

Prospects for Online Instructional Delivery Using Google Classrooms: Implications for Higher Education in Sub-Sahara Africa

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Abstract: Technology is relevant in achieving educational development. Exploring how best to pattern and incorporate educational technology to engender sustainability remains relevant. It is against this backdrop that this study examined the Prospect of online instructional delivery in sub-Saharan African Universities using Google Classrooms ascertained concerning usability and accessibility while examining impending challenges. This study adopted a descriptive survey design. The study population was undergraduates enrolled at the University of Ilorin, Nigeria, a public institution owned by the Federal Government of Nigeria and the most sought institution in terms of admission in the country. The target population was teacher trainees exposed to online instructional using Google Classrooms for 2018/2019 academic session. The study participants were purposively sampled; a total of 1933 participants. Data were gathered using a researcher designed questionnaire which was face and content validated. Three research questions were stated to examine accessibility, usability and challenges while the tested hypotheses were concerning prospects of Google Classroom for University of Ilorin undergraduates' learning across gender and departmental divides. Both descriptive statistics (Research Questions) and inferential statistics (Hypothesis) were employed in analysing data collected gathered. Significant findings revealed that Google Classroom holds prospects for innovative instructional approach for university undergraduates' learning. However, there is a need to improve its level of accessibility to undergraduates to maximise its gains by making efforts to alleviate the challenges militating against smooth access to ensure sustainability in higher education in sub-Saharan Africa, apt in the current pandemic era.

Keywords: Online instructional delivery, Google Classroom, Prospects, Universities, Sub-Sahara Africa

INTRODUCTION

Education is a vital development index. As such, access to quality education for citizens has become the priority of Nations around the world. Efforts are also being made to ensure quality education delivery through human capital development and the availability of support facilities. Indeed, no gainsaying the fact that Education has assumed an international priority with the right to Education first enshrined in the Universal Declaration of Human Rights in 1948 (Didham & Paul, 2015). Providing high education standards while ensuring constant improvement is pivotal to attaining development globally as enshrined in the post-2015 development agenda.

The Sustainable Development Goals (SDGs) came to be in 2015, with the international community through the United Nations and Heads of states of the 193 Member Nations as a new strategy for development by the year 2030 also known as Agenda 2030. SDG is framed into 17 Goals, with Goal 4 to ensure inclusive and quality education for all. At the same time, promoting lifelong learning and building and upgrading educational facilities that do not discriminate along

with age, disability and gender divide while ensuring a safe, non-violent, inclusive and effective learning environment for all (Ugwuegbe et al. 2018). SDG Goal 4 is critical to every one of the 17 Sustainable Development Goals with Watt (2017) reiterating that Education has a unique power to catalyse gains in other areas. Besides, quality Education, life-long learning mechanisms and human capital development in the teaching profession are vital factors in empowering youth as a globally connected engine for change in the post-2015 development agenda (United Nations Secretary-General (UNSG), 2014).

Relevant stakeholders agree that Education is the most important goal for this agenda. World Economic Forum (2015) regards Education as a robust system that opens individuals to diverse opportunities while fueling economic growth. The Forum further explained that Education provides the need skills to thrive in sustainable economies while working in renewable energy, smart agricultural practices, forest rehabilitation for climate controls, the design of resource-efficient cities, and healthy ecosystems. While ensuring quality education among all, it is pertinent to note that Information and Communication Technology (ICT) is becoming an integral part of Education, most especially in the 21st Century (Yusuf, 2005). According to Costley (2014), technology has a positive impact on student learning in terms of students' engagement which results to higher learning retention, enhances their learning experiences and also provides hands-on learning opportunities that can be integrated into all school curricular. Technology can also be useful for restructuring and redesigning the classroom to produce an environment that promotes the development of problem-solving and higher-order thinking skills while enhancing collaboration among learners (Kurt, 2010; Keser et al., 2011). A study by Miller (2011) reported that the technology integration resulted in an evolving atmosphere of respect, creativity, collaboration, and connection while encouraging independent thinking and ownership in the learning process. Another study conducted by Baytak et al. (2011) also revealed a positive students' perception on an improved learning experience with technological integrations. Ghavifekr & Rosdy (2015) through their study reported that teachers had a positive perception of ICT integration in the teaching and learning process. Raja & Nagasubramani (2018) explained that technology integration in education lead to curriculum and instructional delivery enhancement while being a veritable tool in the entire learning process resulting to interactive and aggressive learning.

The proliferation of technology in recent years has given way to integrating more emerging technologies like handheld devices, smart boards, virtual reality and augmented reality and learning management system into classroom teaching and learning (Sosa et al., 2018). ICT is also shifting the pedagogical paradigm from face-to-face instruction to diverse other teaching and learning approaches, such as blended learning, virtual learning, e-learning and technology-enhanced learning (Sosa et al., 2018). More than any tool since the inception of teaching and learning, technology supports human learning and cognition in a more personalised, flexible, portable, and on-demand manner (Zhang et al., 2004). An individual can now learn at their own pace and in their own space. ICT has also shifted the teachers' pedagogical role from being the only source of instruction in the classroom to being a facilitator and designer of learning experiences. Technology in recent times is ensuring access to quality education, but it also increases the opportunities to achieve it.

LITERATURE REVIEW

The 21st Century is characterised by technological advancement and germane to ensuring quality education for achieving Sustainable Development Goals for Nigeria and the continent of Africa. According to Eaton (2018), the relationship between technology and instructional delivery is symbiotic and intricate with success determining factors such as instructor's digital literacy; learning context-specific technology; institutional financial policies on technology priorities, and whether students access to and availability of computer devices. Technology integration for teaching and learning is a worldwide phenomenon at every level of Education. The Covid-19 pandemic has further driven home the present-day realities where teaching and learning have gone virtual; being a smooth transition for developed countries and of course, a struggle for less and

underdeveloped ones. Digital technology continues to change and shape our world (Srivastava & Dey, 2018). If Sustainable Development Goals would be achieved by the year 2030, ICT in Education remains essential.

According to Ghavifekr & Rosdy (2015), ICT in Education is a technology-driven instructional process in schools. ICT integration is paramount because students are familiar with technology and will learn better within a technology-based environment. This integration also contributes to the pedagogical aspects for active learning (Jamieson-Proctor et al. 2013). Srivastava & Dey (2018) further stressed that a proportionate paradigm shift in Education requires a qualified teacher to be digital literate required for using instructional smart classrooms such as Eneza Education. Eneza Education is a Kenyan text technology-based instructional facility for facilitating learning for as low as 10 Kenyan shillings through school partnership for tracking students' progress using mobile devices (Eneza Education, 2016).

A similar initiative is the Samsung SMARTSchool; a social corporate responsibility project geared towards establishing smart classrooms on devices to support the under privileged students with low access to digital Education. The main goal is to close the inequality gaps in Education by equipping schools worldwide with internet devices and alternative power sources schools in remote areas. Currently, many SMARTSchools are in operating in 10 African countries, some of which are Ethiopia, Ghana, Kenya, Uganda and lately; Nigeria (IT NEWS AFRICA, 2016). Not only was Samsung SMARTSchools provided, but teachers were also trained on using this digital solution and smooth integration into instructional activities (IT NEWS AFRICA 2016). Comparing the University of South Australia acclaimed world-class research on teacher education with innovative Science Technology Engineering and Mathematics (STEM) teaching and learning opportunities, a concerted booth for teachers at all career stages is provided which encourages critical thinking, creativity in real-life problem-solving and technological proficiency (University of South Australia, 2019).

Google Classroom (GC) is a free web-based instructional, and assessment solution developed by Google Inc. for teaching and learning. The primary goal of GC is to streamline sharing files between teachers and students, which mainly leverages on internet-savvy technology. The Australian Capital Territory Government-ACT (n.d.) explained that GC bridges the gap between students and teachers as both can share resources, seamlessly share information and tasks through the web. This platform enhances accessibility leveraged by integrating technology such as Google Drive to store and share documents, Google Docs for collaborative enquiry and Google Forms for quizzes and lately Google Meet for holding virtual classes that are not time or location bound. With GC, teachers can also monitor students' progress and give feedback, even during the instructional process (ACT n.d.).

Empirical studies reveal that Google Classroom has been widely used for Online Instructional Delivery internationally and various subjects. Concerning arts subjects, Muslimah (2018) described Google Classroom as one of the technologies is being developed to make the learning process more manageable. The study was geared towards identifying the students' responses to the use of Google Classroom for English Language Education Department students, Islamic University of Indonesia. With 190 respondents who completed the questionnaire about Google Classroom revealing, Google Classroom is useful and helpful for the students while they felt satisfied with Google Classroom for learning. Also, Umamah (2019) identified Google Classroom as a free web-based learning media. The study outlined Google Classroom features such as Single View for student assignments, organised classroom arrangement, the availability of Decimal Grading, ease of transfer of class ownership, ease of integrating other applications such as Google Form for the quiz, Edcite and Code.org and availability of class joining codes which facilitates ease of joining the classroom irrespective of student's location. Google Classroom as a learning media can save time and paper, distribute tasks, and enhance regular communication between students and lecturers. Concerning history, the investigation revealed that most teachers and students do not know about and use Google Classroom media in history learning. However, after witnessing a demonstration of using Google Classroom, both teachers and students agreed that Google Classroom could solve historical learning problems that tend to be monotony. As such,

the study created a need for Google Classroom media to support historical learning activities for improving the quality of learning.

[Bondarenko et al. \(2019\)](#) also reiterated that although Moodle was in everyday use as an open learning management system for supporting blended learning in higher Education, GC was gaining prominence. GC is an interactive educational tool that allows creating informative and rich educational and highly integrative learning environments. This hold potential for supporting blended learning in Geography classes with empirical evidence on real-time learning subjects interaction, particularly valuable with increased independent work volume as obtainable in most Nigerian classrooms with high students-teachers ratio. Furthermore, GC was gainful in ensuring the integrity of both in and out-of-class work; incorporates attractive visual aids in learning through online videos; development of critical thinking; formation of professional geographic competencies; and operational control of educational achievements. Another study by [Al-Marroof and Al-Emran \(2018\)](#) aimed to examine the extent of students' acceptance of Google Classroom at Al Buraimi University College (BUC) in Oman. The authors stressed that the acceptance of Google classroom is affected by different factors, the distance, online or blending learning style of teaching offers many advantages over the traditional classroom teaching style. The most evident advantages lie in its accessibility, students' scheduling flexibility, and adaptability for working. Adopting the Technology Acceptance Model (TAM), findings show that both the perceived ease of use and perceived usefulness positively influence the behavioural intention, in this case, acceptance, which influences the actual usage of Google Classrooms.

On the national scene, [Afolabi \(2017\)](#) investigated first-year University undergraduates' experiences in South-Western Nigeria with the use of open educational resources (OER) in learning and their in-course achievement of which Google Classroom is one. Findings of the study reveal that the University undergraduates perceived OER as usable. This perception engendered acceptability and developing competencies on the students' paths, which were necessary to provide intervention strategy and appropriate support service that could facilitate their understanding and learning of difficult concepts. [Abubakar \(2019\)](#) investigated College Students preference on the Usage of Google Drive; being file storage and synchronisation service created by Google as a learning platform in north-east Nigeria. The results obtained from this study show that a reasonable number of undergraduate teacher trainees of north-eastern university use Google drive as learning platform which facilitates collaborative learning, file storage, file sharing and a platform for learning has tremendous benefits as far as enhancing learning activities for university teacher trainees. [Udosen & Adie \(2019\)](#) investigated Google Classroom for use by Distance Learners in National Teachers' Institute in the South-South region of Nigeria. Results revealed that there Google Classroom were not in use for teaching at the NTI Calabar Study Centre, while lecturers possessed a high level of competence to use Google Classroom Technology as inferred from Nigeria's facilitators' internet-based tasks. It is not unlikely that facilitators' claims to have the skill have been engendered by self-report forms that give loopholes for response set if not correctly designed. This claim shows a negative correlation in findings which deserve a closer look.

ICT is germane to quality education, especially in the face of the Covid-19 pandemic, where teaching and learning have gone virtual. Google Classroom as a useful teaching and learning resource [Aina & Abdurrahman \(2020\)](#), a salient question is the availability of infrastructure to support the needed technology in less developed countries such as electricity supply needed to power most of these gadgets, digital literacy on the path of university lecturers who are supposed to be skilled in integrating ICT gadgets for smooth instructional delivery and the availability of high internet bandwidth needed for smooth utilisation of these ICT gadgets for teaching and learning.

THEORETICAL AND CONCEPTUAL FRAMEWORK

The use of technology in classroom has a deep root in the major learning theories including behaviourism and cognitivism ([Ouyang & Stanley, 2014](#)). These theories have shaped both the design and implementation procedure of educational tools (technologies) in the classroom, through different models and concepts. For instance, to the behaviourist, the teaching and learning

experience should first be planned and designed with achievable goals/objectives which should be observable on the learners at the end of the experience (Keesee, 2011). The cognitivist perspective assumes that knowledge acquisition lies at the very heart of learning. Once people acquire new information in learning environments, they are supposed to use that information in completely different situations later in life. This is only possible if they have understood it correctly and stored it in a well-organised manner in their long-term memory (Schneider & Stern, 2010). The way information is organized is very germane to learning according to the cognitivism theory of learning, and this has a lot of implication to both the app designers and teachers. For designers, techniques like advance organizers, analogies, hierarchical relationships, and matrices can be infused to ensure that learners relate new information to prior knowledge (Ertmer & Newby, 2013). Both theories are both relevant for this study with respect to ICT use in education. This is important considering that the teaching experience should culminate to learning irrespective of the platform used. It is in this light that the study examines the usability and accessibility of Google Classrooms for teaching and learning which forms the conceptual framework for this study.

Usability and Accessibility are two determining factors of the effectiveness of any ICT tools infused into classroom teaching and learning. Access determines the extent of use, and where there is no use; there is no impact (Norris et al., 2015). Usability of a product is defined as the product's capability to be efficiently and effectively used by humans (Sauer et al., 2020). Usability applies several methods of assessing the effectiveness, efficiency, and satisfaction a user derives from using a product in a given context of use (Wegge & Zimmermann, 2007). Usability is the "Extent to which specified users can use a product to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use." (Bevanet et al., 2016). Usability relates to the outcome of interacting with a system, product, or service. It also involves a regular ongoing use, to enable users to achieve their goals effectively, efficiently and with satisfaction (Bevanet et al., 2016). It is important to note that access precedes use. Access is defined as the ability to use technology without any barriers. Access extends the usability of a particular technology to a larger group of users (Sauer et al., 2020). Despite loads of promises, the use of technology in Education brings to teaching and learning, little has been achieved in most developing countries around the world due to access and availability. Among many problems, access still poses a significant threat to technology adoption in schools (Norris et al., 2015). Access is one of the major impediments to the use of technology in developing countries like Nigeria.

According to Matthew (2018), the United Nations (UN) classified internet access as a fundamental human right while condemning countries that do not prioritise internet access for citizens have proved to open to opportunities for affordable and inclusive education globally. However, there exists a disparity in access to technology in terms of gender. Researchers have reported that access to ICT favours male users at female users' expense (Selwyn, 2013; La Valle & Blake, 2001). Mourdoukoutas (2019) reiterated that males living in urban areas have better access to digital technology in Africa. With females, 50% less likely to use the Internet than males, some organisations are now making efforts to attract females to the digital world. Digital technologies can provide opportunities for women in the informal job market by connecting them to employment opportunities.

On the contrary, Davison & Argyriou (2016) submitted that there is no gender gap concerning technology adoption and utilisation in the overall sense. In the same vein, Goswami & Dutta (2015) in their study on Gender Differences in Technology Usage, a literature review observed that there are mixed results concerning the influence of gender on technology adoption as such there are cases where gender differences cannot be discerned. Instead, digital divides in sub-Saharan Africa are along the economic and location divides where the wealthy and those in urban areas have higher internet access resulting in an uneven distribution (World Bank's World Development Report, 2016). According to Oluwatobi & Olurinola (2015), mobile learning delivers Education more affordably, accessibly and effectively than the traditional delivery model, which further deprives the poor in Africa. As such, there is no gainsaying the fact that the rise of disruptive

technologies is profoundly transforming systems of production and management across sectors and industries, but primarily in wealthy countries (Onyeji-Nwogu et al, 2017).

Existing technological gaps between the changing society's progress and teacher' instructional activities are greeted with several research efforts geared to bridge these gaps. Cocoli et al. (2014) conducted a study on Smarter universities focusing on the availability of latest technology and its relevance on the fast-changing digital era leading to the adoption of a variety of smart solutions for the benefit of teachers and students alike. The Digital Futures in Teacher Education (DeFT) project also acknowledged the role of ICT on curriculum development and digital literacy (Burnett, 2011; Gruszczynska et al. 2013). Lei (2009) studied pre-service teachers' digital literacy revealing that they were less equipped technologically. Krumsvik (2006) conducted a study with interest in how learning from the past had occurred with technology implementation to identify challenges faced in the process of pedagogical transfer. Jukes & Dosaj (2006) studied digital divides between students and their teachers, revealing that digital immigrant teachers were slow in adopting computer technology; digital native students prefer technology blended learning. Prensky's (2001a, 2001b) explanation given to this outcome was that young people think and process information faster compared to the older generations with the ability to parallel process and multi-task having instant gratification as rewards obtained using videogames.

Technology remains relevant in achieving the SDG 2030 development agenda concerning Education. Exploring how best to integrate and frame educational technology's role in strengthening development sustainability in Education must be explored. It is against this backdrop that this study examined the Prospect of Google Classrooms for online instructional delivery in sub-Saharan African Universities. While Anderson stressed building a standard integrated theory of online Education as a herculean task; several authors have made attempts Van Melle et al. (2003), Price & Oliver (2007), Khoo & Cowie (2011), Rodríguez et al. (2012), however, with regards to peculiar interests. Prospect, as a construct in this study, is, therefore measured with respect to usability and accessibility. To this end, the goal of this research is to determine the usability and accessibility of Google Classroom for University of Ilorin undergraduates' learning while also considering inherent challenges.

Based on the research goal, the following research questions were generated for the study:

1. What is the extent of usability of Google Classroom for University of Ilorin undergraduates' learning?
2. How accessible is Google Classroom for University of Ilorin undergraduates' learning?
3. What are the challenges of using Google classroom as an innovative learning approach for University of Ilorin undergraduates' learning?

H₀: There is no significant difference in Google Classroom's prospects for the University of Ilorin concerning students' gender or discipline.

H₁: There is a significant difference in Google Classroom's prospects for the University of Ilorin concerning students' gender or discipline.

SIGNIFICANCE OF THE STUDY

The COVID-19 pandemic has further buttressed the exploration of diverse learning opportunities technology offered. In the history of teaching and learning, technology in education is at its peak since the COVID-19 lockdown all around the world (Dabrowski, 2020). According to the United Nations Educational, Scientific and Cultural Organisation (UNESCO), the statistics of the effect of COVID-19 school closure is at its peak in April 2020, with over 84% of world learners' population being shut out of school in over 170 countries of the world (UNESCO, 2020). To minimise the disruption of learning, countries around the world have swiftly shifted to online and remote learning to ensure sustainable, high quality and flexible teaching and learning (Dabrowski, 2020). Most countries deployed the use of Massive Open Online Courses (MOOCs) styled lessons, some aired instructional contents on Radios and Television, while others used existing applications to engage students during the lockdown (UNESCO, 2020). Githiru (2018) explained that technology could answer the deployable state of the education system. These concerns are well-

founded as information and communication technology has positive impacts on improving the education system. This study carried out in the Nigerian setting which suffered a total breakdown of the higher education sector advances knowledge with respect to technology integration for ensuring a smooth teaching and learning deployed virtually with a goal of promoting continuity and effectiveness.

METHOD

Study Design

The research adopted a descriptive research design of survey type. This design was deemed appropriate as it allowed for gathering opinion on the prospects of Google Classroom as an innovative instructional approach fit for our changing world.

Participants Description/ Sampling

The population for this study was the University of Ilorin undergraduate education students. The University of Ilorin is the most sought public institution for undergraduate studies in Nigeria. Candidates seek to be admitted to the institution because of the smooth academic calendar with a track record of about twenty years. The high admission rate results in large classrooms far above the student-teacher ratio of 1:40 characteristic of the faculty of Education, where the participants were selected. Despite the large number of students admitted into the university annually, efforts are geared towards improving the university's ICT infrastructural facilities by providing broadband internet facilities for students and mobile tablets made compulsory at a highly subsidised rate. The university also has a standard electronic library readily made available to students. As mentioned above, all the ICT facilities are made available to students in the Faculty of Education with nine academic departments (See [Table 2](#)) and technical support staff.

The target population was students in the Faculty of Education who were exposed to online instructional delivery using Google Classroom for 2018/2019 academic session. All students who had successfully accessed the Google Classroom were purposively sampled for the study. Purposive sampling was employed to ensure that the study participants had been exposed to using Google Classrooms which served as the criteria for selecting study participants. Below is the demographic information of respondents. Participants by gender presented using percentages in [Table 1](#).

Table 1. Distribution of respondents by gender

| Gender | Frequency | Percentage (%) |
|--------|-----------|----------------|
| Male | 827 | 42.8 |
| Female | 1106 | 57.2 |
| Total | 1933 | 100.0 |

As shown in [Table 1](#), 827 (42.8%) were males while 1106(57.2%) of the respondents were females. This result revealed that more of the female undergraduates participated in the study. Participants presented using percentages, as shown in [Table 2](#).

Table 2. Distribution of respondents by Departments

| Department | Frequency | Percentage (%) |
|-----------------------------------|-----------|----------------|
| Adult & Primary Education Studies | 251 | 13.0 |
| Arts Education | 215 | 11.1 |
| Counselor Education | 94 | 4.9 |
| Educational Technology | 433 | 22.4 |
| Educational Management | 104 | 5.4 |
| Human Kinetics | 128 | 6.6 |
| Health Promotion | 168 | 8.7 |
| Science Education | 346 | 17.9 |
| Social Sciences Education | 194 | 10.0 |
| Total | 1933 | 100.0 |

As shown on [Table 2](#), 251(13.0%) were students from the Department of Adult & Primary Education Studies, 215(11.1%) from Arts Education, 94(4.9%) from Counselor Education, 433(22.4%) from Educational Technology, 104(5.4%) from Educational Management, 128(6.6%) from Human Kinetics, 168(8.7%) from Health Promotion, 346(17.9%) from Science Education while 194(10.0%) of the students were from Social Sciences Education. This result revealed that the Department of Educational technology had the largest number of participants in the study.

Data Collection

The instrument used for data collection was a questionnaire administered using a google form titled: Google Classrooms Assessment Inventory. The instrument was designed to measure prospects of Google Classroom as a construct with usability, accessibility and challenges as its measures. A section on respondents' demographic characteristics was also added in the light of research hypothesis tested in the study.

Literature was consulted in understanding the constructs of Usability and Accessibility. The knowledge gained was the basis upon which items of the scales were researcher developed. The instrument had four sections, as shown in the appendix. Section A was designed to collate demographic statistics of the respondents (in terms of gender and departments); Section B consisted items on the usability of Google Classroom scaled on a continuous 5-point scale from least to highly usable, Section C consisted items on the accessibility of Google Classroom also on a continuous Likert scale of Strongly Agree (4) to Strongly Disagree (1) while Section D consisted of items on challenges of Google Classroom with a categorical Yes (1) or No (1) scale. The instrument was face and content validated by Educational Research, Measurement & Evaluation and Educational Technology experts. The items were subjected to construct validation to establish the sub-scales' internal consistency using Cronbach's Alpha method. A reliability coefficient of 0.87 was obtained for the usability sub-scale, 0.91 for the accessibility sub-scale while items on challenges sub-scale were subject to split-half reliability with a coefficient of 0.75.

Data Analysis

Data were analysed descriptively and inferentially. Research Question one and two were answered using Mean and Standard Deviation, while research Question3 was answered using percentages. Hypotheses generated for the study were answered using t-test (appropriate for inferential analysis at two levels of measurement) and Analysis of Variance (appropriate for inferential analysis at more than two levels of measurement) using SPSS 23.0.

Study Ethical Considerations

All procedures performed in studies involving human participants were following the institutional research ethical committee's ethical standards. Online forms were used for data collection facilitated through WhatsApp groups for information dissemination related to the research and sharing of online form links. Therefore, participants were pre-informed before being added to the created groups to guarantee participants' informed consent included in the study. Considering that the study participants were drawn from a compulsory faculty course in the university EDU 316, participants were pre-informed that the data gathered was strictly for research and would not add up to their assessment scores for the course which further guaranteed that participants were not in any way forced into participating in the study. Utmost confidentiality was also ensured while students' identities were not required to participate in the study.

RESULTS

Research Question 1: What is the extent of usability of Google Classroom for University of Ilorin undergraduates' learning?

Data collected from the 10-item usability scale; scaled 1 to 5 was subjected to descriptive statistical analysis. With a minimum obtainable score of 10, a maximum obtainable score of 50 and a range of 40, usability of Google Classroom was categorised into three levels of less than 23; 'not

useful', 24 to 33 'moderately useful' and 34 and above 'very useful'. The extent of usability of Google Classroom for University of Ilorin undergraduates' learning was analysed using mean and standard deviation, as shown in [table 3](#).

Table 3. Extent of Usability of Google Classroom for undergraduates' learning

| | N | Minimum | Maximum | Range | Mean | Std. Dev |
|------------------|------|---------|---------|-------|-------|----------|
| USABILITY | 1933 | 10 | 50 | 40 | 34.57 | 6.830 |

[Table 3](#) shows that a mean of 34.57 indicates that Google Classroom for University of Ilorin undergraduates' learning was very useful.

Research Question 2: How accessible is Google Classroom for University of Ilorin undergraduates' learning?

Data collected from the 10-item accessibility scale; scaled 1 to 4 was subjected to descriptive statistical analysis. With a minimum obtainable score of 10, a maximum obtainable score of 40 and a range of 30, accessibility of Google Classroom was categorised into three levels of less than 23: 'not-accessible', 24 to 32 'moderately accessible and 33 and above 'highly accessible'. The extent of accessibility of Google Classroom for University of Ilorin undergraduates' learning was analysed using mean and standard deviation, as shown in [table 4](#).

Table 4. Level of Accessibility of students to Google Classroom for undergraduates' learning

| | N | Minimum | Maximum | Range | Mean | Std. Dev |
|------------------|------|---------|---------|-------|-------|----------|
| USABILITY | 1933 | 15 | 40 | 40 | 28.25 | 3.689 |

As shown in [Table 4](#), a mean of 28.35 indicates that students had a moderate level of access to Google Classroom for University of Ilorin undergraduates' learning.

Research Question 3: What are the challenges of using Google Classroom as an innovative learning approach for University of Ilorin undergraduates' learning?

Responses received were subjected to analysis of percentages to examine the challenges the University of Ilorin undergraduate faced using Google Classroom for learning. A percentage response of 50% and above was indicative of a challenge among the issues raised, as shown in [table 5](#).

Table 5. Challenges of using Google Classroom as an innovative learning approach

| S/N | CHALLENGES | YES (%) | NO (%) | RANK |
|-----|---|------------|-----------|-----------------|
| 1 | The high cost of Internet | 1476(76.4) | 457(23.6) | 6 th |
| 2 | Cost of Devices such as smartphone and laptops | 1255(64.9) | 598(30.9) | 1 st |
| 3 | Difficulty in connecting to the Internet | 1355(69.1) | 598(30.9) | 1 st |
| 4 | Slow network connection | 1546(80.0) | 387(20.0) | 7 th |
| 5 | Erratic power supply | 1360(70.4) | 573(29.6) | 3 rd |
| 6 | Difficulties accessing Google Classroom from the University email | 3378(19.6) | 555(80.4) | 4 th |
| 7 | Need for assistance in turning in assignments | 1588(82.2) | 345(17.8) | 8 th |
| 8 | Need for assistance in commenting Google Classroom | 1702(88.0) | 321(12.0) | 9 th |
| 9 | Ease of Google Classroom | 1447(74.9) | 486(25.1) | 5 th |

As shown on [table 5](#), with a percentage response of above 50%, need for assistance in commenting Google Classroom, and in turning in assignments, slow network connection, high cost of Internet, ease of Google Classroom, erratic power supply, difficulty in connecting to the Internet and cost of devices were challenges of using Google classroom as an innovative learning approach ranking from ninth to first respectively.

Hypotheses Testing

There is no significant difference in Google Classroom's prospects for University of Ilorin male and female undergraduates' learning.

Data on collated on the extent of usability and level of accessibility was transformed to determine the prospects of Google Classroom for University of Ilorin male, and female undergraduates' learning and the generated hypothesis was tested using t-test statistics as shown on [Table 6](#).

Table 6. t-test summary on the significance of prospects of Google Classroom for male and female undergraduates' learning

| Gender | N | Mean | Std. Dev | df | Cal. t | p-value | Decision |
|--------|------|-------|----------|------|--------|---------|----------|
| Male | 827 | 63.46 | 8.8894 | | | | |
| Female | 1106 | 62.33 | 8.287 | 1931 | 2.871 | .00 | Reject |

As shown in [Table 6](#), t calculated value is 2.871 significant at the 0.05 alpha level. The null hypothesis one is rejected since the p-value 0.00 is less than 0.05 alpha level ($0.00 < 0.05$). Thus, the null hypothesis stating that there is no significant difference in the prospects of Google Classroom for University of Ilorin male and female undergraduates' learning is rejected for the alternate hypothesis. Therefore, it means that prospects of Google Classroom for males are significantly different for university of Ilorin undergraduate learning with a mean of 63.46 than their female counterparts with a lower mean of 62.33. Though the group's difference was minimal 1.13 ($63.45-62.33$) due to a large sample size of 1,933; however, literature has been sparse on genders comparison, which is one of the gaps filled by this study.

There is no significant difference in Google Classroom's prospects for University of Ilorin undergraduates' learning across departments.

Data on collated on the extent of usability and level of accessibility was transformed to determine the prospects of Google Classroom for University of Ilorin male, and female undergraduates' learning and the generated hypothesis was tested using Analysis of Variance (ANOVA) statistics as shown on [Table 7](#).

Table 7. ANOVA summary on the significance of prospects of Google Classroom for undergraduate students' learning across departments

| | Sum of Squares | df | Mean Square | F | p-value | Decision |
|----------------|----------------|------|-------------|-------|---------|----------|
| Between Groups | 1327.877 | 8 | 165.985 | 2.273 | .02 | Reject |
| Within Groups | 140495.820 | 1924 | 73.023 | | | |
| Total | 141823.697 | 1932 | | | | |

As shown in [Table 7](#), the F value is 2.273 significant at the 0.05 alpha level. The null hypothesis three was rejected since the p-value 0.02 is less than 0.05 alpha level ($0.02 < 0.05$). Thus, the null hypothesis stating that there is no significant difference in Google Classroom prospects for undergraduate students' learning across departments is rejected for the alternate hypothesis. Duncan Post hoc test was carried out to find the sources of the difference, as shown in [Table 8](#).

Table 8. Duncan's post hoc table on significant prospects of Google Classroom for undergraduate students' learning across departments

| Department | N | 1 | 2 | 3 |
|-------------------------------------|-----|-------|-------|-------|
| Health Promotion | 168 | 61.52 | | |
| Science Education | 346 | 61.98 | | |
| Arts Education | 215 | 62.45 | | |
| Adult and Primary Education Studies | 251 | 62.51 | | |
| Human Kinetics | 128 | 62.96 | | |
| Educational Technology | 433 | | 63.25 | |
| Social Sciences Education | 194 | | 63.39 | |
| Counselor Education | 94 | | | 64.49 |
| Educational Management | 104 | | | 64.62 |
| Sig. | | .082 | .053 | .114 |

Means for groups in homogeneous subsets are displayed.

As shown in Table 8, undergraduates in the Counselor Education and Educational Management departments had the highest mean score of 64.49 and 64.62, respectively showing that this was the subset that brought about the highest significance. Following were students in the departments of Educational Technology and Social Sciences Education with a mean of 63.25 and 63.39 respectively and lastly students in the departments of Health Promotion, Science Education, Arts Education, Adult and Primary Education Studies and Human Kinetics with means of 61.52, 61.98, 62.45, 62.51 and 62.96 respectively. This result connotes those prospects of Google Classroom for students in the departments of Counselor Education and Educational Management are significantly different from their counterparts in other departments. Surprisingly, undergraduates from the Department of Educational Technology were not the group that brings about the major statistical difference. This outcome could be due to personal factors such as funds to afford a smartphone or laptops (Some students used their friend's devices a couple of times), to secure accommodation in areas with relatively stable power supply and internet subscription which could primarily inhibit accessibility.

DISCUSSION

Results showed that Google Classroom for University of Ilorin undergraduates' learning was very useful. This finding is supported by Jamieson-Proctor et al. (2013), who reported that technology-blended instruction contributes immensely to pedagogy, where the application of ICT leads to active learning. This result has enormous implication because the study respondents were trainee teachers. Their pedagogical aspects can be enhanced because learning materials for effective teaching-learning can readily be accessed, an individual can learn at their own pace and space hence it supports new and creative approaches which result in innovation in the teaching-learning process. This submission is linked to the pre-service teachers' needs and systemic developments, which makes them relevant in work. Srivastava & Dey (2018) stressed that a commensurate paradigm shift in Education requires the modern teacher to play digital networkers' role to bring creativity within students as change enablers by using smart tools. Real-time use of smart classrooms can generate technology-powered knowledge exchange which can settle long in students' mind in the upliftment of teaching-learning methodology. Similarly, Lei (2009) emphasised the need for equipping teacher with knowledge of advanced classroom assistive technologies during the teacher preparation programme.

The study also revealed that students had a moderate level of access to Google Classroom for University of Ilorin undergraduates' learning. Matthew (2018) reported that in South Africa, low Internet access or penetration rates had constituted a barrier to education, economic development, and even foreign and local investment. Mourdoukoutas (2019) stressed that while

technology can help bridge inequalities caused by the education gap, E-learning as an innovative instructional strategy that can only grow due to its affordability and accessibility. The study showed that the need for assistance in commenting Google Classroom, and in turning in assignments, slow network connection, high cost of Internet, ease of Google Classroom, erratic power supply, difficulty in connecting to the Internet and cost of devices (Smartphone, Laptops, among others) were challenges of using Google Classroom as an innovative learning approach ranking from first to ninth respectively. This finding is congruent with that of [Odedra et al. \(n.d.\)](#) who reported that Less Developed Sub-Saharan Africa countries share similar technology-related challenges. Such as too much foreign dependence, not enough infrastructure and education Information technology, reliable power supply to operate the computers, a well-functioning telephone network to transmit data, foreign currency to import the technology as well as computer literate personnel. Although it was stressed that while several countries including Kenya, Nigeria, Ivory Coast and Zimbabwe are making some progress, others such as Uganda and Tanzania have lagged far behind ([Diallo n.d.](#); [Odedra et al. n.d.](#); [Githiru, 2018](#)).

The study also revealed that the prospects of Google Classroom as an innovative instructional strategy were significantly higher for male undergraduate than their female counterparts. Though the groups mean, a difference that accounted for the statistically significant difference was meagre. However, there have been inconsistent findings in the literature on genders comparison in terms of practical significance. This finding is in line with [Mourdoukoutas \(2019\)](#) findings, who reported that males living in urban areas with undersea fibres are susceptible to digital technology access in Africa. With women, 50% less likely to use the Internet than men, some organisations are now making efforts to attract women to the digital world. However, the finding is not congruent with [Goswami & Dutta \(2015\)](#) and [Davison & Argyriou \(2016\)](#) that gender differences in technology adoption and use cannot be discerned. This outcome is so as digital technologies can provide women opportunities in the informal job market by connecting them to employment opportunities. The study also revealed that prospects of Google Classroom for undergraduates learning in the departments of Counselor Education and Educational Management are significantly higher from their counterparts in other departments (Health Promotion, Science Education, Arts Education, Adult and Primary Education Studies, Human Kinetics, Educational Technology and Social Sciences Education). It is pertinent to note that building and upgrading educational facilities that do not discriminate along divides is essential for ensuring a safe, non-violent, inclusive and effective learning environment for all ([Ugwuegbe et al., 2018](#)).

CONCLUSION AND RECOMMENDATIONS

The study concluded that while Google Classroom is a useful innovative instructional approach to university undergraduates' learning, there is a need to improve its accessibility to undergraduates if its gains will be maximised by making efforts to alleviate the challenges militating against smooth access. This study is apt in pandemics, which has compelled educational institutions to take to virtual teaching and learning.

IMPLICATIONS FOR POLICY AND PRACTICE

Having established that Google Classroom as an open educational technology resource is prospective for teaching and learning at the higher levels of education, the challenges encountered with the use of Google Classroom call for policy making and implementations by relevant stakeholders as follows:

1. educators should intensify efforts on digital literacy while curriculum experts should see to its national integration;
2. Government on providing subventions for the purchase of ICT devices to students to subsidise the cost of purchase;
3. University administration should provide internet access and relevant personnel for technical student support; and

4. Internet network providers should upgrade their services to mitigate the challenge of slow internet connections to enhance ease of use.

LIMITATIONS OF THE STUDY

This study was limited due to the descriptive survey study design adopted which examines variables at a point in time. A longitudinal study that would enable examination of multiple sets of students could provide more insights into prospects of technology integration to teaching and learning applicable to higher institutions of learning which will go a long way to measuring progress made over time.

POTENTIAL FUTURE RESEARCH DIRECTIONS

This study focuses on technology integration with respect to students who are end users in this study, it is necessary to also examine the lecturers who are deploys the technology in terms of their capacity for online teaching in terms of skills required for online teaching relevant in sub-Saharan Africa characterised with low digital literacy skills. This serves as a potential direction for future research.

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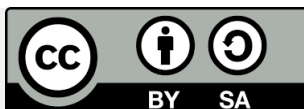
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