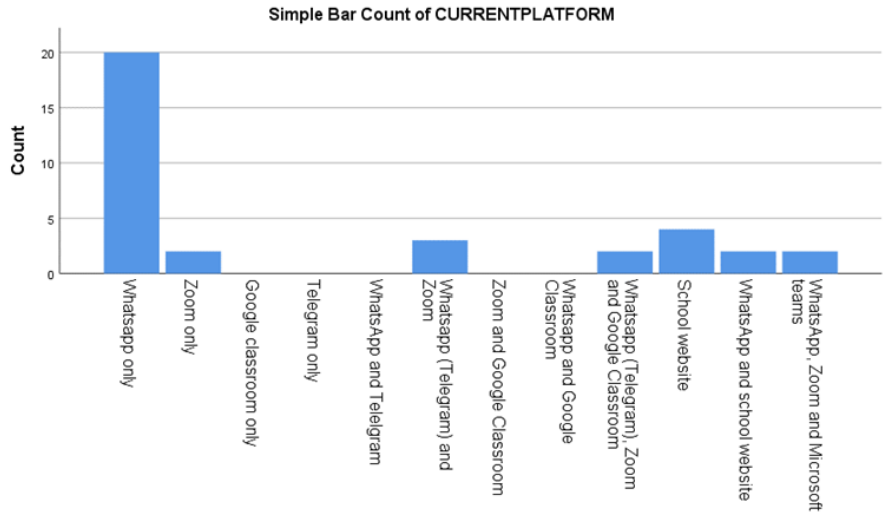


Categories of Digital Platforms

Fig. 2: Current (Post lockdown) Digital Platforms used by Secondary School Teachers for Teaching

Fig. 2 shows the digital platforms adopted by teachers for teaching after the lockdown period. The nine (9) categories in Figure 1 that were obtainable during the lockdown period expanded to eighteen (18) categories. Students' data on the digital platforms used after the lockdown had a low response rate and as such it was not included in the study.

Fig. 3 shows digital platforms adopted by administrators for administrative purposes after the lockdown period.



Categories of Digital Platforms

Fig. 3: Current (Post lockdown) Digital Platforms used by Secondary School Administrators for Administrative Purposes

The eight categories in Fig. 1 that were obtainable during the lockdown period expanded to twelve categories.

State of Continuity with the Use of Digital Platforms in Secondary Schools

Table 4 shows the frequency and percentage of the stakeholders who continued to use digital platforms two years after the lockdown period was over. It also shows the frequency and percentage of stakeholders who no longer use digital platforms in their schools as well as the period they stopped using the digital platforms.

Table 4: Stakeholders' State of Continuity with E-learning

	Currently Used Digital Platforms in Schools		**No longer use Digital Platform in Schools (Period Stakeholders stopped using the Digital Platform)**	
Stakeholder	**Yes**	**No**	**During the lockdown**	**After the lockdown**
Student (Learning Purposes)	97 (23.7%)	312 (76.3%)	20 (6.4%)	292 (93.6%)
Teacher (Teaching Purposes)	120 (40.4%)	177 (59.6%)	2 (1.1%)	175 98.9%)
Administrator (Administrative purposes)	35 (97.2%)	1 (2.8%)	0 (0%)	1 (100%)
Total	**252 (33.96%)**	**490 (66.04%)**	**22 (4.49%)**	**468 (95.51%)**

A higher percentage of students (76.3%) do not currently use digital platforms in their schools to learn. Also, a higher percentage of teachers (59.6%) do not currently use the digital platform to teach in their schools. However, a higher percentage of administrators (97.2%) still use digital platforms for administrative purposes in their schools. Table 4 also shows the period during which the stakeholders stopped using digital platforms. The two periods considered were during and after the lockdown. A higher percentage of students, teachers and administrators who stopped using the digital platform did so after the lockdown period. That is, 292 (93.6%) of students, 175 (98.6%) of teachers and 1 (100%) of the administrator stopped using the digital platform for learning, teaching and administrative duties respectively in their various schools after the lockdown period was over.

Discussions

Digital Platforms adopted during and after the Lockdown Period

The results revealed that teachers, students and administrators in private secondary schools adopted a single digital platform as well as combinations of digital platforms for teaching, learning and administrative purposes. The results also revealed that the ranking of

the categories of digital platforms for each stakeholder (teachers, students or administrators) is different from the ranking when all the stakeholders are considered as a group. The only category of platform that maintained the same rank based on usage by teachers, students and administrators was WhatsApp. In other words, category A (WhatsApp only) had the top ranking at both the individual and group rankings indicating that it was the digital platform that was mostly used by teachers, students and administrators. This finding is consistent with the findings of some other researchers who demonstrated the use of single as well as combinations of digital platforms for e-learning as seen in Enyama et al. (2021) who used WhatsApp; Akpunou and Fomsi (2021) used Google Classroom; Gogo and Fomsi (2019) used Moodle; Servidio and Cronin (2018) used Moodle; Costa et al. (2012) used Moodle; Landa et al. (2021) used a combination of e-mail service, Blackboard LMS, WhatsApp and YouTube.

Furthermore, the digital platforms adopted by teachers for teaching after the lockdown period indicated that more digital platforms were being explored by teachers. Also, the shift for teachers was from social media digital platforms during the lockdown period to learning management systems after the lockdown period. Although social media was still being incorporated. On the other hand, the trend for administrators after the lockdown period was still the use of social media platforms for administrative purposes.

The widespread adoption of WhatsApp suggests that teachers need to be proficient in leveraging mobile-based platforms for instructional delivery. However, the shift towards more comprehensive LMS platforms post-lockdown indicates a need for continuous professional development in educational technology. Also, students must adapt to various digital platforms, developing digital literacy skills crucial for 21st-century education. The preference for mobile-based platforms like WhatsApp may necessitate the development of mobile-optimised learning content. Additionally, the continued use of social media platforms by administrators suggests a need for developing policies on digital communication and data privacy in educational settings.

State of Continuity with the Use of Digital Platforms in Secondary Schools

The results revealed that a higher percentage of teachers and students discontinued the use of digital platforms in the school. However, a higher percentage of administrators continued to use digital platforms for administrative purposes in their schools. Furthermore, a higher percentage of students, teachers and administrators who stopped using the digital platform did so after the lockdown period was over. Administrators stated that parents and students longed for physical classes so after some months they did not want to continue with the virtual classes although they claimed that they enjoyed the classes. Teachers stated that their discontinuity of the digital platforms was a result of the absence of the need for it after face-to-face classes resumed, high data consumption, ineffectiveness, inefficiency, parents'/guardians' complaints of wards getting distracted, students not meeting up, cost and the incompetence of some teachers. Students stated that their discontinuity of the digital platforms was a result of the absence of the need for it after face-to-face classes resumed, loss of phone, parents were not able to always make a device available forwards, teachers were sending too many notes to the students, some students were not coping with the e-learning, parents complained about data subscription, preference for face-to-face, no room for proper assignment, some teachers were not consistent and not all subjects were taught.

The discontinuation of digital platforms by many teachers suggests a need for better integration of technology in regular classroom practices. Professional development should focus on blended learning approaches to ensure teachers can seamlessly transition between online and offline modes. Also, students' reasons for discontinuing digital platforms, such as difficulties in coping with e-learning and preference for face-to-face interaction, highlight the need for developing more engaging and interactive online learning experiences. Schools should consider investing in adaptive learning technologies and providing support for students struggling with digital learning.

An interesting observation was the lack of uniformity in platform usage among students within the same school, particularly regarding LMS adoption. This demonstrates a lack of structure which can have a very negative impact on the overall implementation and introduce some new challenges as well. This inconsistency highlights a need for standardised approaches to digital platform adoption at the school level.

Conclusions

This study has provided valuable insights into the adoption and utilisation of digital platforms in private secondary schools during and after the COVID-19 lockdown period in Nigeria. The findings reveal a complex landscape of digital adoption and adaptation in educational settings. The research demonstrates that teachers, students, and administrators employed both single digital platforms and combinations thereof for their respective teaching, learning, and administrative tasks. This diverse approach persisted not only during the lockdown but also for 18 months following the resumption of face-to-face activities. A significant finding was the predominant use of social media platforms for online learning during the lockdown period. This preference likely stems from the familiarity and accessibility of these platforms to all stakeholders. However, a notable shift was observed in teachers' adoption patterns post-lockdown. While social media platforms were the primary choice during the lockdown, there was a discernible transition towards learning management systems in the subsequent period. This shift suggests an increasing recognition of the pedagogical benefits and enhanced functionalities offered by specialised educational platforms. In contrast, administrators demonstrated a consistent reliance on social media platforms for their administrative duties, both during and after the lockdown. This continuity may indicate either the adequacy of these platforms for administrative tasks or a potential area for technological upgrades in school management processes.

Perhaps the most concerning finding of this study is the poor state of continuity in e-learning practices once face-to-face instruction resumed. Despite the investments in digital infrastructure and the skills

acquired during the lockdown, there was a significant regression to pre-pandemic teaching modalities. This trend raises questions about the long-term impact of the crisis on educational practices and the sustainability of digital learning initiatives in Nigerian private secondary schools. These findings have important implications for educational policy, teacher training, and technology investment in the Nigerian education sector. They underscore the need for a more structured approach to digital integration in education, one that ensures the gains made during the crisis are not lost but rather built upon to enhance the overall quality and resilience of the education system.

Future research should focus on understanding the barriers to continued e-learning adoption and developing strategies to overcome them. Additionally, investigations into the effectiveness of different digital platforms in the Nigerian context could provide valuable guidance for future educational technology decisions. In conclusion, while the COVID-19 pandemic catalysed rapid digital adoption in Nigerian private secondary schools, sustaining and optimising these changes remains a significant challenge. Addressing this challenge will be crucial for preparing Nigerian students for an increasingly digital future.

Recommendations

Teachers, students and administrators should explore different digital platforms especially learning management systems and harness features that can help them conveniently and effectively teach, learn and perform administrative duties respectively. This may require lots of training and practice. Schools are also encouraged to keep harnessing digital technologies to develop a culture of e-learning as this will prepare schools for transition to fully online learning in similar situations that warrant schools to go online as the COVID-19 pandemic did.

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