Original Research Article

Student's Awareness of Free and Open-Source Software (FOSS) in Higher Education

ABSTRACT:

AIMS: THE STUDY IS BASED ON THE FAMILIARITY OF STUDENTS WITH DIFFERENT TYPES OF FREE AND OPEN-SOURCE SOFTWARE (FOSS) AND EXPLORES THE STUDENTS' AWARENESS. IT ALSO EXPLORED THE FACTORS INFLUENCING THE AWARENESS OF STUDENTS ABOUT FREE AND OPEN-SOURCE SOFTWARE (FOSS).
STUDY DESIGN: A DESCRIPTIVE SURVEY METHOD HAS BEEN ADOPTED AND PURPOSIVE SAMPLING TECHNIQUES USED FOR DATA COLLECTION.
PLACE AND DURATION OF STUDY: THE STUDY TOOK PLACE IN THREE ODISHA STATE UNIVERSITIES BETWEEN JANUARY 2019 AND APRIL 2019.
METHODOLOGY: THE SAMPLES COMPRISE 80 POST-GRADUATE STUDENTS FROM THREE ODISHA STATE UNIVERSITIES VIZ RAVENSHAW UNIVERSITY, AND UTKAL UNIVERSITY. INCLUDED SAMPLE FROM EACH UNIVERSITY SELECTED RANDOMLY. THE DATA WERE ANALYZED BY PERCENTAGE AND FREQUENCY OF RESPONSES OF RESPONDENTS
RESULTS THE FINDINGS INDICATE THE MAJORITY OF THE STUDENTS WERE HIGHLY AWARE OF THE USAGE AND BENEFITS OF FREE AND OPEN-SOURCE SOFTWARE (FOSS). SOCIAL MEDIA, COURSE SYLLABUS, AND CONFERENCES/SEMINARS ARE THE MAJOR FACTORS INFLUENCING THE AWARENESS OF STUDENTS ABOUT FREE AND OPEN-SOURCE SOFTWARE WHILE LACKING AWARENESS, LACK OF INSTITUTIONAL SUPPORT, ORIENTATION, AND TRAINING ON THE USE OF FOSS TOOLS ARE THE MAJOR FACTOR RESPONSIBLE FOR FOSS ADOPTION.
CONCLUSION: FURTHER, THE FINDINGS SUGGEST THAT FOSS TOOLS CAN BE ADOPTED FOR EDUCATIONAL PURPOSES LIKE RESEARCH, TEACHING-LEARNING, DATA GATHERING, INTERPRETATION, REPRESENTATION, ETC AND IT IS AN ALTERNATIVE TO PROPRIETARY SOFTWARE. TEACHERS AND CURRICULUM DEVELOPERS SHOULD RE-EVALUATE AND RE-FRAME THE CURRICULUM OF HIGHER EDUCATION GIVING ATTENTION TO THIS AREA.

Keywords: FOSS tools, Awareness, Higher Education

1. INTRODUCTION

Information communication technology (ICT) has expanded its outreach through the Internet. Therefore, the vision is to electronically reach out to a large number of students, teachers, and the general public with quality educational material, so as to address the issues of access to higher education with equity and quality. Integration of technology in education is not only supporting to achieve the national goal but also help increase the accessibility of

quality education. Realizing the potential of information and communication technology, it can be better utilized by the teaching-learning community. For this, awareness and adoption of technology are very much essential. Much academic research show concerns about the lack of technological awareness and its mixing with pedagogy and content. As a result, it becomes a challenge for the educational community to integrate technology into education.

Educational institutions have been using modern technologies with effective use of the internet to expand and distribute education to students. Adoption of technologies at institutional as well as an individual level is facilitating the learning community to learn from everywhere and everyone. But, the most concerning challenge is the availability of appropriate software and hardware technology and its usability. Due to the unaffordable rate of educational software, it is unreachable to the common learners and its potential use in learning. The available software free of cost or minimal charges allows the learner to access through and provides the opportunity to create and learn meaningfully. The open and free software presents benefits and freedom to all learning communities to demonstrate their potential creativity and communication. However, the concept and practice of open source are making source code openly available. The very general concept of FOSS is allowing the source code of software publicly available to everyone to use (Shaame, Shannmugan, and Dehghantanah, 2013). The free and open-source movement aims to break the barriers of proprietary software and to encourage and enable the free sharing and distribution of software for serving the community (Shaame, 2014). Free and Open-Source Software (FOSS) is software in which anyone can freely license to use, copy, study, and change the software in any way, and the source code is openly shared so that people are encouraged to voluntarily improve the design of the software.

Free and Open-Source Software (FOSS) is software that can be classified as both free software and open-source software. That is, anyone is freely licensed to use, copy, study, and change the software in any way, and the source code is openly shared so that people are encouraged to voluntarily improve the design of the software. Proprietary software owners license their copyrighted object code to a user, which allows the user to run the program. FOSS programs, on the other hand, license both the object and the source code, permitting the user to run, modify and possibly redistribute the programs. With access to the source code, the users have the freedom to run the program for any purpose, redistribute, probe, adapt, learn from, customize the software to suit their needs, and release improvements to the public for the good of the community.

LITERATURE REVIEW

There are several empirical studies so far that have been conducted on FOSS and its needs and importance at the higher education level. The reason for adopting FOSS the organization was to save costs in the acquisition of IT (De, 2009). While Schutz, Khan, and Chand (2005) found a lack of knowledge and awareness of FOSS applications, principles, and licensing. They also stated that FOSS usage is not integrated into government ICT strategy and policy, migration difficulties, lack of user training facilities and support structure, catalyst, curricula, and education do not adequately integrate FOSS. Lack of financial incentive to evaluate FOSS alternatives, no stable, low-cost, and fast internet access were the major organizational factor influencing the adoption of FOSS. But Panagiota (2016) stated that the majority of teachers actually incorporate FOSS in their computer courses, with applications like office suites (Libre Office and Openoffice) and multimedia tools (GIMP, Audacity) being the most widespread in Greek secondary schools. Makhathe and Mabanza (2013) found that there has been a general lack of free and open-source software (FOSS) adoption in South Africa and the lack of FOSS general awareness has led to poor adoption levels. While Johnston, Begg, and Tanner (2013), explored those significant factors that emerged as positive influences on the adoption of OSS included cost, performance. The

negative influences that emerged included compatibility, lack of resources and time, and lack of support. Thankchor and Moore (2017) found that the lack of adequate resources to train the teachers was the single biggest challenge in the adoption of FOSS. He also stated that the Lack of support staff trained in the FOSS is one of the major challenges to adopting FOSS in India. The proprietary software applications have support readily available due to wide adoption. In addition, the employees who trained in the UNIX application find it difficult to support the Linux-based application. Mittal and Singh (2013) revealed that Open-source software is the emerging concept for the less budget and legal software. But the lack of awareness about the uses and benefits of open-source software is a large factor in less use of open-source software. Shaame (2014) found that FOSS has got many benefits compared to proprietary software like the ability to customize, availability/reliability, good performance, and security. But there are some challenges that this reform will face to education institutions like academic staff resistance to change and educational support etc. Satpathy and Maharana (2012) found that there is a need to promote awareness of Open-Source Software among library professionals. Rooij (2007 investigated the perceptions of technology and academic decision-makers about open-source benefits and risks versus commercial software applications and revealed perceived barriers to open-source adoption and the extent to which the outsourcing concept could alleviate risks. When Talib (2017) explored that OSS is always a good alternative when they need to meet the market needs and he also found that lack of technical support is the major challenge faced by the organizations.

PURPOSE AND SIGNIFICANCE

The research findings from the previous studies that some of the major challenges like a lack of adequate resources to train the teachers to use FOSS, lack of technical support, lack of awareness and organizational factors, etc. It shows that the majority of the studies are conducted on awareness, perception of people about FOSS but very few studies have been conducted to study the factors which are responsible for awareness and use of FOSS, and some studies tried to check the awareness and adoption of FOSS among library professional, different organizations, commercial firms, etc.

Hereafter the study is carried out to check the awareness of FOSS among students at higher educational levels. Hence the study intended to explore the factors influencing the student's awareness of FOSS in higher education in Odisha state, India.

Objective of the study

1. To explore the awareness of students about Free and Open-Source Software.
2. To study the factors influencing the adoption of Free and Open-Source Software.

Research questions

1. What is the level of student's awareness about FOSS at higher education level?
2. What are the factors influencing the awareness of students about Free and Open-Source Software?

2. METHODOLOGY

The study, has followed a descriptive survey design and a purposive sampling technique has been adapted for data collection. The sample comprises eighty post-graduate students from two Odisha state universities viz Ravenshaw University, Cuttack, and Utkal University, Bhubaneswar. A close-ended structured questionnaire used to gather data on awareness of FOSS. There were ten questionnaire items covered awareness on various FOSS tools. Data analyzed by finding out the percentage and frequency of responses of respondents.

3. RESULTS AND DISCUSSION

The study is to find the awareness levels of higher education students and the questionnaire used for the collection of data incorporates yes/no and multiple-choice questions.

Table 1 shows that 50% of students know about the proprietary software. While 57.50% of respondents do not know about Free and Open-Source Software. About 41.2% know pirated software whereas 58.7% do not. It indicates approximately half of the students are familiar with the term's proprietary software, Free and Open-Source Software, and pirated software, as well as half of the higher education students, have no idea about different types of software. It may happen that students are using the software but they don't know that the particular software they are using is coming under proprietary or Free and Open-Source Software.

Table 1 Students Awareness of different types of software

Item 1	Do you know about the different types of software ownership?	Response	
		Yes	No
a)	Proprietary Software	40 (50%)	40 (50%)
b)	Free and Open-Source Software	34(42.5%)	46(57.5%)
c)	Pirated software	33(41.2%)	47(58.7%)
d)	All of the above	42(52.5%)	38(47.5%)

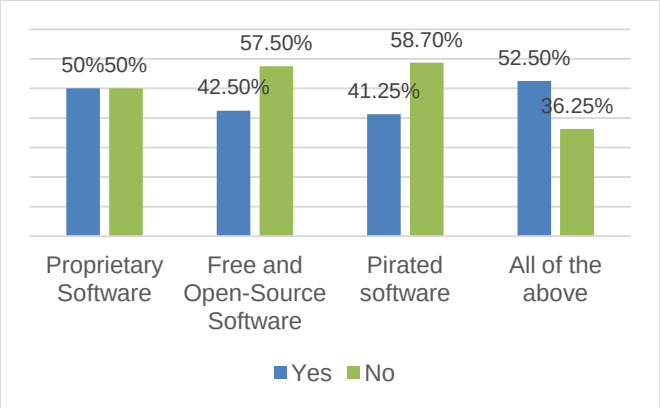

Table 2 Students' usage and benefits of FOSS tools

2.	Are you aware with usage and benefits of FOSS?	Yes	No	Not Sure
		53(66.25%)	14(17.50%)	13(16.25%)
3.	Do you know free software movements?	24(30%)	40(50%)	16(20%)

Table 2 depicts students' usage and benefits of FOSS tools. While majorly 66.25% of students are aware of the usage and benefits of FOSS while 26.25% are not sure of it. This indicates students are well aware of the benefits of FOSS over proprietary software or pirated software.

But, only 30% of students were aware of free software movements and the majority approximately 70% of students either not sure about it or did not know about the movement. In spite of that majorly students are aware of the advantages of FOSS.

Table 3 Students' Understanding of FOSS

4.	What is your understanding of FOSS?	Yes	No	Not Sure
a)	It is software that is distributed freely to anyone interested.	47(58.8%)	14(17.5%)	19(23.7%)
b)	It allows the user to modify the source code.	23(28.8%)	18(22.5%)	39(48.8%)
c)	Its license should not include unreasonable restriction.	21(26.3%)	18(22.5%)	41(51.3%)
d)	It allows users to access to the Programme source code.	30(37.5%)	14(17.5%)	36(45%)
Mean		30.3(37.8%)	18(20%)	33.7(42.2%)

Table 3 depicts an average of 37.8% of students have an understanding of FOSS and its features while 20% do not have any understanding and majorly 42.2% of students are not sure about the features of FOSS. This indicates that the majority of students perhaps knew the FOSS tools but were still not sure about the characteristics of FOSS.

Table 4 Students awareness on features of FOSS

5	Do you know the following features of Free and Open-Source Software?	**Yes**	**No**
a)	Available with source code.	35(43.75%)	45(56.25%)
b)	Freedom to Use.	44(55%)	36(45%)
c)	Freedom to Modify.	34(42.5%)	46(57.5%)
d)	Freedom to Redistribute.	23(28.75%)	57(71.25%)
e)	More Secure.	20(25%)	60(75%)
f)	Reliable.	29(36.25%)	51(63.75%)
g)	Upgrade without initial developer support.	22(38%)	58(72.5%)
Mean		29.6	50.4

Table 4 depicts majorly 55% of students know the feature 'freedom to use, followed by 43.75% with 'available with source code', 42.5% with 'freedom to modify', whereas 75% of students are not at all aware of features like 'more secure', 72.5% of students do not know about 'upgrade without initial developer support', 71.25% with 'freedom to redistribute', 63.75% with 'reliable', 57.5% with 'freedom to modify', and 56.25% with 'available with

source code. This indicates that the majority of students are not aware of the various features of FOSS. Thus, it can be said that students are aware of FOSS but not well acquainted with various features.

Table 5 Students awareness on Various FOSS

6	Are you aware of any listed FOSS software?	Yes	No	Not Sure
a)	Libre office	20(25%)	20(25%)	40(50%)
b)	Open office	30(37.5%)	21(26.25%)	29(36.25%)
c)	Mozila firefox	51(63.75%)	9(11.25%)	20(25%)
d)	Chromium	33(41.25%)	24(30%)	23(28.75%)
e)	GIMP	9(11.25%)	35(43.75%)	36(45%)
f)	VLC media player	56(70%)	4(5%)	20(25%)
g)	Ubantu	38(47.5%)	16(20%)	26(32.5%)
h)	OpenShot	5(6.25%)	37(46.25%)	24(30%)
i)	Audacity	10(12.5%)	37(46.25%)	22(27.5%)
j)	MyPaint	20(25%)	27(33.75%)	21(26.25%)
k)	Tuxpaint	6(7.5%)	42(52.5%)	20(25%)

Table 5 depicts students' awareness of various FOSS and VLC (70%), Mozilla Firefox (63.75%), Ubuntu (47.5%), chromium (41.25%) students are well aware while software like Libre office (25%), MyPaint (33.75%), audacity (46.25%), GIMP (43.75%), OpenShot (46.25%) and Tuxpaint (52.5%) of students are unaware of listed FOSS. But the majority of students were not sure about the listed software are either FOSS or proprietary or pirated software. This indicates low awareness of students in the majority of FOSS.

Table 6 students' awareness on facts of FOSS

		Yes	No	Not Sure
7	Is there any piracy risk in the use of FOSS?	13(16.25%)	27(33.75%)	40(50%)
8	Linux is most invaluable open-source software	20(25%)	30(37.5%)	30(37.5%)
9	Is there any cost to be paid for FOSS?	31(38.75%)	34(42.5%)	15(18.75%)
10	FOSS is less secure than proprietary software	15(18.75%)	28(35%)	37(46.25%)
Mean		**19.75**	**29.75**	**30.5**

Table 6 depicts the students' awareness of facts of FOSS and majorly 50% of students are not sure about piracy, only 25% of students are aware about Linux is invaluable open-source software. While 42.5% of students were aware that it is cost-free and majorly 46.25% were not sure about the security of FOSS over proprietary software.

FACTORS INFLUENCING THE AWARENESS OF STUDENTS ABOUT FREE AND OPEN-SOURCE SOFTWARE (FOSS)

The second objective of the study is about studying the factors influencing the awareness of students about Free and Open-Source Software (FOSS).

Table 7 Factors influencing the students' awareness of FOSS

1	How did you know about free and open-source software?	
a)	From course syllabus	18(22.5%)
b)	Conference/Seminar	9(11.25%)
c)	TV/Radio	9(11.25%)
d)	Internet/social media	35(43.75%)
e)	Newspaper	10(12.5%)
f)	Magazine/Journal	6(7.5%)
g)	Friends/ Teachers	17(21.25%)
h)	Haven't heard it before	15(18.75%)
i)	Others	15(18.75%)

Table 7 depicts the factors influencing the students' awareness and majorly 43.75% of students finds internet and social media is the source of their awareness, while 22.5% from course syllabus, 21.25% from friends/teachers. Hence these are the most influential factors for students' awareness of FOSS. Journal (7.5%), TV/radio and seminar/conference (11.25%), newspaper (12.5%) influencing very lowest in students awareness of FOSS.

4. CONCLUSION

In conclusion, the finding results on university students' awareness of Free and Open-source Software (FOSS) reveals mixed responses. In major cases, students firmly know about the various types of software ownership like proprietary software, pirated software, and free and open-source software. while largely the results indicate the students are not well aware of the benefits and usage, of various types of FOSS. The learning community slightly getting aware of the benefits and importance of FOSS. But still, a large mass is away from the adoption of FOSS tools. Adopting the range of FOSS tools by the teaching-learning and research community might extremely benefit from the copyright issue, low cost or free software, and availability of source code for the learner. The features and characteristics of FOSS tools may provide the best possible learning support to students, teachers, and scholars. There are strong indicators that influence the awareness and motivate the use of FOSS in higher education. Integrating FOSS content in the course syllabus may enable to adopt and create interest in FOSS. Adoptions of FOSS tools by the institutions may also considerably reduce the cost of software purchases. Therefore, awareness and training programs, as well as inclusion in the curriculum, will increase the adoption rate among the learning community.

5. RECOMMENDATION

For institution: University students are slightly getting aware of FOSS and course syllabi are one of the sources of their knowledge. Therefore, educational institutions should integrate FOSS as part of ICT in education. Institutions should provide training on handling various FOSS to teachers as well as students, providing technical support for installation and maintenance.

For teachers: awareness and adoption of FOSS by teacher community in teaching-learning can motivate students to use and adopt for their learning.

For researchers: there are so many factors influencing students' awareness of FOSS but still many of them were confused or have no surety of the benefits of FOSS over proprietary software, therefore research community explores the barriers and issues in FOSS awareness and adoption in higher education.

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