AWARENESS, USABILITY AND SELF-EFFICACY OF COLLEGES OF EDUCATION STUDENTS' ON OPEN SOURCE SOFTWARE FOR LEARNING IN KWARA STATE

BY

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Abstract

Open Source Software (OSS) is a collaborative effort by a group or team of developers. Open Soft Software brings about a powerful learning environment, and it transforms the learning and teaching process in which students deal with knowledge in an active and self-directed way. However, over-reliance on conventional methods, lack of awareness, skills, knowledge, among others, are factors militating against the adoption of Open Source Software for learning in Colleges of Education. Hence, there is still more to be dealt with as regards to the awareness, usability and self-efficacy of Colleges of Education students toward Open-Source Software for learning in Kwara State. A descriptive research design of the survey type was adopted for this study, the population for this study were students in Colleges of Education in Kwara State, with 300 respondents from two purposively selected Colleges of Education forming the research sample. A researchers' designed questionnaire was used to collect the data from the respondents, data gathered was analysed using descriptive and inferential statistics; frequency count; pie chart and percentage was used to organize the demographics information. The findings of the study revealed that Colleges of Education students are aware of OSS for learning in Kwara State; the Colleges of Education students are positive toward using OSS for learning in Kwara State; the students have low

self-efficacy in using OSS for learning in Kwara State; a significant difference exists between male and female students' awareness of OSS for learning in Kwara State (df= 298, t= -4.48, p= 0.000); between male and female students, no significant difference exists in their usability of OSS for learning in Kwara State; and a significant difference also exists between male and female students' self-efficacy in the use of OSS for learning in Kwara State (df= 298, t= 2.59, p= 0.05). Based on the findings of this study, the following conclusions were reached. The study revealed that most Colleges of Education students are aware of most open-source software and their potentials in instruction in Kwara State. However, most students are willing to learn how to use open-source software (OSS) for learning.

Keywords: Awareness, usability, self-efficacy, colleges of education, students

Introduction

Education is the light of every nation; without it, the world would be in darkness. It is the basis of scientific and technological breakthroughs and the foundation of morality and modernity. For this reason, all nations of the world accord big priority to it. However, the levels of priority range from one country to another. Education is the key that unlocks personal and national potential development and all kinds of rights and powers. The increasing awareness of the importance of education to the development of the individual and societal standards has awakened in people and nations a conscious effort at devoting their limited resources to acquiring qualitative education (Akindutire & Ekundayo, 2016). One of the most important areas of human activities is education, which determines human development factors. The early 2000s had witnessed an increased emphasis on industrial, scientific and technological advancements because of the apparent effects of science and technology in the future. Scientific methods influence all human interactions and have a fundamental role in the lives of many countries. Moreover, national economic and scientific growth plays a significant role in national development. Therefore, Information Communication Technology (ICT) is central for knowledge economy and intellectual development, especially in emerging societies (Bal-Taştan, Davouid, Mehdi, Mousavi, Masalimova, 2018).

ICT implementation has become widespread when applying for courses, registering courses, taking classes, completing assignments, and communicating with instructors and others. One of the compelling reasons behind ICT implementation in teaching and learning is to enhance the quality of communication and teaching and improve student learning and persistence. One of the most noticeable applications in higher education is Online Learning (OL). Unlike traditional face-to-face learning, which requires students to come to a physical classroom with supervision at a particular time, Online Distance Learning (ODL) utilises ICT. ICT

enables students to pick their favourite time and location and even use their personal computers to access the course content (Sivo & Acharya, 2018). Technology is one of the essential components in the modern educational system, and it should be an instructional facilitator rather than an obstacle to the attainment of the learning outcome. A technological tool becomes a problem when the costs outweigh the benefits of the use of that tool. It is also a problem when it cannot be customised to meet learning requirements when learning focuses on a single viewpoint directed by specific tools. Institutions and individuals use different ICT tools to communicate, create, disseminate, store, and manage information (Yekini, 2014).

More so, the progress of technology has influenced the way we acquire knowledge and learn. The internet provides fast access to information and communication technology in different fields. This, therefore, improves efficiency and saves time. The importance of online education is emphasised in new methods of learning and education. This is particularly important for the 21st-century generation, which derives knowledge from the internet and focuses on quick information search (Szymkowiak, Melovic, Marina, Jeganathan, & Kundi, 2021). Schools use diverse ICT materials and tools to communicate, create, disseminate, store, and manage information. In some contexts, ICT has become an integral part of the teaching-learning interaction, and teachers need to perform their role as creators of the pedagogical environment. Furthermore, with ICT applications, teachers' teaching becomes more attractive to the learners, and learners will learn at any level of their educational programmes (UNESCO, 2019). ICT, as exemplified by the internet and interactive multimedia tools, which are essential for future education. Therefore, they need integration into formal teaching and learning. The terms free software and open-source software (OSS) are used interchangeably serving the same purpose, liberty to run, copy, distribute, alter/modify or improve the software. Free software foundation is the owner of the term "free software" while open source software are managed by Open Source Initiative (OSI). Open source or free software does not mean zero (0) cost or free of cost but it's all about freedom to use, such as (Free Software Foundation, 2013) The term free software and open source software (OSS) are used interchangeably serving the same purpose, liberty to run, copy, distribute, alter/modify or improve the software. Free software foundation is the owner of the term "free software" while open source software are managed by Open Source Initiative (OSI). Open source or free software does not mean zero (0) cost or free of cost but it's all about freedom to use, such as (Free Software Foundation, 2013) The term free software and open source software (OSS) are used interchangeably serving the same purpose, liberty to run, copy, distribute, alter/modify or improve the software. Free software foundation is the owner of the term "free software" while open source software are managed by Open Source Initiative (OSI). Open source or free software does not mean zero

(0) cost or free of cost but it's all about freedom to use, such as (Free Software Foundation, 2013).

Open Source Software (OSS) is software in which the source code is publicly distributed and accessed in a wide geographical area and available at no cost. OSS is a collaborative effort by a group or team of developers. Availability of source code to the user can easily make the software adaptable and useable according to users' requirements. OSS is downloadable and useable for free. The openness of this software makes the availability of source code for modification and improvement. The main advantage which OSS has over others is that it can be easily shared and adjusted. And its low cost makes OSS an excellent development tool for developing countries (Mittal & Singh, 2013). Incorporating technology such as OSS in the classrooms enables educators to craft compelling collaborative learning experiences that support problem-solving skills and flexible thinking. With the strategic integration of content-specific and content-neutral technology, students and teachers can construct learning together in authentic ways that elevate learning (Picha, 2018). Technology is present in all aspects of education. It has been used far beyond enhancing teaching and learning processes, coupled with its elements of accessibility, affordability, effectiveness and efficiency in disseminating knowledge (Ratheeswari, 2018). OSS has many advantages over proprietary software, but most computer users use proprietary or pirated software. Due to less awareness about the benefits and uses of open source software, it is not widely used in many places (Pardeep & Jatinderpal, 2013). Open Source licenses affect the way people can use, study, modify and distribute software. Generally, open Source licenses grant computer users permission to use open OSS for any purpose they wish. Some Open Source licenses can be called "copyleft" licenses, which stipulate that anyone who releases a modified open source programme must also release the source code for that program alongside it. Moreover, some Open Source licenses stipulate that anyone who alters and shares a program with others must also share that program's source code without charging a licensing fee for it (Opensource.com, n.d). Despite these benefits, the acceptance and adoption of OSS in Nigeria pose many issues that need to being addressed. Some of these issues include; awareness, competency, the usage, among others.   Higher education institutions across Nigeria hosted an OSS conference in 2010. They made substantial investments with the hope of harnessing the benefits accruing from their use in educational institutions (Umar, Datti, & Abubakar, 2016). However, several factors which are peculiar to developing countries hinder users from adopting OSS as operational software. From the early 2000s, the computer is one of the basic needs of everyone, from individuals to business organisations, industries, colleges and universities. Everyone uses the computer for their primary purpose. Software (systems and applications) is an essential component of a computer system.

Systems software coordinates the activities and functions of the hardware and various other programmes, while application software is programmes that help users solve particular computing problems. Categories of systems software are the operating system used to harness communication between hardware, system programs, and other applications; device driver that ensures device communication with the OSS and other programmes; and firmware which enables device control and identification. The translator also translates high-level languages to low-level machine codes and the utility that ensures optimum functionality of devices and applications (Amuno, 2019). Application software includes Application Suite, which refers to multiple and related bundled applications for a specific use, such as Microsoft Office (Word, Excel, PowerPoint, OneNote). Content Access Software provides opportunities to access and view content without manipulating it like browsers and media players. Database software is used for an electronic filing system for the information used by various computer programmes. Finally, educational software is designed for teaching or learning, to run tests, track programmes, class sections, registration of courses (Struyk, 2017).

In contemporary education, most people make use of proprietary and pirated software. However, this software is not the best option for the convenience of the users. Proprietary software is expensive, making it not affordable for many people and pirated software is illegal for usage (Mittal & Singh, 2013). The alternative to pirated software is open-source software, which benefits both the rich and the poor, depending on the user's proficiency. However, open-source software is used sparsely in Nigeria because of the less awareness and inability to operate much of it. By design, OSS licenses promote collaboration and sharing because they permit other people to modify source code and incorporate those changes into their projects. They encourage computer programmers to access, view, and modify open-source software whenever they like, as long as they let others do the same when they share their work (Opensource.com, n.d). Buffett (2014) defined OSS as software developed in a generic collaborative manner for any application made available under a license allowing free source code usability, accessibility, reuse, modification, and redistribution to users. He also defined OSS as software created by a community of developers dedicated to producing real innovation and evolving new and better software. It is as well-known as a software development and distribution model where the software license guarantees individual freedoms. This freedom includes the right to access, download, and modify the source code and reuse and redistribute the software without constraint or high cost. Teacher education refers to the professional training of teachers in achieving attitudes, skills and knowledge considered desirable to make them efficient and effective in teaching, based on the need of a given society at any point in time. It includes training and or education occurring before the commencement of service (pre-

service) and in-service teachers for those already in the teaching profession. Every human society requires adequate human and material resources to elevate the social organisation, preserve the culture, enhance economic development and reform the political structures (Ogunyinka, Okeke, & Adedoyin, 2015). There is a need for proper implementation of strategies and programmes so that ICT's contribution to teacher training manifests in quality student output. It is necessary to devote special attention to integrating e-learning into the training process, applying digital tools, and developing teacher competencies through ICT. The use of technological devices such as ICT for teaching and learning processes should be assessed by the universities to investigate the extent of usage and outcome for improving the quality of education in society (Badarch, 2011).

 ICT is an essential part of the contemporary educational world as teachers, students, administrators, and every person uses it. ICT is used for making the teaching-learning process easy and exciting. So, teachers require ICT skills and competencies for higher productivity. Therefore, pre-service and in-service student teachers need the expertise of ICT during their training programme. This integrated technological knowledge would help prospective teachers know the world of technology and transform their classroom and administrative responsibilities. Besides, student teachers must see ICT use in their subjects for active student learning (Bhattacharjee & Deb, 2016). The use of technology in education has not been new, but the coronavirus outbreak brought a new life to the already existing process of digital education. Coronavirus proved to be a blessing in disguise for the development of digital education. Lots of software applications and mediums were launched to maintain continuity in the regular education and learning processes. The world has entered into an information age and development in ICT, which has opened up new and cost-effective approaches for providing the reach of higher education to the youth. It also provides reach for those who need continuing education for meeting the demands of the explosion of information, the fast-changing nature of occupations and lifelong education (Tillaev, 2020).

The keen awareness and understanding of the term OSS generally vary; many countries and institutions do not have official policies on OSS. As a result, some OSS usage levels are evident in each country. However, levels of use vary from institution to institution. Research has revealed that almost all governments have signed licence agreements with proprietary software companies, but some are beginning to consider other solutions in response to economic pressure. Therefore, there is a need to set aside educational budgets for developing OSS in various levels of education (Amuno, 2019). Self-efficacy is the belief about your proficiency and susceptibility to do a task or cope with environmental needs. In this research context, self-efficacy means a person's self-evaluation of their ability to overcome the demands of work conditions. From the perspective of social cognitive theory, it

refers to human agency mediated by an individual's level of self-efficacy. Self-efficacy belief impacts the person's emotional state, choices, efforts and resilience when facing any challenging situation (Taştan, Davoudi, Masalimova, & Bersanov, 2017).

Self-efficacy creates collective efficacy, which influences the whole school system; having high self-efficacy, teachers would be more efficient in providing a climate for learning. The teacher has essential roles in managing the classroom, enhancing the students to find the tasks more meaningful, and implementing active learning strategies (Taştan, Davoudi, Masalimova, & Bersanov, 2017). Ultimately, teachers with high self-efficacy tend to use more interactive teaching methods and utilise contemporary instructional methods. Teacher's self-efficacy has been defined as a teacher's evaluation of their abilities to enable desired outcomes of student-engagement learning and performance. Based on the implications of social cognitive theory, teachers' self-efficacy beliefs impact effective teaching behaviours and performance levels of students. Research studies have established that teachers' opinions about their competence and potential to teach students significantly impact student's achievement. It is also suggested that the teacher's self-beliefs, including self-efficacy, have crucial roles in the classroom environment and the effectiveness of student learning. On the other hand, teacher's self-efficacy will impact students and the entire school organisational system (Taştan, Davoudi, Masalimova, & Bersanov, 2017).

The use of the internet in teaching and learning has taken over the attention of both teachers and students. OSS is becoming popular among students in higher institutions. It has offered new opportunities for creating and sharing interaction avenues between teachers and students. The influence of OSS has grown over the last decades, and it is argued that OSS software can be more reliable and perform better than proprietary software. OSS encompasses many projects, from the highly technical Linux Kernel, supporting operating systems like Ubuntu, Fedora and Debian, to end-user applications like Android, Wikipedia, and business solutions like Open Office and the GIM (Kuechler, Gilbertson, & Jensen, 2012). Usability can be described as the capacity of a system to provide a condition for its users to perform the tasks safely, effectively and efficiently while enjoying the experience. Perceived ease of use is the degree to which an individual believes that using a particular system can improve their performance. Perceived usefulness is the ability of an individual to assess and derive satisfaction from a specific thing or phenomenon. Meanwhile, user's perception of the usefulness or benefits of technology derives from several factors, like the use of technology can increase productivity, performance, and efficiency (Danurdoro & Dwi, 2016).

Perceived ease of use is an individual's perception that using the new technology will be free of effort. Applying this context to online shopping, ease of use refers to consumers' perceptions that shopping on the internet will require minimum effort. It means consumers' perceptions regarding the outcome of the online shopping experience and perceived ease of use apply to their perceptions of the process leading to the final online shopping outcome (Cho, 2015). Perceived usefulness is how effective a product is in helping users accomplish their tasks, and perceived ease of use is how easy the product is to use as a medium. According to the TAM, perceived ease of use has a dual effect, direct and indirect, on consumers' intention to shop online. The indirect effect on intention occurs through perceived usefulness because the more comfortable a technology is to use, the more useful it can be. An application perceived to be easier to use than another is more likely to be accepted by the user.

Contemporary institutions and individuals in the education industry use application software for several purposes. First, lack of funds has made it practically impossible for individuals to possess the required patented software, particularly in developing countries. Open Source Software (OSS) provide an opportunity to acquire relevant software without additional cost to the individual or institution. Second, educational institutions allow students to learn computing concepts instead of just learning about products and providing affordable computing for their homes. Third, they offer the opportunity to customise and reuse software and extend the life of old hardware. Finally, skilful and talented people create them; these are experts who share source codes and strive to build programmes that will earn the admiration of their peers and hopefully make a difference in the world.

The OSS helps users become more flexible without being tied to a proprietary product. They do not need to abide by a specific IT architecture requiring software and even hardware upgrades. (Ayres, 2018; Bhura, 2019). Despite the potential of OSS to promote openness, collaboration and interactive knowledge sharing within the educational sector (Oduor, Honkavuori, & Pasma, 2012), open-source software, teacher educators and student teachers in the Nigerian educational institutions rarely use them. As a result, the low adoption rate of open source software hinders Nigerian society from reaping its benefits (Umar, Datti, & Abubakar, 2016). Furthermore, there seems to be a shortage of information on OSS applications by student teachers. None of the studies known to the researcher specifically addressed the adoption of OSS by student teachers in Nigeria.

Furthermore, most studies on OSS adoption in education were carried out outside Nigeria, as in India (Gupta & Surbhi, 2018) and Oman (Al-Hajri, Al-Mukhaini, & Ramalingam, 2017). This study aimed at addressing these gaps in practices and

research related to OSS adoption in Nigeria. This study, therefore, investigated Colleges of Education student's awareness, usability and self-efficacy of open source software in Kwara State.

Purpose of the Study

The main purpose of this study was to examine the awareness, usability and self-efficacy of open source software for learning among Colleges of Education students in Kwara State. Specifically, the study:

1. examined the awareness level of students on open-source software;
2. investigated the usability of open-source software among Colleges of Education students for learning;
3. determined the students' self-efficacy in the use of open-source software for learning;
4. investigated gender influence on Colleges of Education students' awareness on open-source software for learning;
5. investigated the gender influence on Colleges of Education students' usability of open-source software for learning; and
6. examined the gender influence on Colleges of Education students' self-efficacy on open-source software for learning in Kwara State.

Research Questions

Based on the stated purposes, this study provided answers to the following research questions:

1. What is the level of awareness of Colleges of Education students on OSS for learning?
2. What is the level of usability of Colleges of Education students on OSS for learning?
3. How do Colleges of Education students rate their self-efficacy in the use of OSS for learning?

Research Hypotheses

The following null hypotheses were tested in this study at 0.05 level of significance.

Ho_1: There is no significant difference in male and female Colleges of Education students' awareness of OSS for learning.

Ho_2: There is no significant difference between male and female Colleges of Education students' usability in OSS for learning.

Ho_3: There is no significant difference in male and female Colleges of Education students' self-efficacy in using OSS for learning.

Methodology

The researcher adopted descriptive research design of the survey type for the conduct of this study. The research involved collecting quantitative information using a validated questionnaire filled by students to describe their awareness, usability and self-efficacy, on open-source software for instruction. The data collected using the questionnaire was statistically analysed using descriptive and inferential statistical tool. The population for this study were students in all Colleges of Education in Kwara State. The target population were NCE 3 students in the selected Colleges of Education. Multistage sampling techniques was adopted; purposive sampling technique was used to select two Colleges of Education from where the student samples were drawn based on their ownership. More so, the proportional sampling technique was employed to select the sampled respondents from each participating Colleges of Education based on their population using the Research Advisor sample size table at 0.05 margin error. Finally, a simple random sampling technique was used to select 300 respondents from sampled Colleges of Education.

Table1
List of Colleges of Education in Kwara State, Students' Population and Sample Size

S/N	Colleges of Education	Students Population	Sample Size	
1	COE A	785	157	
2	COE B	715	143	Total
	1500	300		

Source: Registrars' Office of Respective Institutions, (2023).

A researcher-designed questionnaire titled "Students' Awareness, usability and Self-Efficacy of Open Source Software" was used to collect data for the study. The questionnaire has five major sections, A–D. The Section A of the questionnaire elicited information on the respondents' biodata, institution's name, course of study, and gender. Section B of the instrument elicited responses on awareness of open source software by students. The section has 13 items on the categories of OSS, with four-point Likert Scale response options of Extremely Aware (EA) (3), Very Aware (VA) (2), Slightly Aware (SA) (1), and Not at All-Aware (NA) (0). More so, section C focused on the students' Usability in using OSS for instructional purposes. The section is made up of 10 items also with four-point Likert Scale response options of Strongly Agree (SA) (4), Agree (A) (3), Disagree (D) (2), and Strongly Disagree (SD) (1). Section D of the instrument elicited information on Colleges of Education student's self-efficacy of using OSS for instructional purposes. The section is also made up of 10 items with four-point Likert Scale response options of Strongly Agree (4), Agree (3), Disagree (2), and Strongly

Disagree (1). The final section. The questionnaire was subjected to face and content validity to check the arrangement of items and questionnaire items if they are in-line with the major purposes of the research and the reliability valve on the instrument was given as 0.79. The data obtained using the administered questionnaire were analysed using descriptive and inferential statistics. Frequency count, percentages, and bar charts were used to organise the respondents' demographic information; frequency counts and percentages were used to answer research questions one, two, and three. The three hypotheses were tested using independent t-test at 0.05 significant level.

Results

Table 1

Distribution of the Respondents according Gender

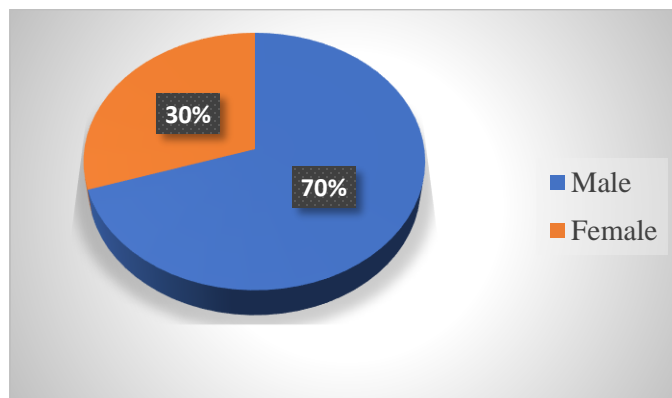| Gender	Frequency	Percentage
Male	210	70%
Female	90	30%
Total	300	100.0

Figure 1: Pie Chart on Gender

Table 2, indicated that 210 respondents representing 70% were male while 90 respondents representing 30% were female. Therefore, it implies that the majority of the respondents were male.

Research Question One: What is the level of awareness of students on OSS for instruction?

In other to assess students' level of awareness on OSS for instruction, data were collected from respondent based on items that expressed their level of awareness

using Frequency and Percentage Distribution of Students Awareness of Open Source Software for Learning

Table 3

Respondents' opinions on Colleges of Education students' awareness of open-source software for learning in Kwara State.

S/N	Statement	NA F %		SA F %	VA F %	EA F %
1	I have heard of open source software (OSS)	60	20.0	60 20.0	70 23.3	110 36.7
2	I have heard of open Source Operation System (OS) Software like Linus, OpenBSD, FreeBSD, etc.	10	3.3	80 26.7	60 20.0	150 50.0
3	Open Productivity Software like Apache OpenOffice; Libre Office; KOffice; etc,	40 13.3		60 20.0	60 20.0	140 46.7
4	Cloud-based Productivity Software like Google Doc.; Dropbox, Zoho CRM; Wave Accounting; etc.,	70 23.3		60 20.0	60 20.0	110 36.7
5	Subject Specific Applications Software like Google Earth (Geography); GrapgCal, Visual Maths (Mathematics);	50 16.7		40 13.3	70 23.3	140 46.7

S/N	Statement	NA F %		SA F %	VA F %	EA F %
	Kalsium (Chemistry); Argumentative (Debate/Logic), Step (Physics) BibleTime, eZikr (Religion), etc.					
6	Web Conferencing Software that supports the online learning facility like BigBlueButton. OpenMeetings, ezTalks Cloud Meeting, etc.	60 20.0		50 16.7	60 20.0	130 43.3
7	School Report Authoring Software for student demographics, like gradebooks, scheduling, attendance, and more, like Open Source Student Information System(openSIS); ClaSS	60	20.0	30 10.0	90 30.0	120 40.0
8	OSS for cataloguing (movie, video, books, images) and Free multimedia Software: like Datacrow,	40	13.3	50 16.7	140 46.7	70 23.3

S/N	Statement	NA F %	SA F %	VA F %	EA F %
	SoftCAT; inFlow; Zotero; LibreOffice Base, (viewing, organizing, and editing pictures); like Picasa VLC media player; Inkscape (creating and editing vector images), etc.				
9	OSS for cataloguing (movie, video, books, images): like Datacrow, SoftCAT; inFlow; Zotero; LibreOffice Base, etc.	30 10.0	70 23.3	50 16.7	150 50.0
10	e-Learning Software and Open source instant messaging software: Moodle, eFront, Google Classroom, (chatting, video calling, video conferencing) like Wire Messenger; Linphone; Signal Messenger; Delta Chat; Q-municate	50 16.7	130 43.3	50 16.7	70 23.3

Table 3, showed the respondents' opinions on Colleges of Education students' awareness of open-source software for learning in Kwara State. In all, 180 respondents representing 60% agreed that they are aware of OSS; conversely, 140

respondents representing 40% were not aware. Therefore, it indicated that the majority of the student are aware of OSS for learning in Kwara State. Also, 210 respondents representing 70% are aware of OSS like Linus, OpenBSD, FreeBSD, while 90 respondents representing 30%, are not aware. A total of 110 respondents represent 70% are aware of Subject Applications Software like Google Earth (Geography) and Visual Maths, while 90 respondents are not aware. Therefore, most respondents are aware of OSS like Google Earth, Grapgcal and Visual Earth. 190 respondents representing 63.33%, are aware of Web Conferencing Software that supports online learning, while 110 respondents representing 33.67%, are not aware. Therefore, it indicated that most respondents are aware of e-learning software and open source instant messaging software like Wire Messenger, Linphone, Signal Messenger, Delta Chat, Q-municate for learning in Colleges of Education in Kwara State.

Research Question Two: What is the level of usability of Colleges of Education on OSS for learning?

Table 4

Frequency and Percentage Distribution of Students Perceived Ease of Use of Open Source Software for Learning

S/N	Statement	SA F	SA %	A F	A %	D F %	SD F %
1	I think that I could easily learn how to use any open-source software for my learning.	130	43.33	110	36.7	50 16.7	10 3.3
2	I would find the information I am looking for using open-source software.	120	40.0	100	33.3	70 23.3	10 3.3
3	I would find it easy to use open-source software for my learning.	120	40.0	100	33.3	60 20.0	20 6.7
4	My interaction with open source software would be clear and understandable	110	36.7	110	36.7	70 23.3	10 3.3
5	I would find open-source software to be flexible to interact with.	110	36.7	100	33.3	80 26.7	10 3.3

S/N	Statement	SA		A		D		SD	
		F	%	F	%	F	%	F	%
6	It would be easy for me to become skilful at using open-source software for my learning	120	40.0	90	30.0	90	30.0		
7	I will find it easy to apply the use of free, open-source software in my class.	120	40.0	80	26.7	90	30.0	10	3.3
8	I would find it easy to use open-source software to track my learning progress.	110	36.7	90	30.0	100	33.3		
9	I would not be frustrated when using open source software for learning.	130	43.3	80	26.7	80	26.7	10	3.3
10	I enjoy learning how to use new kinds of technology, so I will naturally enjoy the use of open-source software for learning	120	40.0	90	30.0	90	30.0		

Table 4, showed the results of the level of Colleges of Education students usability of open-source software for learning in Kwara State. A total number 240 respondents representing 80% agreed they could easily learn how to use any OSS for learning, while 60 respondents representing 20% disagreed. Thus, it indicated that the students are ready to use OSS for learning in Kwara State. Two hundred twenty respondents representing 73.33%, agreed that they would find the information they are looking for using OSS, while 80, representing 26.67%, disagreed. Two hundred twenty respondents representing 73.33%, agreed that they find using OSS for learning easy. A total of 220 respondents representing 73.33%, agreed that their interaction with OSS would be clear and understandable, while 80 respondents representing 26.67%, disagreed. Likewise, 210 respondents representing 70% agreed that they would find OSS flexible to interact with, while 90 respondents representing 30% disagreed. Two hundred ten respondents representing 70% agreed that they would become skilful using OSS for learning, while 90 respondents representing 30% disagreed. Also, two hundred respondents representing 66.67% agreed that they would find it easy to apply free OSS in the

class, while 100 respondents representing 33.33% disagreed. Two hundred ten respondents representing 70% agreed that they enjoy learning how to use new kinds of technology for learning, while 90 respondents representing 30%, disagreed.

Research Question Three: How do students rate their self-efficacy in adopting OSS for instruction?

Table 5

Frequency and Percentage Distribution of Pre-service Teachers Self-Efficacy of Open Source Software for Learning

S/N	Statement	SA		A		D		SD	
		F	%	F	%	F	%	F	%
1	I feel confident that I understand free and open-source software (OSS) well enough to maximise their use in my learning	70	23.3	100	33.3	90	30.0	40	13.3
2	I am confident of my ability to evaluate OSS software for teaching and learning	50	16.7	100	33.3	140	46.7	10	3.3
3	I feel self-assured that I have the skills necessary to use OSS software for instruction.	40	13.3	110	36.7	120	40.0	30	10.0
4	I will generally teach my subject content effectively using OSS software.	40	13.3	120	40.0	130	43.3	10	3.3
5	I am sure I can develop creative ways to cope with patented software constraints (lack of funds) and continue to teach effectively with OSS software	60	20.0	80	26.7	130	43.3	30	10.0
6	I can help students when they have difficulty with the OSS software use in my classroom	40	13.3	110	36.7	130	43.3	20	6.7
7	I feel confident that I can mentor my students in the appropriate use of OSS	70	23.3	90	30.0	90	30.0	50	16.7

S/N	Statement	SA		A		D		SD	
		F	%	F	%	F	%	F	%
	software to learn their subjects.								
8	I feel confident that as time goes by, my ability to address my students' needs for learning using OSS software will continue to improve.	110 36.7		60 20.0		120 40.0		10 3.3	
9	I will be responsive to students' learning needs during teaching using OSS software.	70 23.3		100 33.3		110 36.7		20 6.7	
10	I feel confident about selecting appropriate OSS technology resources and software products to improve my teaching and learning.	80 26.7		110 36.7		100 33.3		10 3.3	

Table 5, revealed the respondents' opinions on Colleges of Education students self-efficacy of open source software for learning in Kwara State. One hundred twenty-five respondents representing 43.67%, agreed that they understand OSS well for learning while 175 respondents representing 56.33%, disagreed. It indicated that most students don't understand OSS well for learning in Kwara State. 150 respondents representing 50% agreed that they have the skills to use OSS software for learning, while 150 respondents representing 50% disagreed. In addition, one hundred forty respondents representing 46.67%, agreed that they could develop creative ways to cope with patented software constraints and continue to teach with OSS software, while 160 (53.33%) respondents disagreed. A total of 150 respondents representing 50%, agreed that they could help students when they have difficulties with OSS software, while 150 respondents representing 50%, disagreed. One hundred and sixty respondents representing 53.33%, agreed that they could mentor students in the appropriate use of OSS software to learn their subjects, while 140 respondents representing 46.67%, disagreed. One hundred seventy respondents representing 56.67%, agreed that they feel confident at times goes and have the ability to address students' needs for learning using OSS software, while 130 respondents representing 43.33%, disagreed. A total of 170 respondents representing 56.67%, agreed that they would be responsive to students need during teaching using OSS software, while 130 respondents representing 43.33%, disagreed. One hundred and ninety respondents representing 63.33%, agreed that

they feel confident in selecting appropriate OSS software to improve their teaching and learning, while 110 (36.67%) respondents disagreed. Therefore, it indicated that students could use OSS software for learning in Kwara State.

Hypothesis One: There is no significant difference in the students' awareness of OSS for instruction based on gender.

Table 6

Influence of Gender on Students Awareness on OSS for Instruction in Kwara State

Variable	N	x̄	SD	df	t-cal.	Sig
Male	210	3.00	0.98	298	-4.48	.000
Female	90	3.56	0.69			

Table 6 revealed that the male students had a lower mean awareness value (x̄ = 3.00, ± 0.98) compared to female students with mean value (x̄ = 3.56, ± 0.69), resulting in t-test result, t (298) = -4.48, p> 0.05. The results imply a significant difference between male and female students' awareness of OSS for learning in Kwara State favouring female students. The hypothesis that there is no significant difference between male and female students' awareness of OSS for learning in Kwara State is rejected. The implication is that there was a significant difference between male and female students' awareness of OSS for learning in Kwara State.

Hypothesis Two: There is no significant difference in the students' usability OSS for instruction based on gender.

Table 7

Influence of Gender on Colleges of Education Students' usability of OSS for Learning in Kwara State

Variable	N	x̄	SD	Df	t-cal.	Sig
Male	210	1.76	0.92	298	-1.21	0.23
Female	90	1.89	0.56			

Table 7 revealed, male respondents had lower scores in perceived ease of use of OSS as they had (x̄ = 1.76, ± 0.92) compared to female students with mean value (x̄ = 1.89, ± 0.56), with t-test results, t (298) = -1.21, p>0.05. Although female respondents had a higher mean score, there was no significant difference between male and female students' perceived ease of use of OSS for instruction in Kwara

State, as the significant value of 0.23 is higher than the established alpha value of 0.05. Therefore, the hypothesis that there is no significant difference between male and female students' perceived ease of use on OSS for instruction in Kwara State is not rejected. The implication is that there was no significant difference between male and female students' perceived ease of use of OSS for instruction in Kwara State.

Hypothesis Three: There is no significant difference in the students' self-efficacy of OSS for instruction based on gender.

Table 8

Influence of Gender on Colleges of Education students Self-Efficacy on OSS for Instruction in Kwara State

Variable	N	x̄	SD	Df	t-cal.	Sig
Male	210	2.43	0.96	298	2.59	0.01
Female	90	2.11	0.99			

Table 8 revealed, that male respondents had higher self-efficacy score related to OSS in instruction, they had ($\bar{x}$ = 2.43, $\pm$ 0.96) compared to female students with mean value ($\bar{x}$ = 2.11, $\pm$ 0.99), with t-test results, t (298) = 2.59, p>0.05.   The results in this table imply a significant difference between male and female students' self-efficacy on OSS for instruction in Kwara State, favouring male students. Therefore, the hypothesis that there is no significant difference between male and female students' self-efficacy on OSS for instruction is rejected. Therefore, implying a significant difference between male and female students' self-efficacy on OSS for instruction in Kwara State.

Summary of Findings

The followings are the summary of findings from this study:
1.   the Colleges of Education students are aware of OSS for learning in Kwara State;
2.   the Colleges of Education students are positive toward using OSS for learning in Kwara State;
3.   the students have low self-efficacy in using OSS for learning in Kwara State;
4.   a significant difference exists between male and female students' awareness of OSS for learning in Kwara State (df= 298, t= -4.48, p= 0.000);
5.   between male and female students, no significant difference exists in their usability of OSS for learning in Kwara State; and

6.   a significant difference also exists between male and female students' self-efficacy in the use of OSS for learning in Kwara State (df= 298, t= 2.59, p= 0.05);

Discussions

This study investigated Colleges of Education students' awareness, usability and self-efficacy of using open-source software for learning in Kwara State. Findings related to students' awareness of OSS for learning in Kwara State indicated that the majority of the respondents were aware of most of the OSS and their potentials for use in education. The general awareness was above average, and specific awareness OSS for Operating Systems, course-specific applications, and general education was equally high. However, the majority of respondents are aware of cloud-based storage Dropbox, Google Drive and Microsoft OneDrive. They are also aware of productivity software like Google Docs, Zoho CRM and others. These findings agree with the findings of Pezer, Lazić, and Odak (2017) in Croatia on teachers' awareness of free and open software for learning.

The study further revealed that the students are confident using OSS for learning in Kwara State because they feel assured of having the skills necessary to use OSS software for learning. In addition, they have the confidence to teach subject content effectively using OSS, also feel confident that as time goes by, they will have the ability to address students need for learning using OSS. The difference in the students' awareness, usability and self-efficacy of use of OSS for learning in Kwara state was such that awareness, self-efficacy, and perceived ease of use greatly impact the use of OSS for instruction among the students.

Conclusion

Based on the findings of this study, the following conclusions were reached. The study revealed that most Colleges of Education students are aware of most open-source software and their potentials in instruction in Kwara State. However, most students are willing to learn how to use open-source software (OSS) for learning, which is exciting. Furthermore, most students are ready to effectively use OSS for learning in Kwara State, which shows a positive progression in accepting educational innovations. The study also revealed that most of the respondent students had low scores in their self-efficacy regarding the use of OSS for learning. This can be seen in their responses to productivity and cloud-based open-source software.

Recommendations

Based on the findings of this study, the following recommendations were made:

1.   The institutions should create awareness among the students on using OSS for learning in their institutions by organising orientation programmes where the students will be trained on how to use OSS for learning.

2. The institutions should make the OSS resources available and accessible to the students to aid their knowledge for the delivery of instruction in the universities in Kwara State
3. The students should adequately use the OSS available in the institutions and ensure that their environment is conducive at all times.
4. Students should be encouraged to use the available OSS for both their instruction and research leading to the presentation of quality conference papers and journal publications for their career advancement.
5. The female students should be inspired on awareness of OSS for learning
6. Female students should be encouraged to acquire the skills and knowledge necessary to use OSS for learning.

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