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LECTURERS' ENGAGEMENT OF OPEN SOURCE SOFTWARE (OSS) FOR LEARNING IN UNIVERSITY OF ILORIN, ILORIN, NIGERIA

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Abstract
The growth and development of education is associated primarily with the use of ICT, whereas, the evolution of the Information and Communication Technology (ICT) gives birth to Open Source Software (OSS), a product of instructional delivery. The research was of descriptive research of the survey type and the population for the study consisted of 300 with 125 male and 175 female lecturers in university of Ilorin, Ilorin, Nigeria. The research instrument was researchers' designed questionnaire titled lecturers perceived ease of use of Open Source Software. The validation of the instrument was done by researchers' colleagues and two lecturers in faculty of education, University of Ibadan. While, the reliability, was pilot-tested on 20 lecturers at the Obafemi Awolowo University, Ile – Ife, Nigeria with Cronbach's Alpha and the values were 0.73 and 0.67 respectively, the instruments were randomly given to the lecturers, and the data obtained were analysed using the descriptive and inferential statistics. Findings revealed that lecturers were positive on the use of the OSS and it was recommended that there should be continued use open source for learning.

Keywords: content and instructional delivery, information and communication technologies (ICTs), online learning, open-source software, teaching-learning

Introduction
Education gives light to world, without education world would have been in complete darkness. Education is the starting point of scientific and technology. Also, the foundation of principle that brought lasting survival and uphold the globe (Akindutire & Akundayo 2012). Bal-Taştan, Davoudi, Masalimova, Bersanov, Kurbanov, Boiarchu and Pavlushin (2018) declared that advancement in technology, industrial, scientific in the world, today and the future are product of education. Therefore, ICT is central for knowledge economy and intellectual development, especially in emerging societies.

"The implementation of information and communication technologies (ICTs) has become widespread for applying for courses, registering courses, taking

classes, to composing assignments and communicating with instructors and others with the same character. One of the cogent reason behind the implementation is the expectation of enhancing the quality of communication and teaching and improving student learning and persistence. One of the most noticeable implementations 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, OL utilises ICTs, enabling students to pick their favourite time and location, and even use their personal computers to access the course content" (Sivo, Ku, & Acharya, 2018).

"Technology is one of the essential components in today's educational system, and it should be an instructional facilitator rather than an obstacle to the attainment of the learning outcome. Technological becomes a problem to the user when the costs outweigh the benefits for the use of that tool. It is also a problem when it cannot be customised to meet learning requirements in learning concentrated on a single viewpoint directed by the use of specific tools. Institutions and individuals use different types of Information and Communication Technology (ICT) tools to communicate, create, disseminate, store, and manage information" (Yekini, 2014).

"ICT has also become integral to the teaching-learning interaction, through such approaches as replacing chalkboards with interactive digital whiteboards, using students' smartphones or other devices for learning during class time. The "flipped classroom" model is an example where students watch lectures at home on the computer and use classroom time for more interactive exercises. ICT is a robust collection of elements which includes computer hardware, software, telecommunication networks, workstations, robotics and smart chips, and they are as well known to be the foundation of information systems" (Yekini, 2014).

"Schools make use of a diverse set of ICT materials and tool to communicate, create, disseminate, store, and manage information. In some contexts, ICT becomes integral to the teaching-learning interaction, through such approaches as replacing chalkboards with interactive digital whiteboards. Students use smartphones or other devices for learning during class time, and the flipped classroom model where students watch lectures at home on the computer and use classroom time for more interactive exercises" (UNESCO, 2019).

The source code of open-source software is available in a wide geographical area. Open-source software is a collaborative effort by a group, or team of developer, availability of source code to the user can easily make the software modifiable and useable according to requirement. Open Source Software (OSS) is downloadable and useable for free. The openness of this software makes the availability of the source code for modification and making a difference. The main advantage which OSS has over others is the advantage of sharing, ease of modification and less cost makes OSS an excellent development tool for developing countries (Mittal & Singh, 2013).

"Incorporating technology in classrooms enables educators to craft compelling collaborative learning experiences that support problem-solving and flexible thinking. With the strategic integration of both content-specific and

content-neutral technology, students and teachers can construct learning together in authentic ways that elevate learning" (Picha, 2018).

Open-source software is software whose source code is distributed publically in a wide geographical area and available to users at no cost. Open-source software is a collaborative effort by a group or team of developer. Because of the availability of source code, one can easily modify and use it according to requirements. Open-source software has many advantages over proprietary software, but still, most of the computer user uses proprietary or pirated software. Due to less awareness about the benefits and uses of open source software, it is not used widely in many places (Pardeep & Jatinderpal, 2013).

OSS is often similar to a software called 'proprietary software' because users have neither access to the source code nor the right to copy, modify or distribute their code. "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 source software for any purpose they wish. Some open-source licenses can be called "copyleft" licenses, which stipulate that anyone who releases a modified open source program 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 questions which need to answer. Higher education institutions across Nigeria hosted an OSS conference in 2010 made substantial investments with the hope of harnessing the benefits accruing from their use in educational institutions (Umar, Datti, & Abubakar, 2016). Several factors which are peculiar to developing countries hinder users from adopting OSS as operational software. Presently, the computer is one of the basic need of everyone. From an individual to business organisations, industries, colleges and universities, everyone uses the computer for their primary purpose. Software (systems and application) is an essential component of a computer system. Systems software coordinates the activities and functions of the hardware and various other programmes, while the application software is programmes that help users solve particular computing problems. Systems software is categorised as "the operating system used to harness communication between hardware, system programs, and other applications; device driver that ensures device communication with the OS and other programmes; and firmware which enables device control and identification. There is also the translator which translates high-level languages to low-level machine codes, and the utility which 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, etc.). Content Access Software used to access and view content without manipulating it like browsers and media players, database software used for an electronic filing system for the information used by various computer programmes. Educational software

designed for teaching or learning, to run tests, and track programmes (Struyk, 2017).

In this era, most of the people make use of proprietary and pirated software. This software is not the best options for the convenience of the users. Proprietary software is expensive, which makes it not affordable by many people and pirated software is illegal for usage (Mittal & Singh, 2013). The alternative to this software is open-source software.

"By design, open-source software licenses promote collaboration and sharing because they permit other people to make modifications to 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) defines that "open source software as software developed in a generic collaborative manner, for any application, and available under a license allowing free source code usability, accessibility, reuse, modification, and redistribution for users. He also defined it as software created by a community of people dedicated to collaborating to produce real innovation and allow the evolution of new and better software. It is as also known as a software development and distribution model where the software license guarantees certain freedom. This freedom includes the right to access and modify the source code and to reuse and redistribute the software without constraint or excessive cost" (Buffett, 2014).

Bianco (2011), observes that "open source software is no longer the product of lone coders and that of industrial-strength. Developed of open-source software is by organised communities and sometimes even by major software companies applying the same rigorous processes and high-quality standards as commercial products. Generally speaking, the strength of open source lies in its no license costs, interoperability, easier integration and customisation, compliance with open technology and data standards and freedom from vendor lock-in. Studies have shown that the benefits of open source generally materialise in the medium to long term. Furthermore, because open-source software is free, there is greater flexibility in selecting the level of services or support that a customer wants to pay for, if at all" (Danurdoro & Wulandari, 2016).

Santos, Kuk, Kon and Pearson (2013) stressed that OSS provides the source code and users free access to product made, modify and update the versions of the new product code. Abdalla (2014) argued that increment in the use of information technology and the spread of Internet brings about a great opportunity for instructional delivery with a significantly low cost. In other words, Anjaneyulu, Biradar, Gopinath and Naik (2017) mentioned that the history has it that OSS started with the arrangement of Richard Stallman in 1985 to support the Free Software Foundation movement that promotes the general freedom to study, create, distribute, and modify computer technology software via the General Public Licence. Since then, Open source software (OSS) has turn into an international occurrence that permits researchers around the globe to share information and ability on every day basics exclusive of barriers. FOSS is an

idea and exercise of creation a program source code widely available to people to use (Abdalla, Shanmugam & Dehghantanha, 2013; Vijay & Tyagi, 2014; Stella & Ravichandran, 2017).

In another development, information communication technology can provide adequate means of given education sector by modified both content and instructional delivery to meet learners' needs However, the costs of these technologies and the acquiring of the software, is a barrier facing the technology in implementing Free and Open Source Software (FOSS) (Thankachan & Moore, 2017). According to the study by Mittal and Singh (2013), underutilised of OSS due to it's a lesser amount of awareness to common man is a major problem of OSS. In the same vein, Sharma and Adkins (2006) stated that lack of support in term of the staff is also challenge to adoption of FOSS in India. Similarly, Howard and Mozejko (2015) stated that the struggle for change during implementation is also inclusive in the challenges.

Many studies have confirmed the efficacy of FOSS in the following disciplines, for example, Library Services (Giri & Sengar, 2011), Engineering (Teel, Schweitzer & Fulto, 2012; Kumar & Rabindra, 2012). Electronics Engineering (Nehra & Tyagi 2014), Water Resource Management (Borsi, Foglia, Cannata, Vázquez-Suñé, Mehl, Filippis, Criollo, Ghetta, Cardoso, Velasco, Neumann, Toegl, Serrano, Riera & Rossetto, 2017). Businesses; Institutions (Robbins, Korkmaz, Calderón, Kelling, Shipp & Keller, 2018).

More so, many studies have stated the ease of use of FOSS in learning. For example, Teel, Schweitzer and Fulto (2012) examined the tools, and the integration to the course, student's reactions, our experience through open source software among the undergraduate students, the study concluded with the benefits realised in comparing with those in the corporate world also, in addition to the gain from educational environment. Also, the standard development tools as well as the production environments were in favour of the teams. And the instructor always available and provide assistance to students. Likewise, Pankaja and Raj (2013) examined the pros and cons in relating to the use of OSS and proprietary software. The author concluded that adopting open source in education brings solutions to educational problems in terms of cost saving and that Moodle can be useful for large audience of learners. in the same vein, Corbly (2014) mentioned that the types of software and recommended freeware and open source software as the most unique. The author stated that the copyrighted software is given for freely use to others. Although the author has the sole possession to copyright, in this regards the nobody cannot modify the software. Similarly, Nehra and Tyagi (2014) presented an exposition of FOSS helpful to electronics engineering training. The author further examined in relation to outlook of FOSS and their web details. The study concluded with overall creating awareness for instructors and students on learning via FOSS. Also, Singh, (2016) worked on the situation of training relating to utilisation of inventions of technology, the author further developed, Moodle as the suitable open source in learning management software. He mentioned that Moodle is imperative in training, along the electronic learning concept. He concluded with role of useful tools for training and exercise. Likewise, Kim and Park (2018) expressed that the numerous merit of OSS has

transformed organizations' positively and intention to use the services, systems and information quality. In fact, it is clear that using FOSS for instructional delivery deliberatively influence the learners positively.

The benefit of Free and Open Source Software (FOSS) has been delve into by researches. For example, the study by Umar, Datti and Abubakar (2016) stated that individual adoption of OSS, serves as ways of alleviate the cost in regards to licensing and promotes individual technological development. Also, Nehra and Tyagi (2014) declared the benefit of FOSS as follows: Reduce Cost, Reduce Constraint, Prevention of unlawful Copying, Encourages self and independent learning. Similarly, Giri and Sengar (2011) submitted that OSS provides an insight into the implementation of OSS for overseeing the services and activities library and that OSS the potentiality to control the staff positively. Also, Muller (2011) stated that using OSS allow s library to manage, circulate and catalog their materials effectively. In essence, academic institutions are pushy to put a balance to resources and requirements for learning, OSS has confirmed to be a possible solution to such institutions, it also provided creativity in making the technology more sovereign by allowing the researchers to work together in other to find solutions to educational (Taiwo & Downe, 2013).

The theoretical frame work is based on the work of scholars in the field of psychology on the UTAUT model. The term, technology usage and acceptance are ideas within the Information Systems, this has received attention and considerations from different discipline. In this regard, many models proposed for understanding users' and measuring how individual accept technology. The most common models are: (TRA), Theory of reasoned action. (DOI) Diffusion of Innovation, (TAM), Technology Acceptance Model, and (UTAUT). Unified Theory of Acceptance and Use of Technology. The Motivational Model, Theory of Planned Behaviour, and Social Cognitive Theory. UTAUT was utilised for the current study because it is based significant constructs precisely the above models. The model consisted of four determinants and variable.

Previous studies have worked on the UTAUT as momentarily discussed. For example, Rosaline and Wesley, (2017) examined the UTAUT model on the predictors of technology for adoption in instructional delivery. The findings revealed a positive significant relation within the behavioural intention to utilise Technological tools. Similarly, Odewumi**,** Yusuf and Oputa (2018) worked on the use of UTAUT model to recognized the intention based on postgraduate gender to use social media in learning, in south-west Nigeria. The author concluded with postgraduate students' as having positive perception towards usefulness, ease of use of social media for learning. Also, Palau-Saumell, Forgas-Coll, Sánchez-García and Robres (2019). This paper observed the acceptance of mobile applications in relation to a search of restaurant by users. The results revealed that SEM point out that the drivers have the intentions to use was positive.

Likewise, on TAM, Sawadogo (2013) affirms that the Rogers' model does not make distinction between adoption and continuity. So, in trying to overcome some of these limitations, we consider the TAM model in the following section. Among various technology adoption models, there is TAM. This theory explains, through a set of determinants, the adoption of IS. According to

Prasanna and Huggins (2016) the model was newly introduced by Davis (1986, 1989). In relation to adaption to (TRA) which is the theory of reasoned action, which was based on perceived usefulness and perceived ease of use of the technology. The study by Davis (1989) expressed the perceived usefulness is ascribed as the extent of which individual believes that particular arrangement would enhance better performance his work. Also, perceived ease of use as the degree in which individual is aware that using a particular structure would effort free, Prasanna and Huggins (2016) embraced TAM technology adoption model in relation to IS, supported by Jawadi and Vannier (2012) based on the first theory of IS.

Based on perceived usefulness, the study by, Abd. Hamida, Abdul Razakb, AbuBakar and Abdullah (2016) examined the relationships between the perceived usefulness and perceived ease of use, and other criterion variable of TAM on the continuous intention to use e-government. The results were positively related in term of continuance intention and other TAM variables. Also, Lanlan, Ahmi and Popoola (2019) researched into the relationship between technology acceptance (TAM) and with the use of CAS. The study discovered the benefit in connection between perceived ease of use and perceived usefulness on use of CAS. It is on this that the study examined the lecturers' engagement of open source software for learning. It on this that the study examined lecturers' engagement of open source software for learning in University of Ilorin, Ilorin, Nigeria.

Method

Research Design

The researcher adopted the descriptive research of the survey type for the conduct of this research. It will involve the collection of quantitative information using a validated questionnaire to be filled by student-teachers to describe the perceived ease of use, of open-source software for instruction by the university lecturers.

Population, Sample and Sampling Techniques

The population for the study consisted of all lecturers in university of Ilorin, Ilorin, Nigeria. The target population were lecturers in categories of lecturers one and above, therefore, purposive sampling was used to sample 300 with 125 males and 175 females.

Research Instrument

The researcher-developed instrument, questionnaire titled, "lecturers perceived ease of use of Open Source Software. The questionnaire has five major sections, A to C focusing on different aspects of the research questions. Section A of the questionnaire seeks for information on the respondents' biodata, name of the institution, programme of study and the gender. Section B of the instrument deals with awareness of open source software by student-teachers. The section had items on the categories of OSS, and the lecturers used. The section C was made up of 10 items also with four-point Likert Scale response options of Strongly Agree (4), Agree (3), Disagree (2), and Strongly Disagree (1). This

Section D of the instrument elicits for information on student-teachers' perceived ease of use of OSS for instruction. More so, 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, Section E is on the challenges which the student-teachers perceive as responsible for low usage of open source software for instructional purposes.

Validation of the Research Instrument

The validation of the research instrument, was first given to the researchers' colleagues, thereafter, the instrument was given to lecturers in faculty of education, University of Ibadan, Ibadan, Nigeria for relevance and suitability of the instruments. Based on their observations and suggestions, necessary modifications were carried out on the draft questionnaire.

The validations were used to modify the instruments and the research questionnaire reliability, was pilot-tested on 18 lecturers at the Obafemi Awolowo University, Ile –Ife. The respondents were not part of the study sample. Internal consistency reliability method was used in eliciting responses from the pilot sample. It was tested with Cronbach's Alpha; values were 0.73 and 0.67 respectively.

Procedure for Data Collection

The copies of questionnaire were given randomly to the lecturers. Researchers personally administered copies of the questionnaire to the lecturers; the data were collated, analysed, ethical standards were also considered.

Data Analysis Techniques

The data to be obtained using the administered questionnaire were analysed using the descriptive and inferential statistics.

Findings and Discussion

Research Question 1*:* What are the OPSS mostly used by the lecturers?

The lecturers' mostly used OSS are: AbiWord, Open Office, Office suite, KOffice, Nvu, GIMPShop, Bbb, Pidgin, Thunderbird, PhpBB, OsCommerce, VirtueMart, Zen Cart, Drupal, Joomla, PHP-Nuke, Ubuntu, Fedora, sipecifically:

1. Linus Open Source Operating System: Ubuntu OS, Zorin OS, Feren OSiFree Office Productivity Suite: OpenOffice, LibreOffice, Apache OpenOffice
2. Infographics: infogr.am, Inkscape, Pixlr.
3. Online Bibliography and Citation Tools: CitationGenerator, Citation Machine – Free, Zotero – Free
4. Testing and Quizzing Tools: ClassMarker, ClassTools, Easy Test Maker
5. Web Conferencing Tools for Teachers: AnyMeeting, BigBlueButton, Jitsi Meet
6. Learning Management System: Moodle, Canvas, Chamilo
7. Open Source Content Management for Website: WordPress, Joomla, Drupal

8. Open Source School Management Software: SchoolTime, OpenSIS, feKara
9. Open Source Screen Capturing Tools for Teachers: Aviary, Clip2 Net, Faststone Capture

Research Question 2

What are the perceived benefits of open source software (FOSS) for learning?

Table 1:
Lecturers perceived benefits of open source software (FOSS) for learning

S/N	Item	Mean
1	Open Source Software (Foss) providing learning for the learners	2.4
2	Open Source Software (Foss) assist my essential aspect of my lesson	2.2
3	Open Source Software (Foss) assists as a flexible means for transmitting contents.	2.6
4	Open Source Software (Foss) provide quick mean of sharing information.	2.5
5	Open Source Software (Foss) arouse my interest to the learners	2.3
6	Open Source Software (Foss) favours my learners assignment.	2.7
7	Open Source Software (Foss) makes my learning real and permanent	2.4
8	Open Source Software (Foss) provides instruction in respect of geographical locations	2.3
9	Open Source Software (Foss) enhances greater electronics awareness the learners	2.8
10	Open Source Software (Foss) assists in solving major subjects educational constraints	2.4
	Grand Mean	2.5

Table 1 revealed that item 8 with the statement Open Source Software (Foss) enhances greater electronics awareness the learners has the highest mean score of 2.8. This was followed by the Open Source Software (Foss) favours my learners' assignment with mean score of 2.7, the items with the lowest mean score 2.3 stated that Open Source Software (Foss) arouse my interest to the learners. On the whole, the grand mean score on the lecturers perceived benefits of open source software (FOSS) for learning was 2.04. Using a bench mark of 2. 0, it could be inferred that the lecturers' generally had positive benefits of open source software (FOSS) for learning.

Research Question 3:
What are the perceived use of open source software (OSS) for learning?

Table 2
Lecturers perceived use of open source software (OSS) for learning

S/N	Item	Mean
1	Open-source software provides the freedom to run the programme for any purpose and anywhere.	2.3
2	The use of open-source software gives the freedom to redistribute copies to colleagues, friends, students, and so on	2.2
3	Open-source software provides flexibility and is customizable by users. New features and tools can be added, or original features changed.	2.1
4	The volunteer help available through the open-source support forums ensuresservice continuity; this eliminates discontinuity of service.	2.2
5	The extensive collaboration of the open-source community ensures ccontinuous improvement of the software.	2.5
6	Open-source software can assist in extending the lifetime of old hardware. For instance, most of the Linux OS distributions and other open-source packages can efficiently run on old computer machines or digital devices.	2.4
7	Open-source software allows for better security, quality, zero vendor lock-in, and interoperability under adherence to open standards.	2.4
8	Open-source software provides better access to quality software to those who otherwise would not have been able to purchase such.	2.3
9	It can guide lecturers and students to develop competence in software development through the customization of open-source software.	2.6
10	It encourages boldness in terms of learning among the lecturers and students	2.0
	Grand Mean	2.1

Table 2 with lecturers perceived use of open source software (FOSS) for learning, revealed that the item with the statement OSS can guide lecturers and students to develop competence in software development through the customization of open-source software, has the highest mean score of 2.6. this by the mean score of was followed by the mean score of 2.5 with the statement, the extensive collaboration of the open-source community ensures ccontinuous improvement of the software 2.5. the item with lowest mean of 2.0 stated that OSS encourages boldness in terms of learning among the lecturers and students. The grand mean score was 2.06 taking the benchmark of 2.0, it could be inferred that the Lecturers perceived use of open source software (FOSS) for learning was positive.

Conclusion

The results of this study have shown that Open Source Software (OSS) is downloaded and used for free, the open nature of the software makes the source code available for modification and alteration and that due to sharing, ease of modification and reduced costs OSS do frequently utilised by the lecturers in University of Ilorin. Here, there are recommendations for the lecturers, schools, and government. Firstly, lecturers should continue to give priority to academic utilization of OSS. Secondly, schools should provide functional internet for the lecturers to access the Open Source. Lastly, government at all levels are to update open source periodically for its use in teaching and learning

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