Open source software implementation in peer assessment

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Abstract. The objective of the research was to implement the Open Source Software in learning assessment. The assessment was a peer assessment. The peer assessment used iPeer 3.4 software, widely known as open source software. The iPeer 3.4 is a web based software, therefore it can be accessed anywhere through various existing devices. iPeer 3.4 was implemented in the course with two different groups of students, and survey was conducted on the assessment and the process of the assessment. The software has undergone the usability testing using System Usability Scale (SUS) developed by John Brook in 1986. The result of the test showed that the score for the software was ‘B’ and rated as ‘good’. It indicated that the iPeer 3.4 was suitable software for peer assessment.

1. Introduction

The birth of industrial revolution 4.0 is triggered by the rigorous development of the information technology and communication technology. The development of super computer becomes inspirable part of the information technology development. Nowadays, computer is not just a device, but an integral part of the human life. This letter creates the collaboration between human and computer. In doing task, human is seen as the trigger and computer will finish thing that has been started. Therefore, the industrial revolution 4.0 puts the computer as more dominant factor than human in completing every activity that include activity in the field of education.

Computer in the education field plays central role. Even more, the shift of the paradigm from the teacher center to the student center becomes the stepping-stone for the integration of computer into education. Therefore, the educational innovation that involves computer must become the prominent point. One of that many issues in education is the student assessment. The assessment can be seen as the final process of the learning. It is a mechanism used to monitor the progress of the students learning. There is a need to employ the alternative assessment in the students learning. The alternative assessment means a non-traditional format for assessment that normally needs construction, demonstration and performance of the students. The format for the alternative assessment focuses on the students and is praised for its authenticity [1].

Student centered assessment can be interpreted as assessment that involves students into its process. This process is important for students to assess their achieved competences and the action done to accelerate the achievement of those competences. The involvement of students on assessment includes the self-assessment and peer assessment. By conducting the peer assessment, students indirectly experience the learning process by learning the result of the assessment of their peer.
Basically the implementation of peer assessment in learning is not complicated. The problem of the peer assessment is increasing the burden of the students and lecture and the time needed to conduct the assessment is normally long. Consequently, there is a need to incorporate technology into the assessment. The incorporation of technology into learning assessment is a must as technology offers benefit, such as: 1) limitless access, 2) limitless storage capacity, 3) provide accurate information, 4) affectivity and efficiency of data processing, and 5) provide various number of outputs that meet the need of the user. Besides the benefit offered, there are also large quantities of existing open source software in the market. Open source is type of software that can be used and modified as well as redistributed under the open source license.

In relations with the perceived benefits of information technology, it is important to integrate it into learning especially for the assessing the students. Moreover, there are a lot of open source software available in the market, so it can ease the integration into the learning. Therefore, the research integrated the information technology into the open source based learning assessment.

2. Computer-based assessment

Assessment is essential in obtaining information about the whole learning outcomes of the students. Therefore, the assessment goal includes process and learning outcome of the students during their learning activity. Assessment is part of evaluation. And, the coverage of the assessment is bigger than evaluation. The qualitative and quantitative measurements are inseparable part of the assessment. Arikunto stated that the functions of assessment are for selection, diagnosis, placement and success measurement [3]. Assessment can be done by involving students in its process. The involvement of the students can be done to assess themselves and their peers. These types of assessment are self-evaluation and peer assessment.

Other researchers published their research finding on peer assessment. Hämäläinen at.al. published their research on the application of peer review in programming assignment [4]. The benefits of the peer review are 1) students can learn from other students and get positive feedback and 2) teachers can use the result of the review done by the students for their learning assessment. The result of the research showed that 75% of the respondents stated that the peer review with comment from the other students as helpful. Wing-Shui [5] published her research on the impact of peer assessment and feedback strategy in the computer programming class. The result of the research stated that students were satisfied with peer assessment and feedback strategy in the computer programming class. The performance of the students using peer assessment and feedback strategy was better than performance generated by the traditional learning. Setemen [6] developed web-based system for conducting peer assessment. The developed system passed the user satisfaction test and the result of the test was ‘good’ category. It means that the developed system is feasible for further development.

Based on those previous researches, peer assessment is important to be used in learning process. Moreover computer based system is also important to be implemented in the process of peer assessment. The computer-based system used in assessment can reduce the amount of burden that lecture and students take during the process of the assessment. Also, the computer-based system can reduce the time needed to conduct the assessment. Therefore, there is a need to incorporate technology in the form of application that can be used in the assessment process.

3. Methodology

The research was descriptive research. The research described phenomenon of implementing the open source based software on learning assessment. Specifically, the research also included surveyed to students related to the assessment that included them in the process and tested usability of the application through SUS questionnaire. Application used in the assessment was iPeer 3.4. It is a web-based open source application therefore it can be accessed from anywhere and through various existing devices.
4. Result and discussion

Use case diagram is a series of interrelated activities that form an organized system run by the actor. The integration of information technology on the learning involves the user of the system namely the lecture and students. The actors have specific task based on the available process in the system. Therefore, in the system there are two actors as the user of the system namely lecture and students. In order to use the system correctly, the actors must log in to the system. The broad-spectrum of the system is presented on figure 1. The series of activities run by the lecture are as follow:

a) register;

b) create subject;

c) create class;

d) validate the students;

e) create group;

f) create rubric;

g) create survey/questionnaire;

h) conduct assessment; and

i) see the assessment result.

Meanwhile, student could do the following:

a) registration

b) join the class; and

c) conduct assessment

Based on the task and the need related to the assessment process as presented on the figure 1, then a specific system that meets these needs was required. Based on the result of the analysis various open source software, the iPeer 3.4 software was then used. The simplicity of the implementation (the installation process) and the setting or configurations of the available features on the software were the fundamental factor in selecting this software. iPeer 3.4 offered complete feature for peer assessment.
Besides, the software could also be used to conduct learning related survey and spread learning related questionnaire. The example of home page for lecture on this software is presented on the figure 1 and figure 2.

![System login page.](image1)

**Figure 2.** System login page.

![Home page for Lecture.](image2)

**Figure 3.** Home page for Lecture.

After the installation and implementation of the iPeer 3.4 system, the next step was surveying the students on the advantage of the peer assessment. The result of the peer assessment is presented on the Table 1. The questions were about the importance of work in group, the benefit of work in group, and the implementation of peer assessment on the student assignment.

| No | Questions                                                      | Response percentage |
|----|---------------------------------------------------------------|---------------------|
| 1  | Have you ever worked in a group?                             | 98%  | 2%    |
| 2  | Do you work in a group for school or university academic assignment? | 98%  | 2%    |

**Table 1.** The result of the survey on the students’ response of the peer assessment.
### Questions and Response Percentage

| No | Questions                                           | Response percentage |
|----|-----------------------------------------------------|---------------------|
| 3  | Do you feel comfortable working in a group?          | 93% 7%              |
| 4  | Does work in a group give benefit to you?           | 93% 7%              |
| 5  | Is working in a group needed?                       | 95% 5%              |
| 6  | Have you ever conducted peer assessment?            | 90% 10%             |
| 7  | Are you comfortable conducting peer assessment?    | 88% 12%             |
| 8  | Does peer assessment give benefit to you?           | 88% 12%             |
| 9  | Is peer assessment needed?                          | 95% 5%              |
| 10 | Do you agree if the peer assessment has higher rate?| 60% 40%             |

Generally, based on the response given by the students it could be said that students acknowledged the importance of work in group and peer assessment. The response of ‘yes’ given by the students was 90%. This response indicated that work in group and peer assessment were needed by students to gain new knowledge.

After conducting survey to students on the benefit of work in a group and the involvement of the students on the assessment, the subsequence step was conducting usability testing on the system used as assessment system. Usability test of the iPeer 3.4 used System Usability Scale (SUS). The SUS questionnaire comprised 10 items eliciting the responses of the users to product interface [6]. Based on the usability testing of the iPeer 3.4, the SUS average score was 81.22 that indicated the system was acceptable. The result of the test showed that the score for the software was ‘B’ with and rated as ‘good’. The iPeer 3.4 was suitable software for peer assessment. Therefore, it could be used in learning assessment.

### 5. Conclusion

The implementation of the open source software in the peer assessment had been conducted. The implementation started with the installing the software on the web server. Then, features correspond to the business process on the use case diagram were modified. The modification of the whole system feature was adjusted to the need of learning assessment, such as system features by students and system feature by teacher. The system underwent the system usability testing (SUS). Based on the testing of the iPeer 3.4, the average score for the SUS was 81.22 that indicated the system was acceptable. Therefore iPeer 3.4 was suitable open source software for peer assessment.

Basically the iPeer 3.4 was a complete system for learning assessment. However, there were some features that had to be added into the system, such as: 1) uploading student assignment, 2) adding feature for student to overview the assignment that would be assessed and 3) adding the feature to export data to see the result of the survey/questioner made by teacher.

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