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Assessing Students' Learning Attitude and Academic Performance Through m-Learning During the COVID-19 Pandemic

Évaluation de l'attitude d'apprentissage et de la performance académique des étudiants via l'apprentissage mobile (m-Learning) pendant la pandémie de COVID-19

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Abstract

This study aimed to assess college of education students' learning attitude and academic performance in using m-learning during the COVID-19 pandemic. The study employed a pre-test and post-test experimental research design with 50 students from the College of Education, Ikere Ekiti, Nigeria. Two research instruments were used to collect data from the participants on two occasions. The first instrument was a students' attitude questionnaire that measured the attitude of the participants towards learning. The second instrument was the students' academic performance test that measured the students' scores. The differences between pre- and post-tests were measured through independent t-test. Demographic data are presented in a bar chart and show that the majority of the students own mobile devices that were suitable for learning; that the majority of the students used mobile devices for learning; and that all the respondents in the experimental group possessed mobile devices with the Zoom app. The pre-test findings revealed no significant differences in the attitude and performance of students towards m-learning and traditional learning ($p>0.005$) while the post-test findings showed significant differences in the attitude and performance of students towards m-learning and traditional learning ($p<0.005$). These findings suggest that m-learning should be integrated into the school curriculum.

Keywords: m-Learning; COVID-19 pandemic; Learning attitude; Academic performance

Résumé

Cette étude a pour but d'évaluer l'attitude d'apprentissage et la performance académique des étudiants de niveau collégial en utilisant le m-learning pendant la pandémie de COVID-19. L'étude a utilisé un design de recherche expérimental pré-test et post-test avec 50 étudiants du College of Education, Ikere Ekiti, Nigeria. Deux instruments de recherche ont été utilisés pour recueillir des

données auprès des participants à deux reprises. Le premier instrument était un questionnaire sur l'attitude des étudiants qui mesurait l'attitude des participants envers l'apprentissage. Le deuxième instrument était le test de performance académique des étudiants qui mesurait les points obtenus par les étudiants. Les différences entre les pré et post-tests ont été mesurées par un test t indépendant. Les données démographiques sont présentées dans un diagramme à barres et montrent que la majorité des étudiants possèdent des appareils mobiles adaptés à l'apprentissage, que la majorité des étudiants utilisent des appareils mobiles pour apprendre et que tous les répondants du groupe expérimental possèdent des appareils mobiles avec l'application Zoom. Les résultats du pré-test n'ont révélé aucune différence significative dans l'attitude et la performance des étudiants envers le m-learning et l'apprentissage traditionnel ($p > 0.05$), tandis que les résultats du post-test ont montré des différences significatives dans l'attitude et la performance des étudiants envers le m-learning et l'apprentissage traditionnel ($p < 0.005$). Ces résultats suggèrent que le m-learning devrait être intégré dans le curriculum scolaire.

Mots clés : m-Learning ; pandémie COVID-19 ; attitude d'apprentissage ; performance académique

Introduction

The negative effect of globalization is seen in the COVID-19 pandemic that most countries have been experiencing since 2019. Coronavirus was known to exist and survive in cold regions of the world (World Health Organization, 2020) but recently Coronavirus was found in temperate African communities. The COVID-19 pandemic led to the shutdown of both international and local activities, thereby disrupting the daily lives of people around the world (Munthali & Xuelian, 2020) because the virus was easily transmitted through human migration (Giovanetti et al., 2020). The increased rate at which the Coronavirus ravaged communities in Nigeria since its appearance in the country necessitated the Nigerian government to lockdown schools, religious centers, and commercial centers to stem the spread of the pandemic.

Meanwhile, schools remained responsible for providing the students with learning opportunities that teach the norms and values that will benefit their country (Odim et al., 2018). Obiakor and Adeniran (2020) stated in their report that the United Nations Educational, Scientific and Cultural Organization (UNESCO) observed that about 40 million students are disadvantaged in learning due to school interruption in Nigeria due to the pandemic. Learning, however, is not limited to the classroom and the closure of educational institutions during the COVID-19 pandemic lockdown should not stop learners from learning. Institutions that could aid learners' learning were not allowed to physically operate during COVID-19 pandemic lockdown but they could use alternative means to provide learning experiences for learners (Dagogo, 2021).

Alternative means of facilitating learning includes the use of interactive technology (Yekini et al., 2020). Some of these technologies are stationary electronic gadgets (e.g., computers) generally referred to as e-learning devices, while m-learning refers to the use of mobile devices (e.g., smartphones). M-Learning is a branch of e-learning but provides quality learning opportunities to

learners at a convenient place and time (Brown, 2005). The utilization of m-learning in teaching and learning provides smooth and continuous learning experiences for students (Aremu & Adeoluwa, 2021). This may stimulate students' learning attitude and academic performance. Based on the background presented, this study looked at college of education students' learning attitude and academic performance through m-learning during the historically poignant COVID-19 pandemic. The study engaged students from the College of Education, Ikere Ekiti, Nigeria. The specific objectives of the study were to identify:

1. Differences in students' learning attitude towards m-learning and traditional learning during the COVID-19 pandemic,
2. Differences in the academic performance of students that are exposed to m-learning and students that are exposed to traditional learning during the COVID-19 pandemic.

Research Questions

1. What are the mobile devices in the possession of the College of Education students during COVID-19?
2. What are the abilities of the College of Education students' for using mobile devices for learning during COVID-19?
3. How compatible are the mobile devices of students at the College of Education for using the Zoom app for webinars?

Research Hypotheses

Ho_1: There is no difference in the attitude of students towards learning through m-learning and traditional learning during the COVID-19 pandemic.

Ho_2: There is no significant difference in the academic performance of students that are exposed to m-learning and students that are exposed to traditional learning during the COVID-19 pandemic.

Literature Review

COVID-19, m-Learning, and Education in Nigeria

Coronavirus dates to the 1960s and evolved to severe acute respiratory syndrome (SARS-CoV) around 2002-2003 (Su et al., 2016; World Health Organization, 2020). In 2012, Middle East respiratory syndrome (MERS-CoV) was the Coronavirus that was prevalent (Al-Osail & Al-Wazzah, 2017). In 2019, SARS-CoV-2 emerged and became widely known as COVID-19. The first case of COVID-19 infection was confirmed and announced in Nigeria on February 27, 2020, in Lagos (Amani et al., 2020); it was observed that the virus was present in an Italian citizen who travelled to Nigeria. Another case of the virus was identified on March 9, 2020, in Ewekoro, Ogun State, which was detected in a Nigerian citizen who had a close interaction with an infected foreigner (Okorocha, 2020). The news that the former Chief of Staff to the President of the Federal Republic of Nigeria tested positive to the virus on

March 23, 2020, caught the attention of many Nigerians (Ayeni, 2020). The daily increase of COVID-19 infection across the country (especially in Lagos and the Federal Capital Territory, Abuja) made the Nigeria Centre for Disease Control declare COVID-19 a pandemic in Nigeria (Nigeria Centre for Disease Control, 2020). The Nigeria Centre for Disease Control recommended that schools be locked down to help reduce the spread of COVID-19, however, the lockdown of schools had negative effects on the learning activities of students (Aina & Opeyemi, 2020).

Outside the context of the COVID-19 pandemic, education in Nigeria continuously experiences major setbacks due to school closures that are caused by incessant strike actions and riots (Adavbiele, 2015; Odim et al., 2018); but for a nation to effectively grow, it must invest in the education of the upcoming generations (Agabi, 2012). To avert the effect of constant school closures, e-learning and m-learning can be adopted as solutions. The integration of mobile technologies into learning experiences has given birth to what is now known as m-learning (Asiimwe et al., 2017). Mobile technologies are useful in education due to their qualities of being durable and portable. The adoption of these platforms was hindered in Nigeria by unstable Internet services, non-proficiency in usage, social media influence, lack of content, and the high cost of device (Osang et al., 2013). However, to facilitate m-learning in Nigeria, it is necessary for learners to have access to mobile devices.

Children (ages 12-14) and youth (ages 15-25) in developing countries such as India and Nigeria generally have access to mobile devices (Vaidya et al., 2016). Adedoja et al. (2012) and Forenbacher et al. (2019) found that m-learning devices are widely available to learners in Nigeria, including children and youth. Most tertiary education students in Nigeria fall within the age range of 15-25 years and have access to mobile devices. The interest in m-learning is not entirely new in the world, though schools in Nigeria have not formally incorporated m-learning into instructional activities (Alaba et al., 2020). Iwayemi et al. (2021) considered the importance of continuously engaging Nigerian students with learning activities that use mobile devices. More so, m-learning stimulates the interest of Nigerian learners during instructional interactions via mobile devices with software applications like Zoom, WhatsApp, Twitter, Instagram, and Facebook (Aiyende & Omojola, 2021).

m-Learning and Students' Learning Attitude

Attitude is an emotional inclination of a person that is either characterized as positive or negative. Students clearly develop positive attitudes towards learning through mobile devices compared to students that learn through traditional modes (Alabi et al., 2019; Salam, 2021). Similarly, a study by Akinleke and Omowunmi (2017) at the Universityof Ibadan, Oyo State and Federal Polytehnic Ilaro, Ogun State, Nigeria, showed that attitudes of students towards m-learning were favourable. Attitude can be favourably or unfavourably exhibited by students depending on the personal mindset of the students towards developing learning habits in an educational environment. Oladele and Molara (2017) studied the attitude and perception of 600 undergraduate students at the Federal University of Technology, Akure, Ondo State, who responded to a survey on the use of mobile technologies for learning, findingthat the students developed positive attitudes towards m-learning.

The survey conducted at Al Buraimi University College by Al-Emram and Salloum (2017) found that among 345 respondents there was no significant difference in the attitude of students and usage of

mobile technologies in e-evaluation. Similar findings were made by Korucu and Bicer (2018) in a mixed-methods study with 30 respondents at Konya Necmettin Erbakem University, Ahmet Kelesoglu, Turkey and by Mugo et al. (2017) in a descriptive survey with 375 respondents at the Chartered University, Kenya. Kant (2016) suggests that mobile device usage increases the attitude of students, based on a survey involving 90 respondents at Darbhanga Polytechnic off campus of Maulana Azad National Urdu University, Hyderabad, India.

m-Learning and Academic Performance

Academic performance refers to the level of learners' accomplishment during teaching and learning activities. Students' academic performance can be enhanced through the incorporation of m-learning into learning activities (Aremu, 2021). In a survey of universtiy students, Egere (2021) found that m-learning is a viable platform through which students' performance can be upgraded. Furthermore, an investigation by Agbo et al. (2021) on the employment of m-learning in relation to students' performance revealed that m-learning has a propelling nature that raised students' curiosity and productivity. Klimova (2019) also dioscovered, through quasi-experimental research that involved 31 respondents in an single class, that the use of mobile phones to study English vocabulary improves students' academic performance.

Using descriptive survey design to investigate the effect of mobile learning on the attitude and performance of 153 students at Jordanian University, Zawaideh (2017) discovered that there was an increase in the academic performance and a positive influence on attitude among respondents using mobile learning. Eladham and Awad (2017) investigated the use of cell phones, attitude and academic performance among 400 primary and preparatory school students in Dakhlia Governorate, also using descriptive survey design. They observed a positive attitude from students towards the use of mobile phones. A cross-sectional survey by Suner et al. (2019) involving 81 undergradaute dentistry students examined usage, attitude, and perceptions of m-learning in dentistry courses, and revealed that both students' attitude and academic performance increased with the use of mobile devices.

Method

Research Design

The present study was both qualitative and quantitative; it was carried out using a pre-test and post-test experimental research design (Check & Schutt, 2012). This study investigated college of education students' learning attitude and academic performance in using m-learning during the COVID-19 pandemic. The study investigated the use of m-learning to improve students' learning attitude and academic performance in adapting to the interruption of school activities in southwest Nigeria.

Open Learner Model

The use of m-learning can be framed on several models including: DeLone and McLean's model; m-learning adoption model; open learner model; mobile tutoring pedagogical model; Africa m-learning model; web-based intelligent learning environment model; multi-agent model; and Shih's mobile learning model (Udanor & Nwodoh, 2010). This study, however, considered the open learner model in exploring the use of m-learning for teaching and learning activities. The open learner model could be considered any model that involves learning activities that allow learners to assess and identify the extent to which they have learnt the content that is being presented to them. These models present the learner with the opportunity to know the extent to which the learning content has been learnt, develop learning security, and motivate their interest in studying more (Kay, 1999). It has been observed that those learners that could not identify what they have learnt seem to feel a kind of emptiness that makes them always go back to what has been learnt, rather than moving forward to learn new concepts to avoid stagnancy (Tobias & Everson, 2009).

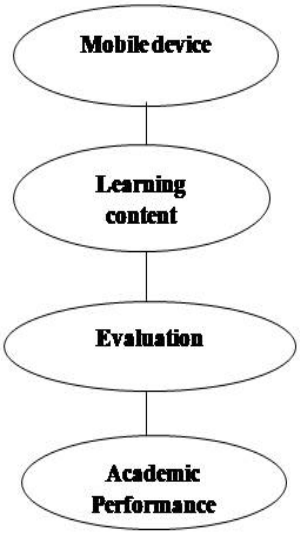
The open learner model can also enable learners to individually have a general idea about the path of their learning experiences and the status of their learning outcomes, and give them control over their pace of learning (Bull & Kay 2016). The open learner model could be applied through diverse means as long as they are learner-centered, self-directed, and construct meaningful learning (Kay, 1997; Bull, 2004). Furthermore, the open learner model makes self-learning and self-evaluation acheivable by learners through the use of e-learning (Baker, 2016; Jivet et al., 2018). Considering that m-learning developed from e-learning, it could be inferred that m-learning can provide learning opportunities that involve self-learning and self-evaluation to learners through the open learner model. The use of this model to develop learning modules for learners will help them learn and give them access to information about their learning performance so that they may be accountable for their learning. Figure 1 shows a schematic diagram of the open learner model for m-learning.

Participants

The participants in this study were two groups of 200-level (second year) students in the College of Education, Ikere Ekiti who previously took a course titled Philosophy of Education at the college through face-to-face learning. These participants reside in Oye Ekiti Town. Seventy-five 200-level students from the College of Education, Ikere Ekiti that belong to the Oye Students Association were identified and 50 selected using simple random sampling. Purposive sampling was used to group the participants into the two groups. The first group of 28 participants was the experimental group which made use of the Zoom app for webinar-based learning activities. The second group of 22 participants was the control group which made use of the traditional learning mode, i.e., reading the study manual. Philosophy of Education is a required course for all students at the colleges of education in Nigeria. The facilitator provided the study participants with the guidelines and purpose of the study. Participants were above 18 years of age and consented to be part of this research.

Figure 1

Schematic Diagram of Open Learner Model For m-Learning



Procedures

The learning activities for the two groups were simultaneously held for 30 minutes once a week over an 8-week period. Orientation and rules for the activities were covered in week 1. A pre-test was conducted in week 2. The topic of Philosophy and Education was considered in weeks 3 and 4. Socrates and Education, Plato and Education, John Locke and Education were topics considered in weeks 5, 6, and 7. A post-test was conducted in week 8.

The facilitator notified the participants about the commencement of learning activities in advance. Participants in the experimental group connected with the class using the Zoom app, which provided audiovisual learning opportunities, while participants in the control group were limited to reading the study manual. The participants in the control group had no link to the Zoom webinar. To ensure active participation of the control group, all participants in the control group were required to submit learning exercises for each learning session to the facilitator by email within 10 minutes after the stipulated learning period ended.

Instruments

The two research instruments used for data collection in this study were students' performance tests and students' attitude questionnaires. The students' performance test was designed based on the guidelines provided by Brown (1971) to measure students' academic performance. The test had four sessions and each session had five questions. It was reviewed by a test and measurement expert who ensured its construct validity. The test-retest reliability of the test yielded a coefficient of 0.94. The student attitude questionnaire was developed by the researchers to measure attitude towards learning. Responses to the items in the questionnaire were rated based on a modified Likert scale with points that ranged from 1 (strongly disagree), 2 (disagree), 3 (agree), and 4 points (strongly agree).

The student attitude questionnaire consisted of 10 items that were subjected to Kaiser Meyer-Olkin (KMO) and Bartlett tests of validity. The KMO and Bartlett test values were 0.869 and 147.480 ($p< 0.000$), respectively. Two factors were extracted to explain 67.675% of the total variance. The minimum factor loading was 0.475 and the correlation coefficients were between 0.4 and 0.7; hence, none of the items were removed. These tests revealed that the questionnaire was significant for the study. The Cronbach's alpha for the internal consistency of the questionnaire was 0.91; this confirmed the reliability of the instrument.

Data Analysis

Demographic information was collected and reported as a percentage. The data retrieved for this work were the students' performance scores and responses to students' attitude questionnaire. An independent t-test was employed to analyze the differences in students' attitude towards learning through m-learning mode vs. traditional learning mode. Differences in the academic performance of the students in the experimental group vs. and control group was also tested through an independent t-test.

Results

Figure 2 illustrates that 84% of the respondents indicated that they possessed mobile devices such as android phones, smartphones, iPads, PDAs, palmtops, and laptops that can be used for learning, while 16% possessed mobile devices such as basic phones and dumbphones that are not suitable for learning.

Figure 2

Posession of Mobile Devices

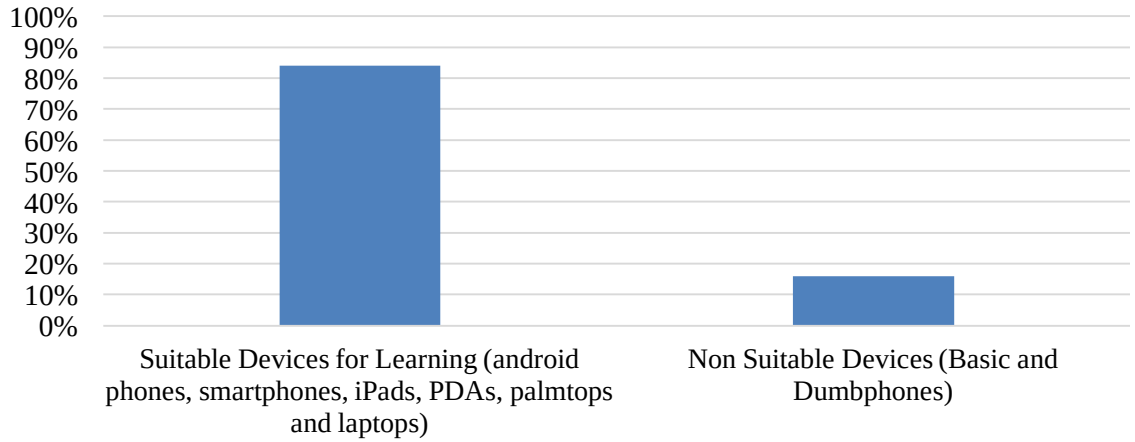


Figure 3 shows that 88% of the students indicated that they were able to use mobile devices for educational activities, while 12% of the participants did not respond to being able to use mobile devices for educational activities. None of the students indicated the inability to use mobile devices for learning activities. This revealed that the majority of the students were able to use mobile devices for learning.

Figure 3

Ability to Use Mobile Devices for Education Activities

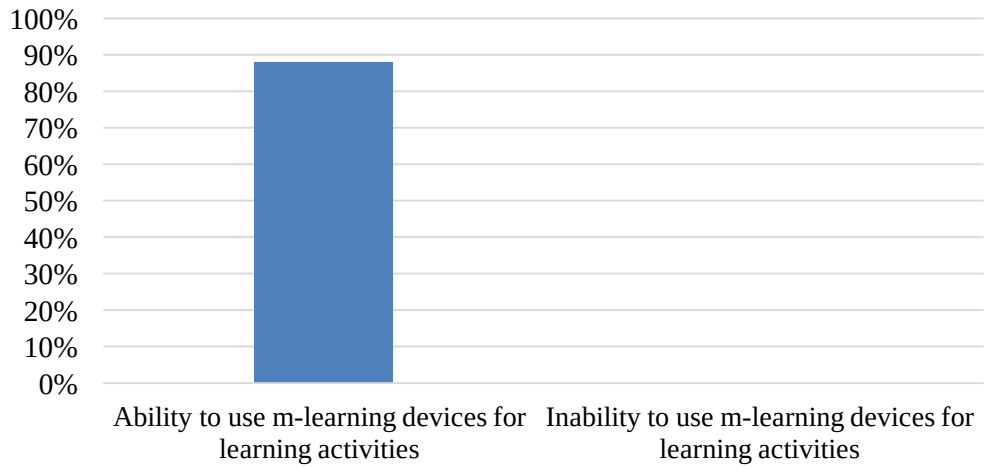
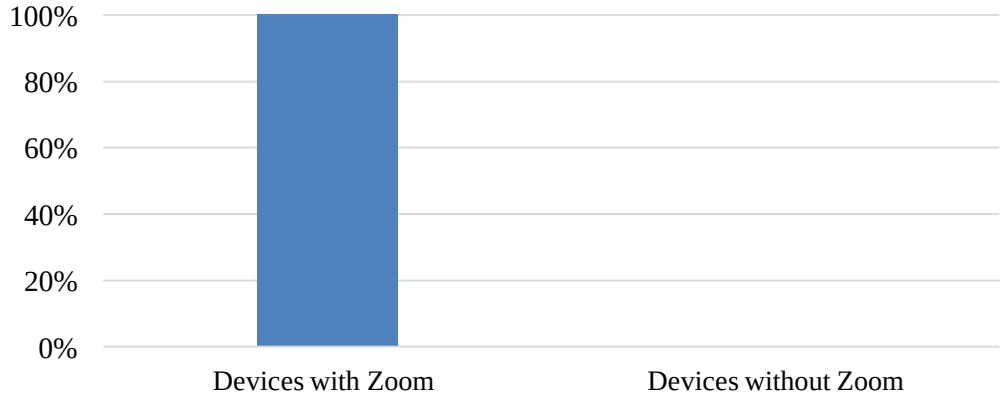


Figure 4 shows that 100% of the respondents in the experimental group possessed mobile devices that were suitable for use for the Zoom webinars, and that all the respondents in the experimental group had the Zoom app installed. This implies that respondents in the experimental group can participate in the learning activities from their different locations and interact with both the instructors and virtual classmates.

Figure 4

Students with Zoom App Installed on Their Mobile Device (Experimental Group)



The result in Table 1 shows that the p-value = 0.34 is greater than 0.05. This implies that there was no significant difference in the learning attitude of the students at pretest.

Table 1

Pre-test Comparison of the Learning Attitude of the Two Groups

Groups	*n*	*mean*	*SD*	*df*	*t*	*p**
Experimental	28	24.0357	2.71460	48	0.971	0.34*
Control	22	23.2727	2.81462			

**p*>0.05

Table 2 shows that p-value (0.74) is greater than 0.05. This implies that the experimental group did not differ significantly from students in the control group in academic performance at pre-test.

Table 2

Pre-test Comparison of Academic Performance of the Two Groups

Groups	*n*	*mean*	*SD*	*df*	*t*	*p*
Experimental	28	15.3929	3.07124	48	0.341	0.74*
Control	22	15.0909	3.16091			

*p >0.05

According to Table 3, p-value (0.00) is less than 0.05. This reveals that there was a significant difference in the learning attitude of the experimental group and the control group at the post-test.

Table 3

Post-test Comparison of the Learning Attitude of the Two Groups

Groups	*n*	*mean*	*Sd*	*df*	*t*	*p*
Experimental	28	34.7143	3.90496	48	19.547	0.000*
Control	22	14.2273	3.36554			

**p*<0.05

Table 4 shows a p-value (0.00) less than 0.05. This implies that there was a significant difference in the academic performance of students in the experimental group and students in the control group at post-test. The table shows that the participants in experimental group performed better.

Table 4

Post-test Comparison of the Academic Performance of the Two Groups

Groups	*n*	*mean*	*Sd*	*df*	*t*	*p*
Experimental	28	22.5357	2.61735	48	8.581	0. 000*
Control	22	16.1818	2.57527			

*$p<0.05$

Discussion

This study investigated college of education students' learning attitude and academic performance in using m-learning during the COVID-19 pandemic. This study found that the students who learned through m-learning significantly differed in their attitude towards learning compared with the attitude of students who learned through traditional learning. This is in line with the result of Alabi et al. (2019) on technology supported instructional platforms and students' attitude towards educational technology in public universities in Nigeria. Oladele and Molara (2017) believed that the university students' attitudes that developed towards the use of mobile technologies for learning did not meaningfully differ. The work of Salami (2021) on the attitude of science education students in Nigeria towards learning through m-learning also revealed that there is no significant difference in the attitude of students towards the use of mobile learning. The outcome of the study explained why Klimova and Poulova (2016) stated that m-learning is significant for learning.

The present study also found that there was a significant difference in the academic performance of students that were exposed to m-learning and students that were not exposed to m-learning. This finding is consistent with the findings of a number of other studies on m-learning. An investigation on the effects of mobile learning on students' attitude and performance at the Jordanian University revealed m-learning positively increased the academic performance of students that used mobile learning devices (Zawaideh, 2017). Klimova (2019) considered that using m-learning to learn helps students to perform better in academics in Hradec Kralove, Czech Republic. It was identified by Suner et al. (2019) that m-learning boosts the performance of undergraduate dentistry students. Similarily, Aremu (2021) observed that students' academic performance was enhanced through the incorporation of m-learning into learning activities at the Federal University Oye Ekiti.

Conclusion and Recommendations

This study found that learners in the experimental group were not limited by location and time as some of them were able to connect with the virtual class and participate in the learning activities at their different locations by interacting with both the instructor and other virtual classmates. This is consistent

with earlier research by Murphy et al. (2014) and Bukharaev and Altaher (2017). There was an understanding that mobile learning devices serve as a channel through which students can learn without time and location barriers (Miller & Cuevas, 2017).

This investigation focused on the learning attitude and academic performance of students' using m-learning during the COVID-19 pandemic. The following recommendations are made based on the observation and outcomes of the study: 1) the mobile devices employed in this investigation were android phones and laptop computers, and therefore it is recommended that subsequent studies increase the diversity of mobile devices examined; 2) the sample size for this study was reduced due to the COVID-19 pandemic, therefore, it is proposed that further studies make use of large samples; 3) this study was conducted using android phones and laptops that were supported with a mobile Internet modem to deliver learning experiences through Zoom-based webinars, therefore future research should examine m-learning with devices supported with stronger Internet bandwidth. In response to the interruptions in school activities for students in Nigeria as the result of strike actions or pandemic, m-learning can be employed as a solution to keep students continuously engaged in learning. Further studies should likewise be carried out on the integration of m-learning to the school curriculum to stimulate learners' interest and address absenteeism.

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APPENDICES

Pre-test/Post-test

Section A

1. The two Greek words that were used to form Philosophy are “Philo and Sophia”.
   A. True B. False
2. John Dewey considered education as a tool for social stratification.
   A. True B. False
3. Philosophical tools, theories, and principles are used for educational activities in Nigeria.
   A. True B. False
4. Philosophy of education considers that philosophers are educationist.
   A. True B. False
5. Philosophy of education uses historical approach to handle educational phenomena.
   A. True B. False

Section B

1. Knowledge is the source virtue.
   A. True B. False
2. Virtue can be learnt.
   A. True B. False
3. Reason is the source of knowledge.
   A. True B. False
4. Socrates opined that people with knowledge are not wrong.
   A. True B. False
5. One of the methods of teaching that is not accepted in Nigeria is question and answer method.
   A. True B. False

Section C

1. The first formal school was established by Plato.
   A. True B. False
2. Technical colleges in Nigeria are the product of Plato’s philosophical ideas.
   A. True B. False
3. Plato’s idea of state control of school is imbibed in Nigeria.

A. True B. False

4. The idea of school supervision is not philosophical in nature.

A. True B. False

5. Plato's school of thought greatly influenced Nigeria education.

A. True B. False

Section D

1. John Locke was interested in the physical, moral and intellectual development of the child.

A. True B. False

2. The use of instructional materials was advocated by John Locke.

A. True B. False

3. Private schools in Nigeria are aligned with John Locke's campaign.

A. True B. False

4. Nigerian children's right to formal education campaign is John Locke's philosophical idea.

A. True B. False

5. John Locke was an advocate of child centered education.

A. True B. False

Questionnaire For Students' Attitude Towards the Use of m-Learning for Philosophy of Education

Dear Respondent,

This questionnaire is designed to elicit information on the students' attitude towards the use of m-learning for Philosophy of Education. All the information given will be strictly used and confidentially used for research purposes.

INSTRUCTION: Please provide the following information by a tick (√) appropriately.

Android ☐ Smartphones ☐ Ipads ☐ PDAs ☐ Palmtops ☐ Laptops ☐

Ability to use m-learning devices ☐ Ability to use m-learning devices ☐

Devices with Zoom ☐ Devices without Zoom ☐

S/No	Items	Strongly Agree	Agree	Disagree	Strongly Disagree
1.	You are comfortable with m-learning than traditional classes				
2.	You consider that Philosophy of Education is better taught through m-learning				
3.	You feel that m-learning allows you to learn at your convenient time				
4.	Your learning speed is improved by m-learning				
5.	m-Learning devices allows you to be in charge of your learning				
6.	You prefer to use m-learning devices to download learning materials				
7.	You desire to connects with classmates through m-learning				
8.	You prefer to raise questions via m-learning devices				
9.	M-learning gives you access online library				
10.	You like to use m-learning continuously				

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