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Usability Assessment of Open source application

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Abstract: Open-source software is becoming a gradually more popular as a software development method; some of the most successful softwares are for example: the Linux operating system, Mozilla, Apache web server and openoffice.org. Open source softwares viewed by many as being very good in terms of their usage, reliability, performance and market share. Mostly open source software developer focus on functionality and different feature of the software; on the other hand they ignore the user centric design requirement. In this research work the importance of the usability in Open source applications, such as Openoffice.org are described and how usability can be measured by assessing user performance such as, satisfaction, effectiveness and acceptability. Openoffice.org is a freely available office suite in different operating system and with different languages. The OpenOffice.org 3.0 feature set is similar to the feature set of Microsoft Office 2003. It has word processing, spreadsheet and presentation applications all together within a common suite. But still this application suite is not much familiar among common users that cause a major usability threat for usability studies. The basic purposed of this research work was to find out the issues and users satisfaction regarding this Openoffice.org. Empirical method of usability assessment such as thinks aloud, Questionnaires and interviews were used.

Keywords: Open Source, usability, Openoffice.org, Usability assessment, empirical methodology

I. INTRODUCTION

Simple definition of open source software, where the user is free to use the program, primarily developed by volunteers, any one can modify and customize and source code is available to users [1]. Different software companies have successfully developed open source software/projects. But it is also reality that some computer users prefer proprietary applications, because some open source softwares have poorer usability [2]. Poor usability is a huge barrier to wider open source adoption [3], Open Source software's are criticized; because these are no longer developed only to serve for particular users and to fulfil their needs. But it can be change if developer put a little bit effort to improve the usability in their Applications. In this research work the author will present little background information of open source software and relationship with human computer Interaction.

The author also analyze the open source application in term of usability. Usability simply define as, interaction of user with a system. (ISO 9241-11) define a usability "the degree to which a product can be used by particular users to achieve specified goals with effectiveness, efficiency and satisfaction in a particular context of use" [4].The usability of Open Source Software is becoming a significant aspect [5]. Good, simple and understandable application always having the upper edge among the others while the usability is a key quality attribute for the success of interactive Application [6][7]. The purpose of the usability evaluation is to focus on the users to complete their task simply and to make this application useful due to the high competition in the field of HCI. Moreover, the usability is generally regards to insure the interactive products are easy to learn, effective to use and interesting for the users [8]. Open source softwares have increased a reputation for reliability, efficiency, functionality that has surprised many people in the software engineering world [9]. Open source software becoming an increasingly popular software development method producing successful software such as the Linux operating system and the Apache web server [9]. Applications like OpenOffice.org and Mozilla Firefox are spreading throughout the world of desktop computing [5].

The OpenOffice.org is a free software suite that seemed to inspire new hopes as far as usability concerned [10]. The adoption of this suite by several countries and by foreign armies in particular (Singapore in 2006, the French Gendarmerie in 2005) due to free of cost [10]. The OpenOffice.org suite is available for Linux, Windows and Solaris [11]. Most of the openoffice.org features are similar to MS-Office 2003. It has word processing, spreadsheet and presentation applications all joined together within a common looks and feel [11]. These applications roughly resemble Microsoft's Office suite with Word, Excel and PowerPoint respectively. The reason to select this area of study is that Openoffice.org is free open source application suite, regardless of this fact, why it is not popular among common users. The concept of this study is to evaluating the usability of Openoffice.org. The author will also discuss and conclude what are the views of the user regarding its efficiency, effectiveness and satisfaction in context of its use.

Application according to user requirements. The author gets into deep analysis about some usability error which makes this application not to familiar among common users.

II. OVERVIEW

Research is the careful and critical enquiry in seeking facts for principles. It can also say that research is the combination of both experience and reasoning and must be regarded as the most successful approach to discovery the truth. And methodology is the set of criteria followed in a particular discipline. There are different research method for investigation, for example Observation, questionnaire, interview, analysis of records, case study etc. These Methods and Techniques are used in performing research operation i.e. collection of data, statistical processing and analysis (test), to evaluate the accuracy of the results obtained.

But author use a systematic approach for investigation that is based on mixed methodology as elaborated by Creswell [13]. In this mixed approach author use qualitative and quantitative method of research. In quantitative approach measured and expressed in term of quantity. Quantitative research helps in précised measurement and knowing trends and changes over the time. The quantitative researched is mainly concerned with quantifying relationship or to compare two or more groups [14].According to another definition The qualitative research is concerned with studying object in their natural setting. A qualitative research is attempted to interpret a phenomenon based on explanation that peoples brings to them [15]. This research will be taken in different segments. In first segment, a detailed and comprehensive literature study will be carried out to understand the usability assessment and open source application i.e. OpenOffice.org. In second phase the author select some method and technique for usability evaluation, there are different methods and techniques available for usability assessment but the author select think aloud technique for testing. After performing the initial usability test the author will design the questionnaire, in that way the result will be compile qualitatively, for more validating this research the author conducted an interviews with BTH students. Figure 3.1 illustrated the overview of the research methodology.

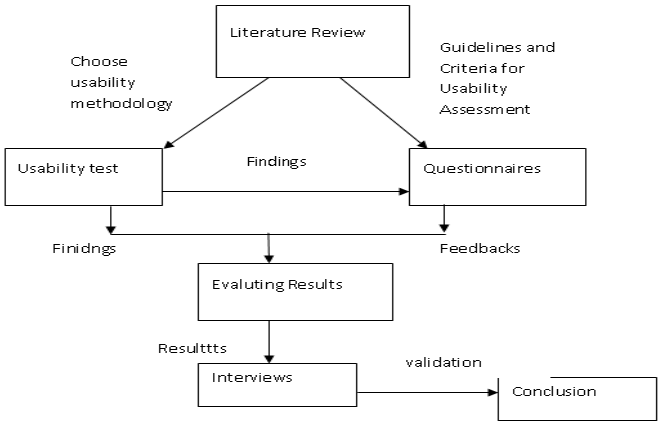


Figure: 2 Overview of Research Methodology

III. USABILITY TEST

In order to conduct the usability test, the author felt it necessary to conduct pre-test questions before commencing the post test. There are different factors that influence the usability test and its results, such as usability measures, Observer's role, Number of participant, tasks, usability problem research work, test environment, and other factors [16]. These factors are illustrated in Figure 3.

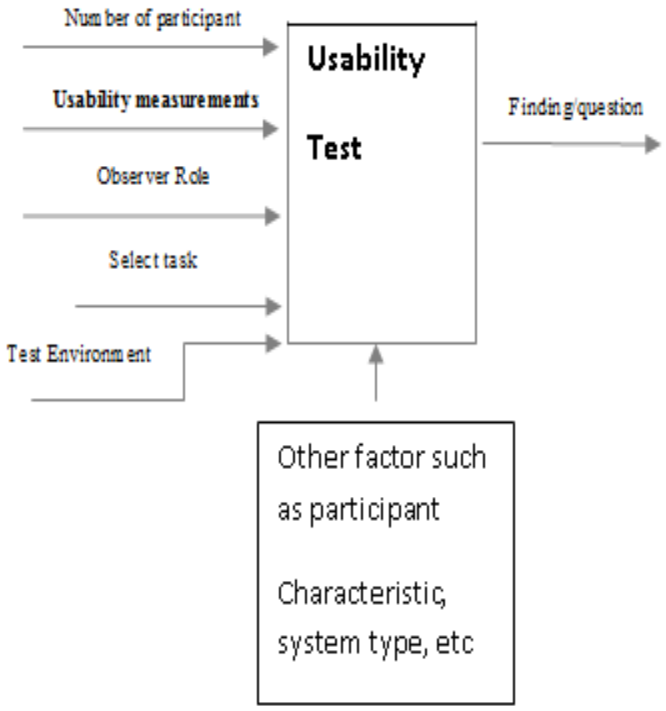


Figure 3.1 Current issues with usability testing

A. Select Number of participant:

The number of participants has also been discussed in a number of researches; Nielsen recommends that optimum five users are enough to discover 85% of usability problems [17]. In order to conduct the usability test author kept in mind all the detail about the number of participants and limited time constraint of the research work, so the author selected the 6 students from BTH (Blekinge Institute of Technology Ronneby Sweden) at graduate level. All 6 students were from computer science program. They all have a 4 to 5 year of experience of using MS-Office.

B. Test Environment and Tools:

The test environment was controlled by providing a same machine and very quite room.

The usability test was conducted in fully balanced university library room. The author provided same computer system and printed form of the test's task to all participants. The author observed the participants and got permission to record their activities with digital camera.

Following are the specifications for think aloud test.

Number of participants	**6 BTH students**
Tasks performed	3 tasks
Test Environment	Book Prior Library room
Participants background	Computer Science
experience of using MS-Office	4 to 5 year
The age of the average participants	28 years
Gender	Male students
System specification for test	2.0 GHz Processor, 1 Gb Ram, HP Compaq, 120 Gb hard disk.

Figure 3.2 specification for think aloud test

C. Tasks Recording:

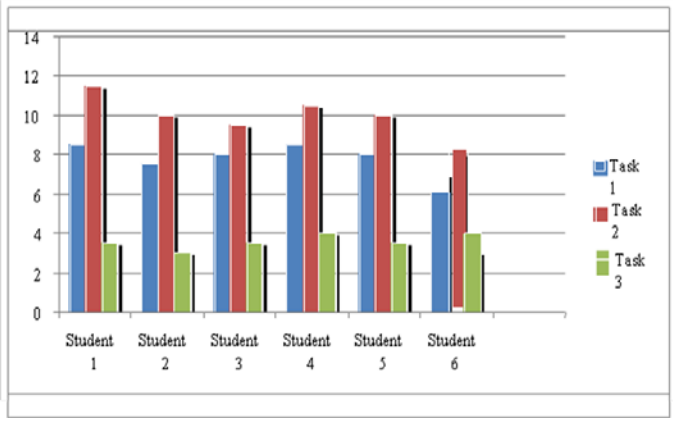
Whatever the action or step performed during this test, participants are free to speak and express their thoughts, and Observer noted their recording as fellows.

a. Time used to complete each task
b. Usability problem Faced during each task
c. Number of task completed successfully
d. What problem face during Uncompleted task
e. What is the satisfaction level of the user

D. Experiment Results:

The author conducted a test from six students independently. Each student performed number of tasks according to schedule and sample that was given to them. The table 3.3 shows the participants time taken to complete each task.

This figure 3.3 shows the experiment performed by six students and each student assigned three tasks to complete this experiment. Student-1 took 8.5 minutes in task-1 and faced some problem in some steps, which are mention in task analysis and in task-2 student-1 spent 10.5 minutes, this task also took too much time and it was also lengthy task., student-1 took very less time approximately 3.5 minutes in task-3, it was a short task and participants felt very little problem while performing this taks-3. Some time variations are clearly depicted in graphic fig 3.5 for each task corresponding to each student. This graph shows all the details of above think aloud



Think aloud Figure 3.4 Problem analysis of each task in Experiment

The table 3.3

Participant	**Task-1 Time**	**Task-2 Time**	**Task-2 Time**	**Total Time**
Student-1	8.5	11.5	3.5	23.5
Student-2	7.5	10.00	3.0	20.5
Student-3	8	9.5	3.5	21
Student-4	8.5	10.5	3.5	22.5
Student-5	8.00	10.00	3.0	21.
Student-6	6.00	8.02	4.00	18.02

The author intensely observed all the participants when they were performing experiment. During the experiment observer noted the entire problem, which was faced all participant in each task. This task was related to world processor and task scenario was clearly and well designed with different steps. These steps were distributed in three different tasks as shown in table 6.1.Different participant faced different problem in each tasks. Let analyze the problem of each task one by one.

a. Task # 1:

There were total 12 steps in task-1, and each participant was performed all 12 steps to complete this task. One common problem observed almost all students was failed to find the synonym of any word. All students got stuck in this step and they did not complete this step.

Student faced another problem while performing this task was that six out of three students were not able to draw the basic shape such as arrow and line. But all steps were clearly demonstrated.

b. Task # 2:

This task was related to Presentation (impress) application. There were total seven steps required to complete this task of impress scenario. Four students faced problem to create and select the proper layout of the slide and to enter some data in this slide. Three student faced problem while creating a boxes and also entering a data in each boxes. And two students got problem to create a bar graph along some data. Half of the student did not feel comfort while using this impress application .in order to analyze further that approximately three student faced problem in three steps but they completed four steps without any problem. Half students completed all steps without any problem.

Number of Levels	**Easy to Use**	**Consistency**	**Completeness**	**Learnability**	**Satisfaction**
Level-1 S.Agree	17,19%	21,47%	17.33%	16,31%	09,1%
Level-2 Agree	25,15%	24,11%	22,34%	26,19%	12,19%
Neutral	18,33%	21,77%	20,9%	21,38%	19,31%
Level-4 Disagree	13,45%	13,9%	22,19%	14,19%	30,01%
Level-5 S.Disagree	09,5%	11,45%	09.00%	13,46%	19,45%
N/A	14.5%	10,0%	05,00%	9,00%	15,00

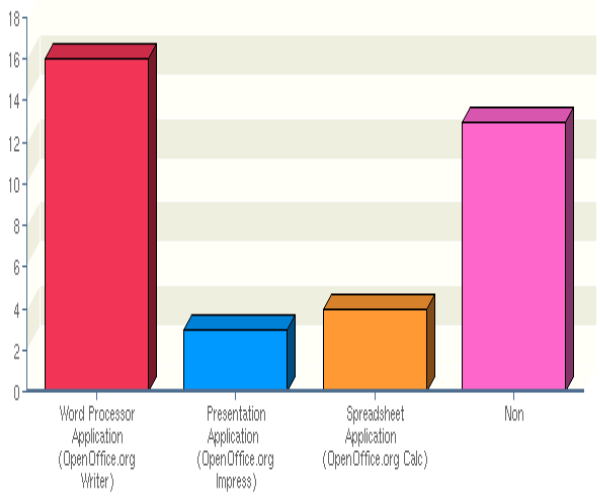
c. Task # 3:

In order to complete this task, six steps were required. This task was related to Spread Sheet (Calc) application .In this task almost all students complete this task easily except two. They just faced problem in step number 4, where needed to calculate a percentage of this scenario and also faced problem to draw chart of given scenario. But other participants performed all step well but different variation of time which is clearly mention in think aloud table 3.4

IV. QUESTIONNAIRES RESULTS

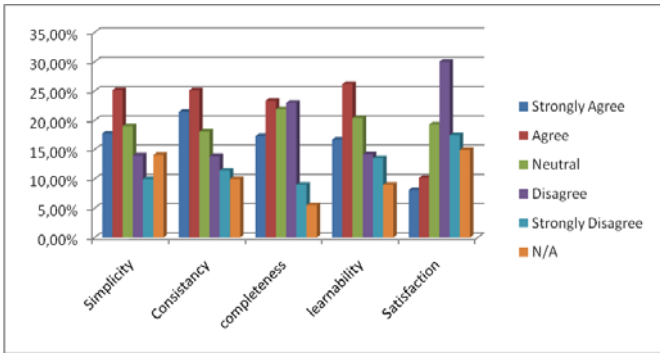
Interview can not be taken from the large number of people personally. If data is collected from the limited number of people that information may not represent the large group. And decision taken on the basis of such data may mislead or even erroneous. So that's why the author decided to design clearly and well organized questionnaires and published on the survey design web site. BTH student were selected as test participants of this openoffice.org survey and posted this survey URL to BTH students on their email addresses .By using this method The author got the quick response. The author took the guide line from the literature [18][19][20][21] in order to design the questionnaires .More then 30 quick responses of this web base survey were received from our targeted user group. The author received all the quantitative data by using web survey. The author counted the numbers of responses of the participants who completed the survey and compute their percentage of participant relevant to each level and criteria. Questionnaires feed back are represented graphically below in figs 4.1, 4.2, 4.3, 4.4.and 4.5

Think aloud Figure 4.1



Think aloud Figure 4.2

In order to analyze the questionnaires qualitative outcome, the author represent the questionnaire's feed back graphically.



Think aloud Figure 4.4

This figure 4.4 represents the number of student's choices in percentage on Y-axis. The criterion (satisfaction, consistency, simplicity, Learnabaility and completeness) are representing on X-axis against each question. Different colours of bars illustrates the number of levels such as (Strongly agree, Agree, Neutral, Disagree, Strongly Disagree and N/A). This figure 4.4 describes the responses of the students relevant to questionnaire's criterion, 17.19 percent students are strongly agree that the open office is an this statement. But 18.33 percent students remain neutral with this statement. If analyze it further then it comes to know that 13.45 percent are disagree and 9.5 percent are strongly disagree with this statement. By examine graph in more depth, it comes to know that average 21.095 students are agree that openoffice.org is a simple and easy to use application suite.

But at the other hand average 11.045 percent are disagree with this statement. Hence it has been proved from this result that OpenOffice.org is a simple and easy to use application suite. If analyze the consistency criteria in the application, it is clearly shown in bar graph that average 23.29 percent are agree that it is a consistent application and average 12.65 percent students disagree with this statement. Average 20 percent students are agreeing that is a complete office application. On the other hand average 15.5 percent students not agree with this statement, but one strange thing observes that 21 percent students remain neutral with this statement, so it needs further investigate through interviews. If further examine this application with learnability prospective ,it comes to know that average 21.4 percent students agree that it is a easy to learn and easy to understand office application. And 13.82 percent students are not agreeing with this statement.

Response of the students concerning the satisfaction of the student about this application is about 11 percent is agree with this statement. But 24 percent students are disagreeing with this statement. They are not satisfying with this OpenOffice.org 3.0 desktop application. Then The author needs to investigate this matter of dissatisfaction about this application by interviews. Another important thing for further investigation, when The author asked this question that "Would you recommend the OpenOffice.org office suite to others?", The author get this response as shown in graph 4.5

We also needs some further investigation for wider spread of this application suite. The author investigates this issue by using interview, and can get some deeper level of detail that what is the reason, why some people don't want to recommend this software to others; even it is free and simply available this office application suite.

V. INTERVIEW RESULTS AND ANALYSIS

Interviews involve much of usability time and resources, but it is more beneficial and flexible, because interviewer can explain difficult questions in more depth [11]. The Interviewer gets the deeper level of detail and getting reaction of the interviewee's opinion and how people reason about the issues. Authors clearly designed the interview questions with the help of supervisor, and then conducted the interview with same people, who took part in experiment.

The author got responses from the interviews that Openoffice.org is a simple to use application suite. It is almost easy to learn and understand office application. But one thing should discuss here is that half of the interviewees were not satisfy from layout and interface of the Openoffice.org. Majority of the student not felt comfort while working in it; because most of the participants were familiar with MS-Office 2007and on the other hand openoffice.org doesn't support the MS-Office 2007 file format. The author also analyze that some of the functions are not available or difficult to find. Half of the student did not find any interesting thing except built in PDF converter and Multimedia flash export in Openoffice.org application suite. When the author asked question from interviewees that "Are you willing to adopt OpenOffice.org for academic, personal and business activities?" fifty percent reply Yes and fifty percent reply No. Even it is free available software and easy to install, no licensing issue even then response was equal in quantity. Another problem observed and also got it from literature studies are that Openoffice.org takes too much execution time to load into a memory [23].

VI. DISCUSSION/ANALYSIS

Validation and assessment is depicted in this portion of the research work. This portion divided into two parts, in one part the author discussed the selected criteria, another part is about validation of the results.

A. Simplicity:

Majority of the students admitted that OpenOffice.org 3.0 is a simple and easy to use office suite. It is available for multi platforms and in Multilanguage. It is easy to install and simple to use. Its Applications provided the same interface like MS-office 2003 applications.OpenOffice.org introduced same old interface like MS-office 2003 interface in 2007. But if they want to stay in this competition, they have to bring a new innovation in opnoffice.org interface. Definitely MS-office 2003 is simple to use interface beside this it has no interaction and innovation in its interface, that is why they change their interface, and people accepted their new effort and new innovation.

B. Consistency:

Consistency means that the design of the user interface should be meaningful and purposeful, and it will be clear and recognize to the user. Organize related things to one place. Because lack of consistency creates a complexity in the system .Open office.org is a complete office suite and it provide almost maximum tool that required to the user for normal usage. It provides a good consistent layout of the interface just like a MS-Office 2003. Openoffice.org holds a good learnability and efficiency because they do not need to learn the same features of the system again and again

C. Learnability:

Learnabaility mean that, whenever user interacts with the system first time, they can easily perform the task. In the prospective of Open office.org 3.0 few of the task create problem while performing the task first time. Overall openoffice.org 3.0 has good learnability except few task remained incomplete during experiment. The author also assessed the learnability by using questionnaires almost majority of the students are satisfied with the learniability of the system.

D. Satisfaction:

Satisfaction represents the effectiveness and how pleasing to work on the system, satisfaction can be defined as in other words that, how much it is acceptable. In this research work satisfaction level of the students has been collected by experiment, questionnaires and interviews. According to feedback of this methodology, students are not much satisfied with OpenOffice.org 3.0, because some of the basic functionalities are absent or difficult to find. It is also not possible to read the Docx document in Openoffice.org. Most of the student failed to find the synonym of the words in Openoffice.org experiment. Most important thing is that its application's interfaces is not impresses and attractive for the user. OpenOffice.org's applications almost have the same interface like MS-Office-2003's applications. There is no new change and innovation in its interface. People become fading up from this old interface. That is why MS-office2007 changes its simple interface into Ribbon interface. Most of the students don't prefer to use openoffice.org frequently. One more important factor regarding the dissatisfaction of the student is that, it takes too much execution time, to load into memory.

E. Completeness:

Completeness means, all the frequent use options, tools and function should be available to the user. OpenOffice.org provides maximum frequent used tools and function except few. OpenOffice.org can not meet the needs of students with current layout of interface and limited number of features and content, such as students are not satisfied with the synonym finding option, all students were failed to perform this steps. It also takes too much time to load into memory. Some of the features are difficult to find.

F. Validation:

There are four criteria of judging the accuracy of the qualitative research proposed by Guba and Lincoln [47]. For

validating the result the author first conducted the experiment, after performing the experiment, the author posted questionnaires to BTH student. In order to validate the result, author carried out the interviews from BTH students.

G. Credibility:

The main purpose of qualitative research results is credible from the participant's eyes.

Participants are only valid key to judge the credibility of the result [24]. For validating a result The author conducted the interviews from 6 students. For the accuracy of the research work, the authors used a mixed research methodology. Based on a literature review, usability test and questionnaires outcomes, the author conducted interview with six students to validate the results of usability assessment of the openoffice.org. Details of these interviews contained in appendix section and these interviews validate the usability assessment of the system. After adopting this validation process, the authors are confident about credibility of the study.

H. Transferability:

Transferability mean, results of qualitative research can be generalized or transferred to other contexts or setting [24].In this reprot OpenOffice.org application suite provides the same tools, functions and services like MS-Office application suite. Most of the students used MSoffice-2007 and it save a document in Docx format. The main threat is that Openoffice.org doesn't support the Docx file format.

Another potential threat can be similar educational system and culture background of the students. Almost all the students have the same educational and culture background in this usability test. The test result may be different, if different sex, educational and cultural background students performed this test. MS-Office 2007 brought a change in office 2007 and introduces a new interface such as ribbon interface and openoffice.org has the same old interface. Another threat is that most of the student has been fade up from old interface.

I. Dependability:

Dependability means that any change takes place in the context of research over time [24].

It is the duty of the researcher to explain these changes and its effect on research with respect to time. The authors selected the number of students for experiment from BTH and conducted the usability experiment of OpenOffice.org. The author reserved a morning time and same library group room with participants. The author design a web survey after analyzing the experiment, and posted to BTH students on their emails. Whenever they felt relax and got time they respond accordingly.

J. Confirmability:

Confirmability means that the results could be confirmed or supported by other researchers [24]. There are number of approaches to boost confirmability. The author got the confirmability of the research work by properly documenting the usability assessment method and literature study at each steps. The author used thinks aloud techniques for experiment. The author designed the questionnaires, on the basis of experiment and questionnaires design guideline. The author further validated the result by the help of interview.

VII. CONCLUSION

The purpose of this research is to evaluate the openoffice.org application suite, to find the usability issues and satisfaction level of the user regarding this application. The author selected the number of students from BTH University Sweden to conduct the usability experiment. This usability experiment is performed in totally balanced environment. The university group room was prior reserved according to time reservation with graduate students. After the analysis of usability experiment and literature study, the author designed the questionnaires and posted to BTH students on their emails and got quick response. Then results of questionnaires were deeply analyzed and validate this result by interviews with same students who took part in experiment and questionnaires.

On the basis of research questions, the author analyze that Openoffice.org is one of the license free great desktop office application suite. On the other hand the author draws a conclusion on the basis of this usability evaluation methodology is that Openoffice.org could not build an impression on user with current interface, functionality and tools. Most of the interviewees were not satisfied from current layout of the interface and tools. And most of the student not felt comfort while working in it.

The author draws attention of open source community toward this Openoffice.org application and recommends some of the points on the basis of observation, which was taken during analysis of the experiment, questionnaires outcome and interviews that might helpful in improving the OpenOffice.org application suite. These points are as fellows.

Interoperability problem in between openoffice.org and MS-Office 2007. Openoffice.org should support the MS-Office 2007's Docx File format.

OpenOffice.org takes too much time to execute or load into a memory [23], execution time should be decrease.

Openoffice.org has the same old and limited set of interface. There should be a new innovation in its interface that impresses the users.

There should be more advanced features with less mouse clicks.

There should be eye catching and beautiful templates, users do not struggle to find style and formatting.

Openoffice.org doesn't support the speech recognition; this functionality should be included for users ease.

Some of the tool options are difficult to find in Opeoffice.org. Such as in usability experiment, there was one step to find the synonym. The entire student failed to complete this step. Most frequent tool should be in main tool bar or easy to find.

When save a file in open office extension and then try to open this file with other office suite like Microsoft office 2003 then file does not open. This problem should be solve.

VIII. FUTURE WORK

Recommendations are very important to improve the openoffice.org application suite. Open standards are generally considered to have important economic and technological benefits. Organizations are seeking benefits of open standard, but there are role to consider the Interpretability. In a future work the author can work to find the Interoperability issues of open Document format.

IX. ACKNOWLEDGMENTS

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I would like to thankful those students who took part in empirical methodology of the experiment. It could not be possible to complete this research work without their participation and support.

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