COMPUTER SCIENCE LECTURERS' READINESS IN USING OPEN SOURCE APPLICATIONS FOR TEACHING AND LEARNING IN FEDERAL POLYTECHNIC NASARAWA, NASARAWA SATATE, NIGERIA

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Abstract

The study investigated the readiness of Computer Science lecturers in Using Open Source Applications in teaching and learning. The study was guided by two specific objectives which culminated to two research questions. Relevant empirical literatures were reviewed. Survey research design was adopted for the study. The population of the study comprised 50 Computer Science lecturers. Lecturers Readiness in Using Open Source Applications Questionnaire (LRUOSAQ) was used as an instrument for data collection. The internal consistency of the instrument was determined using Cronbach alpha and reliability coefficient of 0. 928 was obtained. Data was collected with the help of trained research assistants who assisted in the administration of questionnaires. Data collectedwere analyzed using mean and standard deviation. The findings revealed that the lecturers of Computer Science in Federal Polytechnic Nasarawa, Nasarawa state, Nigeria are aware of Open Source Application and have adequate knowledge of Open Source Application for educationalpurposes. The study recommended that; the Polytechnic Management should support and donate electronic smart boards, tablets and other ICT teaching facilities to the Computer Science departments_ Lecturers. Annual training should also be organized to increase lecturer_s awareness ofthe available of OSA and also to equip them with the necessary skill and technical know-how ontheir use of open source application.

Keywords: Open Source Application, Computer Science Lecturers, Readiness, Awareness, Knowledge.

Introduction

Educating the students is the primary and foremost concern of all lecturers. Students need to be guided by lecturers who will facilitate the development of knowledge and skills in the students tobecome valuable assets of the nation for economic growth and development of the nation. Dispensing the appropriate knowledge, skills, attitude and practices to enable students learning highly depends on lecturers_ readiness in establishing the activity (Namunga & Otunga, 2015). Readiness has been defined by Baker (2014) as a combination of one_s ability and willingness todo a job. In the field of education, lecturers are more likely to engage in the tasks and perform in a successful way when they feel confident and competent in what they are doing (Bandura, 2015). As cited in Baker (2014), lecturers would be considered as more ready to implement a teaching task when they have enough experience in preparation to create a supportive environment for all the students. In other words, they will possess greater confidence to handle the challenging behaviors inside the classroom (Hersey, 2015). Readiness is the state of being prepared for or willing to engage in a particular activity. Fisseha (2016) affirms factors such as attitude, motivation, computer anxiety and computer self-efficacy as factors affecting lecturers_ readiness to use computers during classroom

sessions. The ability of lecturers to handle and apply technology in the classroom to facilitate learning cannot be over emphasized. The way student relate and interact with internet technologies is complex and they identify with its values and benefits, nonetheless, they need lecturers to guide them while using it for educational purposes. Lecturers are the driving factor that enables the deployment of technology to aid the learning process (Eristi, Kurt, & Dindar, 2013). Lecturers will use technology in teaching when there exist positive attitudes about such usage, both for the effectiveness of the lecturers and for the learning outcomes of their students. Lecturers_ attitudes are major predictors of the use of new technologies in instructional settings and these attitudes toward technology shape not only the lecturers_ personal experiences, but also the experiences of the students being taught (Onasanya, Ayelaagbe, & Laleye, 2014). Open source software (OSS) is a computer software that is released under a license in which the copyright holders grant users the right to use, study, change and distribute the software and its source code to anyone and for any purpose. Example of open source software includes; open offices, e.g Microsoft office, android, is an opens source operating system for mobile devices, internet browser e.g Mozilla fire fox, Wikipedia etc. According Williams (2013), Open Source Application (OSA) is software whose source code is publicly distributed in a wide geographical area and available at no cost. Open Source Application is a collaborative effort by a group or team of developers. Because of the availability of source code, one can easily modify and use it according to requirements. Open source software has many advantages like; high-quality software, no vendor lock-in, integrated management, simple license management, lower software costs and abundant support over proprietary software but still, most of the computer user use proprietary or pirated software. According to Hancock (2016) OSA is a form of Application in which the original source code is openly available for users to examine and modify, and to use, run or to create computer programs. One of the best-known examples of OSA is Linux, which is widely used as an alternative to commercial Operating System (OS) software. Open Source Application includes a license to use, modify, and redistribute the code. Commercially sold Application products can be developed from open source Application. Open Source Application is not a brand of application, but a philosophy of software development. Several definitions abound in relation to the concept of Open Source Application. Close source software (SSS) is known as proprietary software, the public is not given access to the source code, and so they cannot see or modify it in any way. Rajani, Rekola, & Mielonen (2019) attested that there is less awareness about the benefits and uses of open source software in higher schools of learning, it is not widely used. In this regard, information can be considered to be ―free thus it is argued in the Open Source movement that software development is faster and more efficient if done in an open environment where the source code is open and all potential interests from different parties is accommodated in and allowed to contribute to the development (Rajani*et al.*, 2015). According to Jackson, Feher, and Sondag (2016) the use of OSA is similar to the use of highways, railways, and telecommunications. Everybody uses them equally (both rich and poor) by sharing, not owning, and hence the term Software as Service (SaaS) came so that users do not have to own the software but can use it as a service. The introduction of OSA enables educational institutes to start using more IT-related resources for teaching and learning (Peters, 2017). It has become a very important step for the following reasons: OSA can be customized to suit the educational need of an institution; it

can help students practice their software development skills as the source code is available freely to everybody; and using OSA can contribute to a reduction in running costs. According to Peters, (2017) Open Source Application is distributed with its source code. The Open Source Definition has three essential features: It allows free re-distribution of the software without royalties or licensing fees to the author, It requires that source code be distributed with the software or otherwise made available for no more than the cost of distribution, It allows anyone to modify the software or derive other software from it, and to redistribute the modified software under the same terms. According to Derener (2006) the availability and accessibility are the primary determinants of resource openness. A resource can be a video, lesson plan, lecture, book, or other licensed creative work. Wiley (2015) extends this concept of a resource openness to include specific affordances provided by alternative copyright licenses. Users of fully open resources have the right to use the resource for their own purposes (reuse), to update or change it to fit their context (revise), to combine it with other resources (remix), and to distribute the original work or their updated versions (redistribute) to whomever they wish (Wiley, 2015). The Centre for Educational Research and Innovation (2007) reiterates that a resource‗s free digital availability and minimal ―technical, legal, or price barriers‖ restricting its use are the most important considerations of its openness. Meiszner (2014) continues the idea of openness defined by access and use when defining open education as the free and Open Access to the usage of and the right to modify and reuse digital open educational resources and digital educational tools, and the free and Open Access to the related virtual educational communities, in order to learn, teach, exchange or advance knowledge in a collaborative and interactive way.

The goal of open source applications in the context of education, and in particular in computer science, is two-fold: To provide the students with generally free, tools for creating, modifying and exchanging information and on the other hand, for what concerns computer science education, to allow the lecturers to explain the fundamentals of computer science in a real world scenario. From a general point of view, opening up education increases the availability oflearning material, so that both lecturers and students can benefit from it (Johnson, 2017). It is with these factors in mind that this study aimed to investigate the readiness of Lecturers of Computer Science, in using Open Source Applications in Federal Polytechnic Nasarawa, Nasarawa state, Nigeria as well as to examine its uses and benefits to the educational industry if well utilized.

Objectives of the Study

Specifically, the objectives of this study was to:

1. To determine the Level of Awareness of Open Source Application by Computer Science Lecturers in Federal Polytechnic Nasarawa, Nasarawa state, Nigeria.
2. To determine the Knowledge of Open Source Applications by Computer Science Lecturers in Federal Polytechnic Nasarawa, Nasarawa state, Nigeria.

Theoretical Framework

This study was based on Technology Acceptance Model (TAM) propounded by Davis *et al.*, (1989). The model is an information systems theory that models how users come to accept and use a technology. The actual system use is the end- point where people use the technology.

Research Questions

1. What is the Level of Awareness of Open Source Application by Computer Science Lecturersin Federal Polytechnic Nasarawa, Nasarawa state, Nigeria?
2. What knowledge of Open Source Applications is possessed by Computer Science Lecturers in Federal Polytechnic Nasarawa, Nasarawa state, Nigeria?

Methodology

A survey research design was used to investigate the Readiness of Computer Science Lecturersin Using Open Source Applications within Federal Polytechnic Nasarawa, Nsarawa State, Nigeria. The population of the study was 50 Computer Science Lecturers in Federal Polytechnic Nasarawa, Nasarawa state, Nigeria. The entire population was used in this study because the entire population of the study was manageable. Computer Science Lecturers Readiness in Using Open Source Applications Questionnaire was used as an instrument on 5 point likert scale. The instrument was coded and scored; Very Much Not Aware (VMNA) = 1, Not Aware (NA) = 2, Undecided (UD) = 3, Aware (A) = 4 and Very Much Aware (VMA) = 5. Strongly Disagree (SD)
= 1, Disagree (D) = 2, Undecided (UD) = 3, Agree (A) = 4, and Strongly Agree (SA) = 5. A mean score of 3.00 was adopted for forming the basis of agreement, needed, aware etc. The instrument was validated by two experts and the internal consistency of the instrument was determined using Cronbach alpha and Reliability coefficients of 0. 928 and the data collected were analyzed using mean and standard deviation.

Results

Table 1: Mean values and Standard Deviation on Computer Science Lecturers' Awareness of Open Source Application.

S/N	Potentials of Open Source Applications	N	Mean	SD	Remarks
1	OSA comes with available Source Code	50	3.71	0.849	Aware
2	There is Freedom to Modify OSA	50	3.81	0.562	Aware
3	There is Freedom to Redistribute OSA	50	3.54	0.789	Aware
4	OSA is More Secure than Closed Source Application.	50	3.48	0.975	Aware
5	That OSA is Cheaper than Closed Source Applications.	50	3.68	0.894	Aware
6	That OSA is Reliable than Closed Source Application.	50	2.47	0.463	Not Aware
7	That OSA is No Vendor Software.	50	2.44	0.457	Not Aware
8	That OSA Upgrade is without initial developer support.	50	2.22	0.226	Not Aware
	Grand Mean		**3.44**		

Table 1 shows the mean and standard deviation of computer science Lecturers_ response on theirawareness of Open Source Application in Federal Polytechnic Nasarawa, Nasarawa state, Nigeria. Almost all the items are having mean scores of above 3.0 with the exception of item 6,7 and 8 with 2.47, 2.44 and 2.22 respectively. The grand mean score of 3.44 indicated that indicates that the Lectures are aware of open source application.

Table 2: Mean values and Standard Deviation of Computer Science Lecturers' level of knowledge of Open Source Application.

S/N	Knowledge of Open Source Applications	N	Mean	SD	Remark
1	OSA is freely distributed to anyone interested.	50	3.70	0.739	Agreed
2	OSA allows users access to the programs source code.	50	3.74	0.665	Agreed
3	OSA allows users to modify the source code when using it.	50	3.59	0.800	Agreed
4	OSA allows users to redistribute the modified version.	50	3.53	0.955	Agreed
5	OSA requires that all changes to the software are publicly distributed	50	2.89	0.436	Disagreed
6	OSA License requires that changes to the software are publicly available.	50	2.49	0.224	Disagreed
	Grand Mean		**3.54**		

Table 2 shows the descriptive statistics on the Knowledge of Open Source Applications possessed by the Computer Science Lecturers in Federal Polytechnic Nasarawa, Nasarawa state. That is, almost all the items are having the mean score of above 3.0 with the exception of item 5 and 6 with 2.89 and 2.49 respectively. The grand mean score of 3.54 indicated that the Lectures have the knowledge of open source application.

Findings of the Study

The following findings have been made from this study.

1. The Computer Science Lecturers in Federal Polytechnic Nasarawa, Nasarawa state, are aware of OSA which are available with source code, Freedom to Use, Freedom to Modify, Freedom to Redistribute, More Secure, Cheaper Software, Reliable, Secure Future, NoVendor Software and Upgrade without initial developer support.
2. The Computer Science Lecturers in Federal Polytechnic Nasarawa, Nasarawa state, have adequate knowledge of OSA, that is a software which is distributed freely to anyone interested, It allows users access to the programs source code, It allows users to modify the source code, It allows users to redistribute the modified software, Its license should not include unreasonable restrictions, It allows you to make any changes to the OSA software asyou may wish, The OSA requires that all changes to the software are publicly distributed, The OSA License requires that all changes to the software are publicly available andKnowledge of migration to OSS is easily available.

Discussion of the Findings

The findings of this study were discussed and compared with similar studies in literature. The discussion followed the main research findings of the study. The findings of the study showed that Computer Science lecturers are aware of OSA in Federal Polytechnic Nasarawa, Nasarawa state, Nigeria. Computer Science lecturers are very much aware of the features of OSA such as; available with source code, Freedom to Use, Freedom to Modify, Freedom to Redistribute, More Secure, Cheaper Software, Reliable, Secure Future, No Vendor Software and Upgrade without initial developer support. The findings of this agreed with Randhawa (2015); Saunders & Shrem, (2016); Santos, Kuk, Kon, & Pearson (2017); Ukachi, Nwachukwu, & Onuoha, (2019) who reported that open source comes with available source code, Freedom to Use, Freedom toModify, Freedom to Redistribute, More Secure, Cheaper Software, Reliable, Secure Future, No Vendor Software and Upgrade without initial developer support.

Another findings of this study revealed that computer science lecturers have adequate knowledgeof OSA application. The findings of this study is in line the result of Emeasoba and Ezenwafor (2019) which assessed computer and networking knowledge possessed by computer science lecturers in tertiary institutions in Anambra and Enugu states and found that lecturers possessed high competencies/knowledge in computer operation.

Conclusion

The study investigated the readiness of Lecturers of Computer Science, in using Open Source Applications in Federal Polytechnic Nasarawa, Nasarawa state, Nigeria as well as to examine its uses and benefits to the educational industry if well utilized. Based on the findings, this have indicated that the Lectures are aware of open source application and have the knowledge of opensource application.

Recommendations

The study therefore recommends as follows; The the Polytechnic Management should support and donate electronic smart boards, tablets and other ICT teaching facilities to the Computer Science departments_ Lecturers.

1. The Polytechnic management should organized annual training to increase lecturer_s awareness of the available OSA and also to equip them with the necessary skill and technical know-how on the use of open source application.

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