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Nigerian Preservice Teachers' Perceptions of Collaborative Mobile Learning with Google Classroom: A Pedagogical Alternative in the Era of COVID-19 Pandemic

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Nigerian Preservice Teachers' Perceptions of Collaborative Mobile Learning with Google Classroom: A Pedagogical Alternative in the Era of COVID-19 Pandemic

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Abstract

Teaching and learning can no longer be restricted to the four walls of the classroom due to the outbreak of the coronavirus disease (COVID-19) pandemic in Nigeria. This has necessitated the adoption of online modes of delivering instruction. Consequently, new pedagogical interventions are required as an adjustment to the new normal in other to ensure seamless learning. By drawing on descriptive research methodology, the study designed a Collaborative Mobile Learning Environment (C-MOLE) that embedded google classroom and thereafter implemented C-MOLE in the delivery of a science teaching methodology course to preservice science teachers. Technology Acceptance Model (TAM) questionnaire was used to survey preservice teachers' perceptions of C-MOLE. This study revealed that preservice teachers had high perceptions regarding the perceived ease of use, perceived usefulness and behavioural intentions to adopt google classroom in collaborative mobile learning respectively. Furthermore, the perceived ease of use and perceived usefulness positively influenced the behavioural intentions to use C-MOLE. There was a significant relationship between perceived usefulness and behavioural intentions to use C-MOLE. Likewise, there was a significant relationship between perceived ease of use and behavioural intentions to use C-MOLE. These results indicated that the three major constructs of preservice teachers' perceptions of C-MOLE fit into a cohesive model that determines the preservice teachers' acceptance of google classroom as a pedagogical alternative to face-to-face classroom instruction. The study recommended among others that google classroom should be blended with appropriate learning strategies and adopted in Nigerian universities.

Introduction

The pedagogical use of mobile technologies in an educational context has attracted the attention of educators and researchers in recent times (Chang, Chen & Hsu, 2011; Heflin, Shewmaker & Nguyen, 2017; Wu, Wu, Chen, Kao, Lin & Huang; 2012). The world is fast becoming a mobile digital virtual space where teaching and learning can no longer be restricted to the four walls of the classroom (Chad, 2013; Sandler, Romine & Menon, 2015). The affordance of mobile devices among students offers new possibilities for learner-centred pedagogies that utilize mobile devices for learning purposes (Traxler, 2011). Mobile learning is a form of e-learning that enables learning and access to learning materials irrespective of time, space and location (Ozdamli & Cavus, 2011). Mobile learning harnesses the power of mobile technologies to facilitate learning through handheld and wireless mobile devices such as mobile phones, tablets, personal computers, laptops and Personal Digital Assistant (PDAs) that can be conveyed from place to place without breakage of transmission signals (Kearney, Schuck, Burden & Aubusson, 2012). Mobile learning is an innovative pedagogy that offers flexibility in teaching and learning and provides students with opportunities for contextualized and personalized learning (Crompton, 2013; Metz, 2014). Mobile technology can be integrated into the curriculum across all subject domains to aid the achievement of educational goals if blended with appropriate learning strategies (Merchant, 2012; Jeng, Wu, Huang, Tan & Yang, 2010; Sung, Chang & Liu, 2016). Educators can also leverage the power and potential of mobile technologies to design interactive classroom instructions and to expand their teaching repertoires (Sutherland, Armstrong, Barnes, Brawn, Breeze & Gall,2004).

Perceptions about the usefulness of a particular technology is an important predictor of the technology acceptance and its' subsequent adoption as an instructional tool (Celik & Yusilyurt, 2013; Chen & Huang, 2010). Students' perceptions towards pedagogical intervention driven by online and mobile learning platforms are critical to the study especially now that students are required to revert to online learning. Kim, Rueckert, Kim and Seo (2013) reported that students' perception of mobile technologies for learning purposes were positive and highly correlated

with their intentions to use mobile devices in an educational context. On the other hand, Adedoja and Morakinyo (2014) conducted an experimental survey of preservice teachers' perception after exposure to mobile learning platforms. The researchers documented findings that revealed that the preservice teachers perceived mobile learning platforms to be sufficient for learning and that the preservice teachers are willing to adopt mobile learning platforms for learning purposes. Likewise, Sad and Goktas (2014) asserted that preservice teachers generally have positive perceptions of the instructional use of mobile technologies.

The immersion of Nigerian students in socialization through their mobile devices is overwhelming. This characteristic media trait can be harnessed to engage students in collaborative learning through mobile devices (Lofty, Olufemi & Ama, 2015). Nevertheless, mobile learning communication tools and applications remain one of the under-explored mobile phone features in higher institution of learning despite the pedagogical potentials of these devices (Rambe & Bere, 2013). Nigeria has a huge infrastructure that supports mobile learning, coupled with a whopping number of over 107.4 million active mobile phone subscribers which makes Nigeria the largest market for a mobile device in Africa (Adeyemo, Adedoja & Adelore, 2013; NCC, 2012). There is also a high proliferation of mobile devices among university students (Alexander, 2011). Nonetheless, the pedagogical strategies needed to infuse mobile devices into education are inadequate and understudied (Khaddage, Christensen, Laid, knezek, Norries & Soloway, 2015). Hence, the full potential of mobile technologies as a supportive learning management tool is yet to be fully actualized among students in Nigerian higher institutions of learning (Lofty, Olufemi & Ama, 2015).
The world is facing an enormous catastrophe with the coronavirus disease (COVID-19) which broke out on the 31st of December, 2019 in Wuhan city, Hubei province, China. Many of the several cases spread pervasively to other countries and continents to become the largest catastrophe of the decade (Ren, Gao & Chen, 2020). COVID-19 was subsequently declared a global pandemic by the World Health Organization (WHO) on the 11th of March, 2020 following its spread to over 119 countries which includes Nigeria. The Federal Ministry of Health through the Nigeria Centre for Disease Control (NCDC) reported an index case of COVID-19 in Lagos State, Nigeria on the 27th of February, 2020 which thereafter began to increase in number with new cases recorded daily. Consequently, the Federal government of Nigeria declared a nationwide lockdown on the 13th of April 2020 in a bid to curtail the spread of the COVID-19 pandemic in Nigeria (Kalu, 2020). Before this declaration, higher institutions of learning were mandated to shut its' doors to students who were at this point told to evacuate the universities dormitories within short notice amid fears of COVID-19 outbreak among university students who stood at risk of contracting the deadly virus. With concerted efforts still in place to combat the spread of COVID-19 in Nigeria, lecturers and students are now required to adopt virtual and e-learning management systems as alternatives to the traditional face-to-face classroom interaction. The understanding of educational responses to the COVID-19 pandemic in Nigeria is critical to this study in other to ascertain if students will benefit maximally from pedagogical initiatives driven by virtual and e-learning management systems. Besides, studies in the field of education rarely incorporate the aftermath effects of disease outbreaks in the provision of more effective education solutions and services globally (Edgar, 2020). Consequently, the study designed and implemented a Collaborative Mobile Learning Environment (C-MOLE) that embedded google classroom and thereafter surveyed preservice teachers' perception of this mobile knowledge management system as a pedagogical alternative to learning in the era of the COVID-19 pandemic in Nigeria.

Design of the Collaborative Mobile Learning Environment (C-MOLE)

The study designed a C-MOLE using google classroom features. Google Classroom is a free and commercially available web-based learning management system that runs on a computer, IOS and android devices. Google Classroom makes teaching and learning more productive by providing opportunities for teachers and students' collaboration, effective communication and grading system. Google classroom incorporates other google tools like google docs, google slides, google sheets, google drive, google forms, google meet and google calendar to further create a seamless collaborative learning environment (more details about google classroom can be retrieved from https://supportgoogle.com). Mobile collaborative learning is a pedagogical strategy that allows students to learn from one another under the surveillance and guidance of an instructor who provides the necessary supports and rules of engagement for learning (Lofty et al, 2015; Obere & Erkollar, 2013). Learning activities in the C-MOLE was organized using the five components of the mobile knowledge management learning system developed by Chen and Huang (2010) as an overarching frame in figure 1.

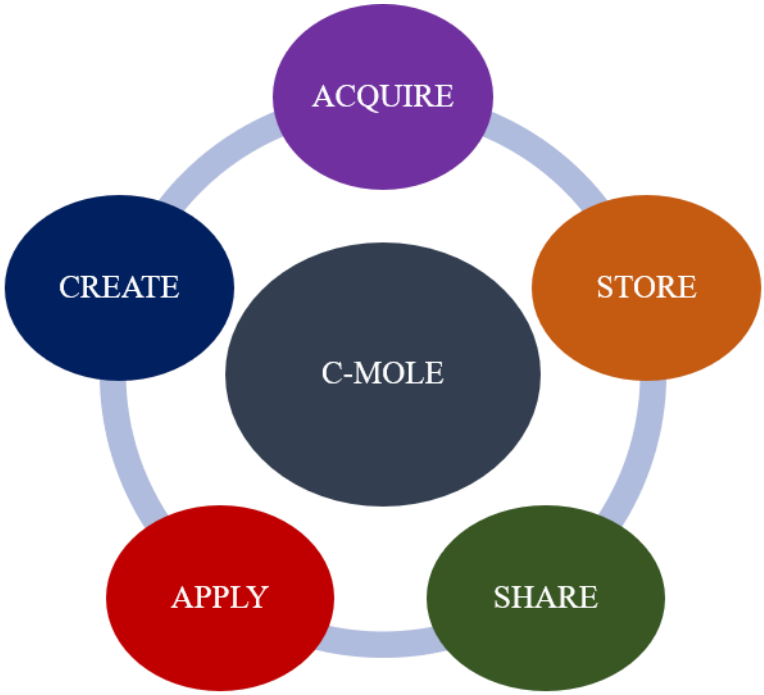

Figure 1. Collaborative Mobile Learning Environment (C-MOLE) learning activity framework

1. Acquire: in the preparatory phase of the acquire stage, the instructor who served as the technical expert and moderator of all learning activities in the C-MOLE created a class google mail account which was thereafter used to create the class sections on google classroom. Invitation code generated in the google classroom application was sent out to preservice teachers to join the classroom. Preservice teachers were acquainted with the objectives of the class and rules of engagement before the teaching and learning scenario. Thereafter, the preservice teachers took short quizzes created with google forms as concept inventories in other to ascertain their knowledge levels at the commencement of the instruction. Reciprocal peer tutoring collaborative learning strategy was simulated into the C-MOLE, the tutor for the day introduced the topic or concepts and concurrently post already prepared notes, slides, visuals, video tutorials, simulations and a URL link to e-resources which were vetted by the instructor to support preservice teachers' learning. Questions and task prompts were introduced to promote interactions and discussions among the preservice teachers.
2. Store: all the information and resources posted to the C-MOLE were downloaded and stored on individuals' mobile devices. Preservice teachers were also advised to organize their works and resources into e-portfolios which were saved to google drive. The instructor also created a folder for materials and resources that were saved to the class google drive and made accessible to everyone.
3. Share: preservice teachers explored the e-resources and materials posted to the virtual classroom to create their jots and notes which were shared with other members during class group presentations in other to create a forum for further discussion and interactions. Preservice teachers were also permitted to share their personal learning experiences and provided additional materials and links to e-resources.
4. Apply: preservice teachers were re-administered the concept inventories after exposure to course concepts in other for the instructor to measure class performance. New assignments and tasks were also sent out to students to enable them to apply their knowledge to new learning situations. Preservice teachers' returned assignments and tasks were graded appropriately by the instructor while timely feedbacks were provided on the preservice teachers' performance.
5. Create: collaborative document building features of google docs, google sheets and google slides embedded in the google classroom were harnessed to enhance preservice teachers' collaboration and co-creation of knowledge. Instructor and preservice teachers utilized these google classroom features to post notes, documents and slides which could be updated or edited by others.

Theoretical Framework

The mobile learning pedagogical framework and the Technology Acceptance Model (TAM) provide an appropriate theoretical anchor for students' learning in a Collaborative Mobile Learning Environment (C-MOLE) that embeds google classroom. The mobile learning pedagogical framework draws some basic principles from socio-cultural learning theory that emphasizes learning as a social process with meanings negotiated from multiple perspectives (Vygotsky, 1978; Palinscar, 1998). Mobile learning pedagogy highlights that mobile learning

incorporates authenticity, personalization and collaboration as its' main characteristic features (Kearney, Schuck, Burden & Aubusson, 2012). Mobile learning applications can be used to create an interactive learning environment grounded in a real-world context (Chen & Huang, 2010, Kearney et al., 2012). Learning through mobile devices also afford students the opportunities for self-paced and self-regulated learning suited to their personal needs (Mcloughlin & Lee, 2008; Cochrane, 2014). The interactivity dimension of the mobile learning environment provides room for discussion and collaboration among students (Chen & Huang, 2010). For instance, C-MOLE embeds reciprocal peer tutoring collaborative learning strategy as one of its' design features in other to promote students' maximum engagements. In reciprocal peer tutoring, students work together in collaborative smalls groups on a learning task and interchangeably take up the role of a tutor and a tutee in the collaborative learning space (Cerbin, 2010). This instructional paradigm was simulated into C-MOLE to ensure group interdependence and individual accountability. Furthermore, C-MOLE provides students with a choice of what, where, when and how they learn to enable personalized and customized learning tailored to individuals unique learning pathways. Chen and Huang (2010) submitted that mobile knowledge management learning systems can be organized into five major components which are: acquire, storage, share, apply and create. In the C-MOLE mobile knowledge management system, learners have access to course information, materials, quizzes, assignments, video tutorials and simulations which can be organized and stored on their mobile devices. Students also have the opportunities of participating in class discussions, share their learning experiences and resources or collaborate with their peers to co-create knowledge that can be applied to new learning situations.

The study adopts the Technology Acceptance Model (TAM) developed by Davis (1989); Vankatesh and Davis (2000). TAM model provides insights into how learners perceive or come to accept and use a particular technology. TAM is made up of three major components which are: perceived utility/usefulness (PU), perceived ease of use (PEOU) and behavioural intentions (BI) to use a system or technological tool. Perceive usefulness describes individual believes that the use of technology will improve their performance, perceived ease of use determines the degree to which individuals believe that using technology will be free from efforts while behavioural intentions measure an individual's attitude towards the use of a technology (Azjen, 1985; Davis, 1989; Fishbein & Azjen, 1975; 1980). TAM specifies that perceptions of the ease of using a system will determine the perceived utility/usefulness of that system. On the other hand, perceived usefulness and ease of use of a system are the two major factors that predict the acceptance of technology. Based on this submission, the study hypothesizes that students' perceived ease of using C-MOLE and perceived usefulness of C-MOLE for teaching and learning purposes will determine the behavioural intentions to adopt C-MOLE as a pedagogical alternative to face-to-face instruction in the era of COVID-19 pandemic crisis.

Purpose of the study

The main purpose of the study is to determine Nigerian preservice teachers' perception of a collaborative mobile learning environment that embeds google classroom features.

Research Questions

The following research questions were raised in line with the purpose of the study:

1. How do preservice teachers perceived the ease of using google classroom for collaborative mobile learning?
2. How do preservice teachers perceived the usefulness of collaborative mobile learning facilitated through google classroom?
3. What are the preservice teachers' behavioural intentions to adopt google classroom for collaborative teaching and learning purposes?

Research Hypothesis

Ho_1: there will be no significant relationship among preservice teachers' perceived usefulness, perceived ease of use and behavioural intentions to use google classroom for collaborative mobile learning.

Methods

The study adopts a descriptive research design. Descriptive research is a theory-based design method in which the researcher gathers, analyses and presents data in a way that provide great insights that enhance the understanding of the research problem (Blaikie, 2000). Thus, the study builds on grounded work on mobile learning by providing

additional information that describes students' perceptions of collaborative mobile learning with google classroom which was adopted in the design of the Collaborative Mobile Learning Environment (C-MOLE). This instructional framework was thereafter implemented in the delivery of a science teaching methodology course. This course is offered by science education majors in a large public research university based in Nigeria. Purposively sampling was used to consider only preservice biology, chemistry and physics teachers respectively. The preservice science teachers were invited to join the science teaching methodology class using the invitation code generated by the google classroom application. All the 114 preservice teachers that volunteered to participate in the study were accommodated as the study's sample. One of the researchers was the technical expert and moderator of students learning activities in the virtual classroom. Learning activities in the C-MOLE was asynchronous in other to offer the preservice teachers some flexibility with learning. Nevertheless, the preservice teachers were encouraged to stick to formally agreed time table and teaching schedules in another benefit maximally from class interactions and discussions. The C-MOLE learning activities framework (see figure 1) was implemented in three iterative cycles for delivering the course to the preservice teachers.

The instrument tagged TAM questionnaire was adapted from Chen and Huang (2010). The TAM questionnaire originally developed by Chen and Huang (2010) is a reliable and valid instrument for assessing students' perception of mobile knowledge management learning systems. This instrument was adapted and used to survey preservice teachers' perception of C-MOLE facilitated through google classroom. The instrument comprised of three sections that measured the preservice teachers' perceived usefulness, perceived ease of use and behavioural intentions to use google classroom in collaborative mobile learning respectively. The instrument was created using the google forms online survey tool. The TAM questionnaire was adapted to a five-point Liker response instrument which consisted of eleven items that measure preservice teachers' perception of C-MOLE. The TAM instrument was administered after preservice teachers' exposure to the C-MOLE for a four weeks duration. A pilot test of the TAM questionnaire yielded a Cronbach's Alpha reliability coefficient of 0.98 which indicated that the instrument was reliable. Data gathered from the survey was captured in SPSS statistical software version 25 and analysed using descriptive and inferential statistics.

Results

Table 1: Demographic variables (N=114)

Variables	Subgroups	Frequency	Percentages
Gender	Male	48	42.1
	Female	66	57.9
Age	16-20	56	49.1
	21-25	34	29.8
	26-30	14	12.3
	Above 30	10	8.8
Discipline	Biology	54	47.4
	Chemistry	38	33.3
	Physics	22	19.3
Device owned	Android phone	94	82.5
	iPhone	14	12.3
	Laptop	4	3.6
	Tablets	2	1.8
Experience	Novice	2	1.8
	Below average	10	8.8
	Average	61	53.3
	Above average	34	29.8
	Expert	7	6.1

A pre-survey instrument that gathered data on students' demographic variables (see table 1) indicated that the sample comprised of 48(42.1%) male preservice teachers and 66(57.9%) female preservice teachers. This data revealed that female preservice teachers' volunteers were more than the male preservice teachers in the study. A large proportion of the freshmen preservice teachers 56(49.1%) were in the age bracket of 16-20 years, followed by 34(29.8%) preservice teachers who were within the age bracket of 21-25 years. 14(12.3%) of the preservice teachers were in the age bracket 26-30 years while 10(8.8%) were above 30 years old. Furthermore, 54(47.4%) of the sample were preservice biology teachers while 38(33.3%) and 22(19.3%) of the preservice teachers were from the chemistry and physics cohort respectively. The majority of the preservice teachers 94(82.5%) own smart android mobile phone, 14(12.3%) were i-phone users, 4(3.6%) uses laptops while 2(1.8%) preservice teachers use tablet computers. Furthermore, the preservice teachers were asked to rate their prior knowledge of using mobile

devices for learning purpose. The returned pre-survey indicated that most of the preservice teachers 61(53.5%) rated themselves average, 34(29.8%) rated themselves to be above average, 10(8.8%) rated themselves to be below average, 7(6.1%) rated themselves as experts in the instructional use of mobile devices while the remaining 2(1.8%) rated themselves as a novice. This data shows that majority of preservice teachers had sufficient knowledge on the instructional use of mobile devices.

Research Questions

The proceedings for reporting the findings of the study began with the quantitative analysis of preservice teachers' response to each question items

Table 2. Descriptive statistics of preservice teachers' perceptions of C-MOLE (n=114)

No.	Items	M	SD
Perceived ease of use		3.63	1.057
1.	I think that the C-MOLE is easy to use	3.83	0.995
2.	I think that the C-MOLE is convenient to use	3.67	1.118
3.	I think that the C-MOLE is easy to understand	3.39	1.148
Perceived usefulness		3.49	1.063
4.	I think that the C-MOLE is helpful to my learning	3.36	1.045
5.	I think that the C-MOLE can help me better understanding the learning contents	3.49	1.099
6.	I think that using the C-MOLE in the course of instruction is a good choice	3.31	1.122
7.	I think that the mobile device enabled to use C-MOLE is good for learning	3.59	1.087
Behavioural intentions to use		3.66	1.037
8.	I think that the C-MOLE can enhance my learning intention	3.54	1.009
9.	I will continue to use the C-MOLE for learning in the future	3.55	1.114
10.	I am willing to use the C-MOLE to acquire, store, share, apply and create knowledge	3.89	1.002
11.	I think that C-MOLE is a good learning approach	3.67	1.036

Items 1-3 in the descriptive statistics table1 answered the RQ1 on how preservice teachers perceived the ease of using C-MOLE. Results indicated that preservice teachers have positive perceptions (mean=3.63) on the ease of using C-MOLE. This was based on the benchmark mean of 2.5. Most of the preservice teachers perceived C-MOLE to be easy (mean=3.83), convenient (mean=3.67) and easy to understand (mean=3.39) respectively.

Items 4-7 answered RQ2 on preservice teachers' perceptions of the usefulness of collaborative mobile learning facilitated through google classroom. The grand mean of 3.49 indicated that preservice science teachers perceived C-MOLE to be a useful pedagogical tool. For instance, most of the preservice teachers (mean=3.59) agreed that C-MOLE is useful for learning and that C-MOLE aids the understanding of the science teaching methodology course contents (mean=3.49). Also, the preservice teachers (mean=3.39) agreed that instructional practices facilitated through google classroom provided a scaffold for their learning, while a majority of the preservice teachers (mean=3.31) supported the view that collaborative mobile learning via google classroom was a good choice for learning.

Items 8-11 that were used to answer RQ3 revealed that preservice teachers have high intentions to adopt collaborative mobile learning (mean=3.66). Most preservice teachers (mean= 3.89) are willing to adopt C-MOLE for acquiring, storing, sharing, applying and creating knowledge. They also perceived C-MOLE to be a good learning approach (mean=3.67) which can further enhance their learning (mean=3.54). Based on this submission, preservice teachers were willing to adopt collaborative mobile learning facilitated through google classroom for future learning purpose (mean=3.55).

Research Hypothesis

Ho_1: there will be no significant relationship among preservice teachers' perceived usefulness, perceived ease of use and behavioural intentions to use google classroom for collaborative mobile learning.
Multiple linear regression analysis using the enter method was conducted in other to determine the relationship between the independent variables of preservice teachers' perceived usefulness and perceived ease of use on the dependent behavioural intentions to use C-MOLE. The results are presented in tables 3, 4 and 5 respectively.

Table 3. Model Summary of Regression

Model	R	R Square	Adjusted R Square	Std. The error of the Estimate
1	.990[a]	.981	.981	.577

a. Predictors: (Constant), perceived usefulness, perceived ease of use

b. Dependent Variable: behavioural intentions to use

The result from the model summary as depicted in table 3 revealed that the preservice teachers' perceived usefulness and perceived ease of use accounted for 98.1% variance on their behavioural intentions to use C-MOLE. The adjusted R-squared of 98.1% further indicated a strong fit in the constructed regression model.

Table 4. ANOVA Summary

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1907.318	2	953.659	2865.871	.000[b]
	Residual	36.937	111	.333		
	Total	1944.254	113			

a. Dependent Variable: behavioural intentions to use

b. Predictors: (Constant), perceived usefulness, perceived ease of use

The analysis of variance summary presented in table 4 showed that there was a statistically significant relationship ($F=2865.871$, $p=.000<.05$) between the independent variables (perceived usefulness and perceived ease of use) on the dependent variable (behavioural intentions to use). Thus, indicating that perceived usefulness and perceived ease of use have a significant influence on preservice teachers' behavioural intentions to use C-MOLE.

Table 5. Coefficient Summary

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.761	.195		3.913	.000
	Perceived usefulness	.490	.060	.502	8.185	.000
	Perceived ease of use	.646	.080	.494	8.045	.000

a. Dependent Variable: behavioral intentions to use

The coefficient summary table 5 revealed that the preservice teachers' perceived usefulness of C-MOLE had a positive influence on their behavioural intentions to use google classroom in collaborative mobile learning with a beta coefficient of .502 which was statistically significant with the t-value ($t=8.185$, $p=.000<.05$). On the other hand, the preservice teachers' perceptions on the ease of using C-MOLE had a positive influence on the behavioural intentions to use C-MOLE with a beta coefficient of .494 and a significant t-value ($t=8.045$, $p=.000<.05$).

Discussion

The study designed a collaborative mobile learning environment that incorporated google classroom features. Findings from the study revealed that preservice teachers have positive perceptions regarding the perceived ease of use, perceived usefulness and behavioural intentions to adopt collaborative mobile learning as a pedagogical alternative to face-to-face instruction. This is because collaborative mobile learning facilitated through google

classroom enhanced the preservice teachers' understanding of course contents. It also embedded features that promoted inquiry, sharing and application of knowledge to new learning situations. The instructional use of mobile devices provided maximum opportunities for preservice teachers' collaboration and co-creation of knowledge. These assertions are supported by the fact that mobile learning can be blended with appropriate learning strategies to enhance the delivery of course contents (Merchant, 2012; Jeng et al., 2010; Sung et al., 2016). Furthermore, findings from the study agreed with the outcomes of the empirical study conducted by Adedoja and Morakinyo (2013) where preservice teachers were reported to have high and significant perceptions towards the instructional use of mobile devices.

Results from the regression analysis conducted in line with the research hypothesis indicated that the three major constructs of preservice teachers' perceptions of C-MOLE fit into a cohesive model that predicts the preservice teachers' acceptance of google classroom as a pedagogical alternative to face-to-face classroom instruction. The study revealed that perceived usefulness and perceived ease of use had a positive influence on the behavioural intentions to use C-MOLE. There was a statistically significant relationship between preservice teachers' perceived usefulness and behavioural intentions to use C-MOLE. Likewise, perceived ease of use had a significant influence on preservice teachers' behavioural intentions to use C-MOLE for future learning purpose. These findings agree with Kim et al. (2013) who affirmed that perceptions on the instructional use of mobile devices as knowledge management systems are highly correlated with the intentions to use mobile devices for learning. Similarly, Chen and Huang (2010) submitted that perceived ease of use and perceived usefulness significantly predicts the intentions to adopt mobile learning technologies.

Conclusion

The world is facing a major catastrophe with the outbreak of the COVID-19 pandemic. Consequently, teaching and learning can no longer be restricted to the four walls of the classroom. The adoption of e-learning, mobile learning and virtual classroom platforms have become the new normal. The proliferation of mobile devices among Nigerian university students is high. Thus, mobile learning can be introduced as a viable pedagogical alternative to face-to-face classroom instruction if blended with appropriate learning strategies. The study's designed C-MOLE that incorporated google classroom documented findings that revealed that preservice science teachers have positive perceptions on the instructional use of mobile devices, and they are also willing to adopt its' use in the learning of course contents. The acceptance of C-MOLE among Nigerian preservice teachers thus shows some great prospects for mobile learning in Nigeria.

Recommendations

The following recommendations are made:

1. Google classroom should be blended with appropriate learning strategies and adopted in Nigerian universities as a pedagogical alternative to conventional face-to-face classroom instruction.
2. Instructors and university students should be trained on how to design collaborative mobile learning environments that embed google classroom features.
3. Challenges such as limited phone memory capacity, poor internet connectivity and other limitations associated with mobile learning should be timely addressed in other to create a seamless collaborative mobile learning environment.

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