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INTEGRATING MOBILE TECHNOLOGIES IN TEACHING AND LEARNING: A PANACEA FOR UNINTERRUPTED TEACHING AND LEARNING IN DISASTER-PRONE ENVIRONMENT

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Abstract
Natural disaster is an occurrence that when it happens usually disrupt ongoing human activities. Education process is such an activity that is time-bound and a disruption do have impact on the actors. This paper seeks to explore various ways mobile devices can be employed in teaching and learning in a disaster-prone region of Nigeria to allow for uninterrupted educational process. Secondary data were collected and collated from relevant literatures from notable electronic databases. A rating analysis was carried out on various mobile learning platforms. The result showed that Moodle LMS is the most ideal to adopt because of its overbearing strength. Furthermore, it was discovered that countries who had adopted the use of mobile technologies in their teaching and learning had good outcome because natural disasters does not halt learning process. The paper recommended that it is apt for Nigeria schools to exploit this positive use of mobile devicesand save our education from academic disruption occasioned by natural disasters.

Key Words: Mobile, Technology, Learning, Management, System, Teaching, and Learning.

Introduction

Technology integration is a method in which computers and other technologies are employed as tools to assist the tasks of teaching and learning (Crompton, 2013). In other words, the concept of technology integration includes establishing the best ways to incorporate education technology into the curriculum as teaching tools. It further lay credence to the different ways that technology tools can be used to support students as they construct their own knowledge through completion of authentic learning activities that heightens sound learning.

Disasters are serious disruptions to the functioning of a community that exceed its capacity to cope using its own resources. Disasters can be caused by natural, man-made and technological hazards, as well as various factors that influence the exposure and vulnerability of a community. Natural disasters are occurrences that happens by nature and includes floods, earthquakes, landslides, typhoon, volcano eruptions, tsunamis, e.t.c. (Cueto, and Agaton, 2021*).* Nigeria experienced a devastating flood in second week of September 2022 that affected about 15 states of the federation with the worst hit in the South Southregion of the country. During that period activities including education were halted.

Mobile devices which include phones and tablets are the most prevalent digital technology on earth. According to Gambari, Abubakar, Yahaya and Adamu (2021) there were about 169.2 million subscribers to the four Global System for Mobile communication (GSM) providers in Nigeria representing 83% of the population as at 2020. The study also revealed that about 20% of Nigerians which is about 40 million of the population own smartphones as at 2020 and the young people are greater percentage of this number. A studyby Haruna, Abdullahi, Babayoand Mohammed (2021) showed that about 60% of surveyed students in tertiary institution in Nigeria owned a smartphone. These startling statistics goes to affirm that smartphones and other mobile device are the closest companion of an average student in Nigeria especially those in tertiary institutions.

Mobile devices especially smartphones and tablets are generally equipped with range of advanced computing capabilities that can facilitates teaching and learning (Bernacki, Greene and Crompton, 2019). Smartphones operating platform can easily sync with desktop computers and laptops which were earlier ICT tools that aid teaching and learning. Most schools in advance clime practice hybrid learning whereby learning can take the form of traditional face-to-face and e-learning powered by technology. Learning through the medium of mobile devices is found to excite the learners as compared to traditional face-to-face classroom learning. This is simply because most of the present-day students 1990 and later are regarded as digital natives as they have been raised and exposed to ICT since born (Prenksy, 2001). However, the result of utilizing these tools often relies on the effectiveness of the teacher's instructional approach. Due to the features of mobility and ubiquity, mobile technology also supports informal learning and personalized learning. It was reported that using mobile technology, the students extended their learning beyond the classroom, which supplemented their formal learning and helped to improve academic achievement (Bai, 2019; Crompton, 2013).

The objectives of this paper are to explore the possible ways that mobile technologies can be usedin teaching and learning in Nigeria settings, to summarize major mobile learning platforms highlighting their strength and weakness based on their ratings and to practically outline step by step of integrating mobile technologies in

teaching and learning. The rest of the paper is arranged thus, section 2 is the literature, section three is the methodology and section four is the discussion and conclusion.

Literature Review
Overview of mobile technologies
The Latin term mobile means "ability to move" or portable. Therefore, mobile technology means, technology that is portable. Mobile devices are internet powered movable devices that assist in the processing, storage and retrieval of information as is obtainable with desktop computers (Khaddage, and Knezek, 2013). They have in-built functionalities and features that facilitates information access. They comprise of moveable devices such as smartphones, e-book readers, Personal Digital Assistants, MP3 players, cell phones and tablets. Mobile devices' functionalities have become versatile, allowing people to use them for communication purposes and to access simple and too complex forms of information. Barnhart and Pierce (2012), also shared the view that modern mobile devices are handy, internet ready and can be used to access web-based contents and re-edit the accessed information and share on a

collaborative platform such as WhatsApp application, Instagram, Facebook, etc. To Moreira, Ferreira, Santos, and Durao (2017), mobile devices are user-friendly, portable, and adaptable and individuals can customize their usage to derive the full benefits from them. They are broad-spectrum computing devices with multi-core processors that come in handy with internet inbuilt features and can be used for several communication purposes.Mobile devices enable access to services like that (Naismith et al., 2004). Mobile technology is a form of technology that is mostly used in cellular communication and other related technologies. It uses a form of platform where by many transmitters have the ability to send data at the same time on a single channel. This platform is

called Code-division multiple access (CDMA). This platform allows many users to make use of single frequencies because it restricts the likelihood of interference of frequencies from two or more sources. This channel is what is referred to as mobile technology generations which has evolved over the years as depicted by Figure 1.
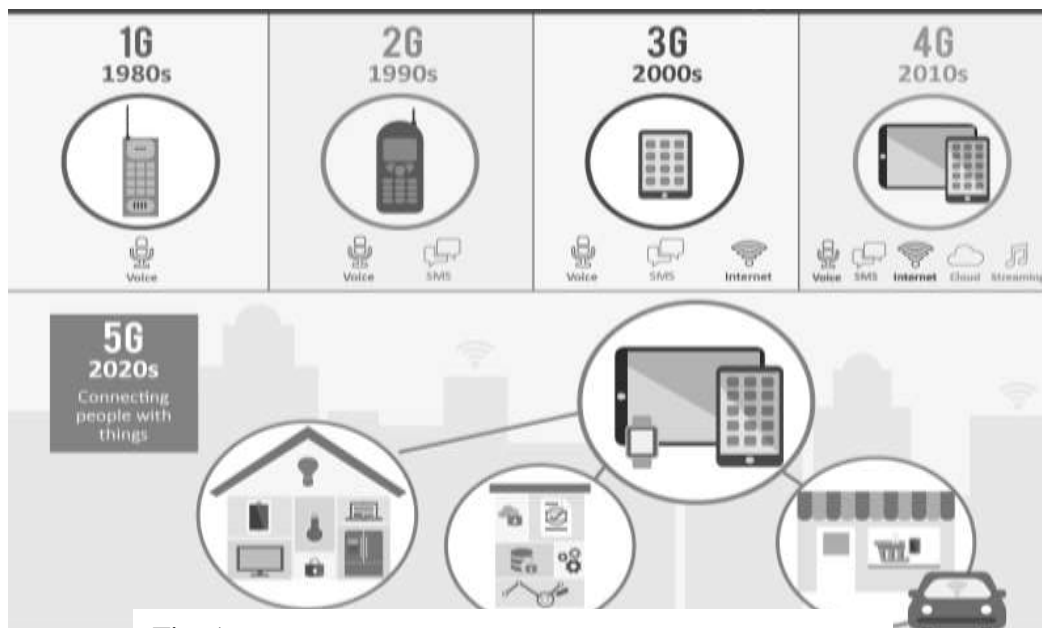

Fig. 1: Evolution of mobile technologies

The mobile technology is rapidly evolving; over the years, its uses are becoming diverse and is gradually replacing some similar sources in the market that are also used for communication e.g., post office and land lines. The mobile technology has improved from a simple device used for phone call and messaging into a multi-tasking device used for GPS navigation, internet browsing, gaming, instant messaging tools etc. Professionals argue with the trend that the future of computer technology is rest on wireless networking and mobile computing. Mobile technology through tablet and portable computers are becoming more and more popular.

Mobile technology was a mystery two decades ago but now, it has become something of necessity to both the rural and the urban areas. The mobile technology started as a remarkable achievement in the world of technology but now, it is transforming into user comfort technology due to its present diverse functionalities. When the mobile was first introduced, it used to be basically for SMS, Calls and games. But it has presently transformed into a digital world and has made life and business much easier; marketers now have the ability to sell their products with ease through mobiles technology. The mobile has made it possible for users to transfer files and other files through Bluetooth and wifi.

The mobile is also equipped with internet connectivity, making it easy for the user to gain information and also to download files from the internet. Video call conferencing is another achievement that has come to reality through mobile technology. Business men and clients now have the channel to communicate even without seeing in person. With the use of mobile technology, it is now easy to catch up with every form of entertainment from the comfort of your home. It has also made it possible for one to easily locate places on the globe using the Global positioning system (GPS). The importance of mobile technology cannot be overemphasized; bankers depend solely on mobile technology on managing finances and stocks. Many business firms use the mobile technology to increase their earnings through providing customers easiness to patronize their product through apps and websites. For example, the Cinema may create an app for ticket booking; railway travel tickets can be purchased from the internet without having to queue up to purchase it. The evolvement of mobile technology has made our life easier and also saves us time and resources. The academics institution is not spared as many students receives tutorials in their course of study beyond their boundary.

The first generation of mobile technology as indicated in figure 1 can only enable voice call but the technology progressed till the fourth generation which can enable a lot of things such as instant messaging, wifi, mifi, cloud computing and internet of things. The fifth generation which took off in 2022in Nigeria will go further in internet of things, wearable devices and smart environment (which includes home, schools, markets, etc).

The Concept of Mobile Learning

Mobile learning can be defined as learning across multiple contexts, through social and content Interactions, using personal electronic devices (Crompton, 2013). This multifaceted definition highlights the move away from traditional pedagogies (i.e., sedentary teacher focused, single context learning Merchant) and tethered technologies (i.e., corded technologies, such as

desktop computers) to provide new affordances for learning including seamless engagement

across environments. Connectivity is a primary purpose of a mobile device, and affords learners the ability to communicate with peers, educators, experts, and the world as well as interact with content (i.e., consuming, editing, and producing) devoid of spatial and temporal constrictions.

The final part of the definition describes the technology as a personal electronic device.

Methodology
The software rating analysis of the top four mobile learning management system was conducted. The data of various rating of the software by those who had earlier used them were collected online and analyzed using Microsoft Excel.

Major Mobile Learning Application platforms
The top mobile learning management are presented below eliciting their pros and cons:
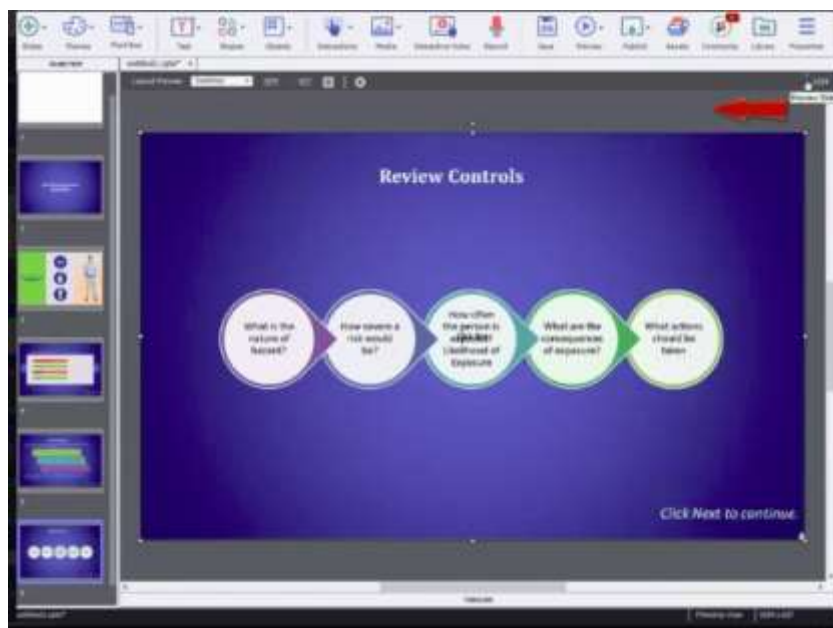
A.) Adobe Captivate

Fig. 2: Adobe Captivate Menu window
(https://learningmanager.adobe.com/acapindex.html)

The adobe captivate is a smart e-learning platform that can help someone to create fully responsive digital content without having the skill of programming. The platform can be used on computers, smartphones and tablets.

Advantages
- It has in-built well-designed slides that requires minor editing
- It streams videos from external or internal host with ease.

- It has well detailed training video on how to use the platform inbuilt in it.
- You can rapidly format the content.

Disadvantages
- The video quality is not great.
- It runs slow in older computing specifications.

B.) Google Classroom

Google classroom is a learning management system and virtual learning environment aimed at academic institutions instead of business training use cases. It is designed in such a way that a teacher can have his/her own classroom that they can use to add assignments, quizzes and learning notes.

Fig. 3: Google Classroom Splash Screen
(https://classroom.google.com)

Advantages of Google Classroom
- It is easy to use and accessible from all devices.
- It provides effective communication and sharing.
- It speeds up the assignment process.
- It provides efficient feedback.
- It has a user-friendly interface.

Disadvantages of Google Classroom
- It has limited integration options.
- It does not have any automated updates.
- It is difficult to edit content.

C.)   Blackboard

Blackboard is a virtual learning platform that have easy workflow, grading tools and excellent content editing tools. It also constitutes inbuilt communication tools, learning progress tracker and anti-plagiarism software. It also benefits students from announcements, push notifications, and synchronous collaboration.Its video chat option with features like a digital whiteboard, polls, and breakout rooms, is considered highly beneficial for instructors for creative lesson planning.
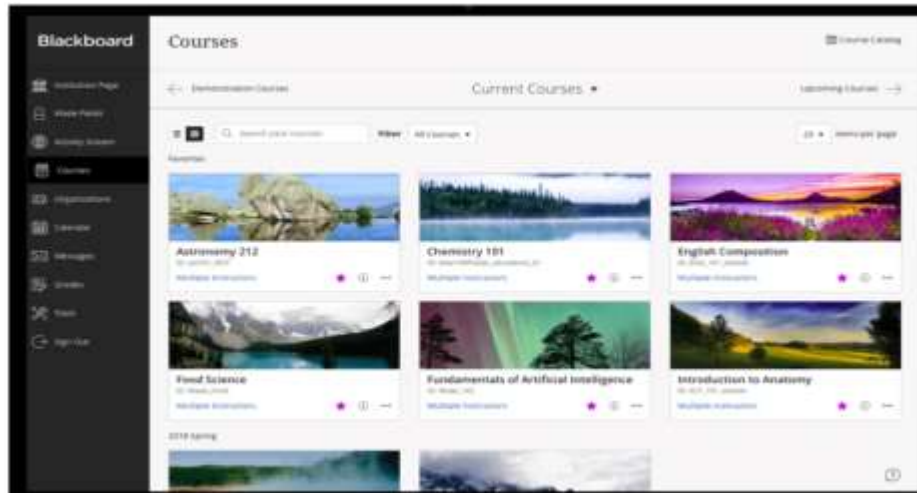
Fig. 4: Blackboard interface window
(https://www.blackboard.com/)

Advantages of Blackboard
- It has no setup fee.
- It is easy to maintain.
- It has links to many online resources like wikis, education blogs, etc.
- The examination and test interface is easy to administer.

Disadvantages of Blackboard
- It does not interface well with other software.
- It is difficult to learn.
- The mobile version is not stable.

D.)   Moodle
Moodle is learning management system used for course administration and resource deployment that includes chats, forums, in platform quizzes, assignment grading, and surveys. It is one of the robust and highly customizable platforms that work as server-based software. It requires the expertise of the IT level to manage it.

Fig. 5: Moodle window interface
(https://moodle.com/)

Advantages of Moodle
- It is an open-source platform.
- It has live online learning.
- It has video learning.
- It helps you sell content online.

Disadvantages of Moodle
- It is not entirely developed to cope with big projects.
- The system does not work efficiently with larger schools.
- The more the students access the platform, the more it gets slow.
- The website also shuts down occasionally.

Analysis of the mobile Learning platform
According to Almaiah, Jalil, and Man (2016), the following criteria should guide in rating of software by the users.The analysis was based on online ratings of those who had used the software as obtained in this rating portal (https://www.g2.com/). The rating scale for each parameter is Excellent for 5 star, Very Good for 4star, Good for 3star, Fair for 2star and Poor for 1star. The rating parameters includes:

- **System quality:** This represents the extent by which the system has the required desirable features.
- **Service quality:** This checks the degree of quality of service provided by the system which can meet end users' requirements and expectations.
- **Functionality:** The functionality of a mobile learning system can bedefinedas the degree of which students see the overall functional benefits of using a mobile learning system, including time, efficiency, and effectiveness.
- **Design quality:**The design of a mobile learning system refers to aesthetic factors, such as the use of color and appealing multimedia features, and must support several types of learning content and mobile devices to meet students' and teachers' requirements.
- **Usability:**Usability in mobile learning platform has been defined as qualitative characteristics thatdefine the most effective, efficient, and satisfactory way to use the user interface.

Table 1: Mobile learning Users Rating Table

Mobile Learning Applications	System quality	Service quality	Functionality	Design quality	Usability
Adobe Captivate	Good	Good	Very Good	Good	Good
Google Meet	Very Good	Good	Excellent	Good	Good
Blackboard	Good	Fair	Good	Good	Fair
Moodle	Very Good	Very Good	Very Good	Excellent	Excellent

Practical Ways of Integrating Mobile Technologies in Teaching and Learning

- **Use of smartphones:** Mobile learning management system (mLMS) works with the aid of smart mobile devices such as phones and tablets. This is because only the operating system running in these devices that supports mLMS. Therefore, to integrate mobile technologies in teaching and learning the students and the teacher must have smartphones or tablets with high specifications.
- **Educational Software:** The school should procure vital educational software that will facilitates mobile learning. Such software includes video editing software, data analysis software, graphics editing software, word processors and simulation software.
- **Mobile Learning Management System:** License mobile learning management system such as Moodle, Google classroom, etc should be installed on all the devices of all the participants (students and teachers). During the procurement, the school should ensure that they get the license that will cover their participants' population as the license is charged based on the number of participants that will connect at a time.
- **Didactic video clips:** A video editing studio should be provided in the school where video that will help in teaching and learning will be produced. Such studio should be equipped with sufficient memory which will be used to store the archive.
- **Virtual experiments and simulation of phenomenon:** For science-based courses, simulation software will be very necessary to stage virtual experiment. It is just like carton where graphical manipulation in the computer plays human roles in movies. So practical session for science-based courses can be simulated.
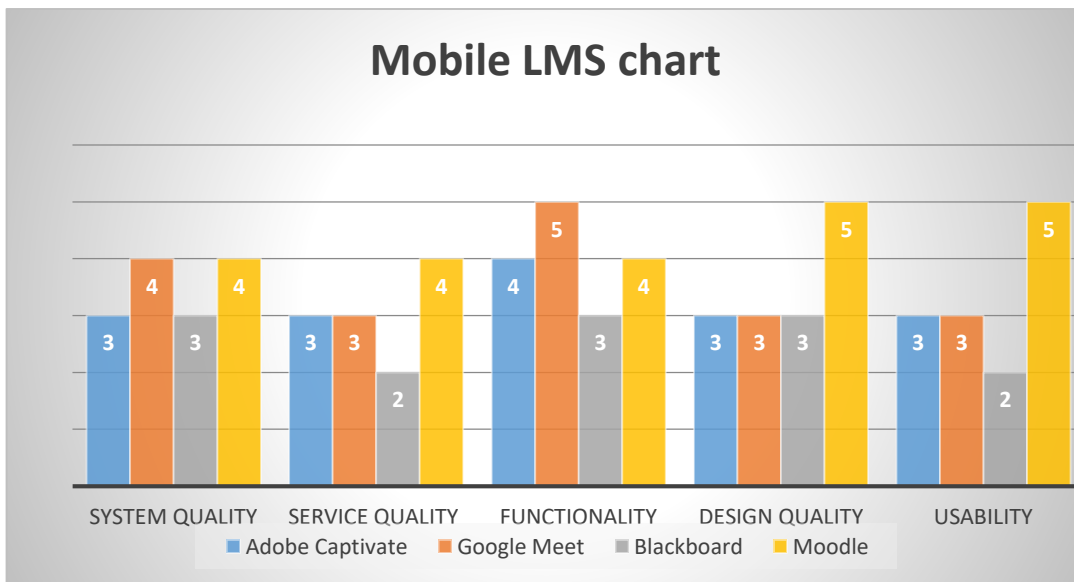
Discussion

Fig. 6: Mobile learning management system chart

From the analysis as depicted in Figure 6, it is observed that Moodle mobile learning management system had the most favourableratings from the online clients that had used the platform in the past. It had complete 5star-rating from design quality and usability whereas it scored 4star-rating in system quality, service quality and functionality. This agreed with the position of Almaiah, Jalil, and Man (2016) that any application that has good design quality and ease of usability will have the tendency to be more popular than other competitors. Google Meet platform followed as seen from the outcome of the analysis. The platform scored 5-star ratings in functionality, 4-star ratings from functionality and 3-star ratings from service quality, design quality and usability. The result of the analysis showed that Moodle platform and Google Meet platform can be engaged for mobile learning platform with ease.

Perceived barriers of using mobile technology in teaching and learning
- **Few teachers skilled in mobile technology:**Many teachers are not well grounded in advance use of smartphones and its advance features. Some only use it to answer calls, send and receive SMS and to interact with social media apps.
- **Teacher's resistance or inertia:** Many adultsare averse to change. This inability to easily adapt to change can constitute a barrier to integrating mobile learning platform to teaching and learning.
- **Lack of educational software:** Genuine education software is not without a cost. Poor funding of education in Nigeria may not make fund available for licensed education software. This will indeed hinder such integration.

- **Limited access to ICT tools:** ICT tools is not always adequate in our schools as compared to those that will use them (teachers and students). This is capable of preventing the integration of mobile learning platform to teaching and learning.
- **Poor internet connection in school:** Mobile devices need internet connection for most of its function and mobile learning platforms are not exception. Some education institution in Nigeria do not have active internet connection for the teachers and students use.

Conclusion
Mobile and handheld devices have come to stay with us as the number of persons using them keep increasing in geometric progression. Mobile device has been found to be a very useful tool in accessing information via the internet ever since the manufacturers incorporated such capability. In academic setting, students and teachers alike uses the services of these devices to interact in teaching and learning especially in developed countries. The younger generation continued to get glued to smartphones for purposes that may not be useful to them. It had also been revealed that teaching through mobile platforms excite the students more than the traditional classroom teaching settings.

Furthermore, the rate at which natural disasters disrupts education and other activates in recent time in Nigeria is becoming more frequent. For example, in 2020 the global covid-19 pandemic halted education activities for months and in 2022, flood swept across some regions of the country and that affected school activities as well because people were sacked from their homes. It could be recalled that while most schools in Nigeria were halted due to the

pandemic, schools in advanced clime who had embraced this integration did not stop their teaching and learning.

Recommendations
The following recommendations are outlined as a result this study:
  (1) Policy makers in education sector should adopt mobile learning in our school curriculum.
  (2) School administrators should conduct training for teachers on the use of mobile learning platform.
  (3) Government should make fund available for the procurement of educational software.
  (4) Free internet service should be provided in our schools for students and teachers use.

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