

## Usability Evaluation of Indonesia Open Educational Resources Using Multi-Methods

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**Abstract:** Education is an important thing in life. Unfortunately, education in Indonesia has not been equally accessible. In order to overcome the issue, Indonesia Open Educational Resources (I-OER) has been developed. I-OER is an online portal developed to provide one stop learning medium for those who want to access learning materials, certify themselves and follow various activities. This research aims to develop I-OER using interaction design principles to ensure the best user experience for its users. The development is conducted using evolutionary prototyping in which usability evaluation is established on each stage. Finally, the final product from this research is I-OER prototype developed using interaction design principles which give the users a good user experience.

**Key words:** e-Learning, open education, open courseware, Indonesia open educational resources, interaction design

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### INTRODUCTION

“Education is the most powerful weapon in the world”, said Nelson Mandela. Education is defined as a whole process in which people are eligible to develop their valuable skills, attitudes and other behaviors in society (Good, 1973). In the 1945 constitution of the republic of Indonesia Article 31 verse 1, it is stated that every citizen has the right to receive education. Unfortunately, the good quality of education is still not available and accessible in every area of Indonesia. Indonesia is an archipelago country with 17,508 Islands in 5,193,252 km<sup>2</sup> area whom 240 million people live in. Indonesia needs a high number of teachers and learning materials, yet this geographical issue causes difficulty to spread them evenly throughout Indonesia. Currently, Java is the only one island in Indonesia with the highest number of teachers.

Furthermore, looking at the data from Indonesia high education database in 2015, the education level of lecturers in Indonesia is considered not ideal. The demography of lecturers in Indonesia is 54,421 of them are bachelor graduates, 131,419 are Master’s degree graduates and 25,228 are doctoral program graduates. Moreover, the data from the Ministry of Education reveal that only 0.5% of higher level institutions in Indonesia have world class university qualification,

9.5% with A qualification, 52.2% with B qualification and 38% with C qualification. Therefore, the quality of Indonesia higher education is also questionable.

To resolve this problem, an Open Educational Resources (OER) system is needed to improve access to education resources and effectiveness of education completely. OER is digitalized software which is provided open and free access for lecturers, students and independent learners to use and re-use for education, learning and research purposes.

Seeing these problems occurred, a laboratory at one of large universities in Indonesia developed Indonesia Open Educational Resources (I-OER). I-OER is an online portal which implements OER in Indonesia. To provide a good learning medium which is able to cater all learning needs from its users, I-OER will combine several OER models which are Open Content (OCT), Open Course Ware (OCW) and Open Education (OED). This combination will enable us to fulfil all learning needs, not only for those who want to search and download materials but also for those who want to follow activities and get certification of specializations.

This research aims to continue I-OER development by creating a prototype of I-OER using interaction design principles to ensure good user experience. Evolutionary prototyping and the user-centered design approach are used to enable usability evaluation between each iteration

in order to test I-OER interaction with real users, resulting in improvement between each prototype. Several research questions have been answered in this research:

- Can I-OER be developed using interaction design principles
- What evaluations need to be conducted to improve the interaction design of I-OER
- Is evolutionary prototyping suitable in creating a better interaction design
- How does Indonesian society think about this system in the first impression

This research provides a good open education system which is disclose and easy to use. Moreover, I-OER is also aiming at helping Indonesian people to get easier access to appropriate and proper education.

**Literature review**

**Open educational resources:** Open Educational Resources (OER) is digitalized education material which is provided freely and openly for educators, students and independent learners to help teaching, learning and research (Huyen, 2006). Every material in OER has licenses which control how those materials should be used.

Learning materials used in OER consist of four: digital assets, information objects, learning activities and learning designs (Littlejohn *et al.*, 2008). Digital assets are usually in a form of documents such as pictures, videos, texts and audios. Information objects are structured aggregations from digital assets which are specifically designed to store information. Learning activities are tasks which include interaction to form specific learning outcomes. Learning designs are structured and sorted information and activities to support learning. There are several models of OER used, for instance, open courseware, open learning, open content, open journal, open library, etc.

**Indonesia’s Open Educational Resources (I-OER):** Indonesia’s Open Educational Resources (I-OER) is designed to help resolving several problems of education in Indonesia. This I-OER program has a legal based on the National Education Constitution of the year 2003 and the Higher Education Constitution of the year 2012. The National Education Constitution of the year 2003 regulates online higher education and the use of information technology as a tool to interfere with teaching and learning activities. The higher education constitution of the year 2012 regulates open and online distance education development, OER development and also support for learning material disclosure.

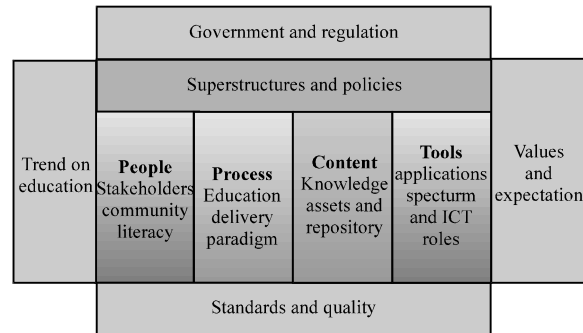


Fig. 1: I-OER design concept

According to the concept used by government, I-OER will be developed by uniting all learning and teaching stakeholders such as governments, education institutions, society, etc. There are four factors that are able to support I-OER: government regulations, scores and expectations, education trends and also quality and standards. The government needs to start public education and information dissemination in advance about the urgency of I-OER. The standards and accreditation institution need to design the supporting instruments for I-OER. These will create a new education paradigm that will be able to improve education in Indonesia. The design of I-OER is as shown in Fig. 1.

I-OER that has been developed at a laboratory at one of large universities in Indonesia has three main programs: OCT (Open Content), OCW (Open Courseware) and OED (Open Education). OCT focuses on becoming an online repository that enables Indonesian users to download and upload education materials. OCW acts as a portal for institutions to share their materials without any interaction between lecturers and students. Different from the other two, OED is a platform where students are eligible to enroll in an online course that provides certifications. Students might also be able to get a formal education degree by enrolling in the OER Program.

**Open content:** Open Content (OCT) is a concept about education materials disclosure. Firstly, this concept was brought by David Willey in 1998. This license is based on a premise stating that a learning material should be developed freely and has the same vision with free technologies and open source. In terms of education, OCT is widely used to support educational development. The disclosure principal of OCT is also implemented on open courseware, open education, open journal, open study, etc. By using the I-OER open content, the users can upload and download educational contents that are available in different formats such as PDF, audio files,



Fig. 2: The interface of I-OER open content



Fig. 3: The interface of I-OER open courseware

slides, etc. Only registered users can upload contents. Interface of I-OER open content is shown in Fig. 2.

**Open courseware:** Open Course Ware (OCW) is one of OER models/programs. OCW was introduced by MIT at the first time through the MIT Open Courseware project in 2002. MIT Open Courseware is a free publication for all learning materials that are conducted in MIT. This makes MIT learning resources open and widely used by every person in the world.

By using the I-OER open courseware, registered users can upload and download syllabi and relevant educational contents. Visitors can also view some information such as an overview of the course, learning objectives, materials and assignments. I-OER Open courseware interface is shown at Fig. 3.

**Open education:** There are various kinds of open education, one of the most popular ones is the MOOC or massive open online course. MOOC facilitates efficiently in forming, distributing and using knowledge and information to learn. MOOC provides lectures as usual with interaction between lecturers and

students but in online environment. In terms of the function, there are three forms that have been commonly used in OER in a form of MOOC. The first one is lectures without certifications, the second one is specialization programs that oblige students to finish some particular lectures to get certified acknowledgement for accomplishing that lecture and the last one is an institutional program that enables attendants to get a formal educational degree from the program.

## MATERIALS AND METHODS

**Research approach:** This research approach is to create I-OER prototype using interaction design principles. Evolutionary prototyping and the user-centered design approach are used to enable usability evaluation between each iteration in order to test I-OER interaction with real users, getting feedback from them thus resulting in continuity improvement between each prototype. Eight golden rules principles are also used as a guideline to see I-OER compliances against interaction design principles (Shneiderman and Plaisant, 2014).

**Data collection:** There are three data collecting techniques used: usability testing, a questionnaire and open-ended questions. In usability testing, participants are asked to finish some scenario-based tasks and their results data are measured by using usability metric. Nielsen defines five components of usability are also used in this research which are:

- Learnability: how easy users could accomplish a task
- Efficiency: how long users could accomplish a task
- Memorability: after users are back to use the design, how easy users could recall their skills to use it
- Errors: how many error users make while using the system and how easy for users to know the correct step to accomplish a task
- Satisfaction: how satisfied users are in using the system

System Usability Scale (SUS) is used to guarantee the validity and reliability of the questionnaire used in this research. SUS questionnaire consists of 10 statements that users need to choose where they stand in 5-Likert scale strongly disagree to strongly agree with the statement. The statements in the SUS questionnaire are as follows:

- I think that I would like to use this system frequently
- I found the system unnecessarily complex
- I thought the system was easy to use
- I think that I would need the support of a technical person to be able to use this system
- I found various functions in this system are well integrated
- I thought there was too much inconsistency in this system
- I would imagine that most people would learn to use this system very quickly
- I found the system very cumbersome to use
- I felt very confident in using the system
- I needed to learn a lot of things before I could get going with this system

To overcome language boundary, SUS is translated into Indonesian language in advance through a face validity process with ten participants.

**Interaction design activities:** To obtain constructive feedback and comments from research participants an open-ended question was used in this research. Our open-ended question used is “Do you have any critique and suggestion related I-OER?” This could enable participants to give their personal opinions about the system which is expected (Ballou, 2008).

In this research, there are four main activities based on the basic steps of the interaction design which are requirement identification, alternative design making, interactive design making and design evaluation. Looking at the four activities, there are several steps that were conducted in this research and they are:

- Literature review
- First prototype evaluation with usability testing, open-ended question and eight golden rules of evaluation
- Requirement identification for developing the second prototype using first prototype evaluation results
- The second prototype development
- Second prototype evaluation with usability testing, SUS questionnaire and eight golden rules of evaluation
- Requirement identification for developing the third prototype using second prototype evaluation results
- The final version of prototype development

**Participants:** 5 persons participated in the first prototype evaluation and 20 people participated in the second one. All participants are university students living in 5 regions including Jakarta, Bogor, Depok, Tangerang and Bekasi.

## RESULTS AND DISCUSSION

This research aims to develop the I-OER System with the satisfying interaction design. As a step to achieve it, usability testing and open-ended questions are used in first prototype evaluation. The results for usability evaluation can be seen in (Fig. 4).

Overall, the first prototype already fulfils 5 principles of usability and 8 golden rules of the interaction design. Participants were able to finish the task given in moderate time although, some participants failed to finish certain tasks.

Additionally, overall participants reported that I-OER is interesting and a cool system; however, the website navigation needs to be fixed. However, several adjustments need to be done to meet better interaction design principles which are:

- Delete login button from the OCW page. Users are required to login when they view OCT or OED page
- Remove the OCT, OCW and OED link at the top menu
- Replace the statistic circle with more representative pictures
- Restructure the position of e-Mail column in the registration form. It will be moved below the name column

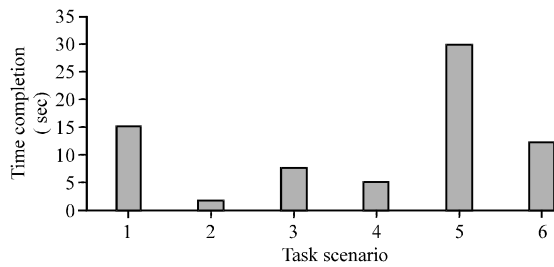


Fig. 4: First prototype evaluation time completion

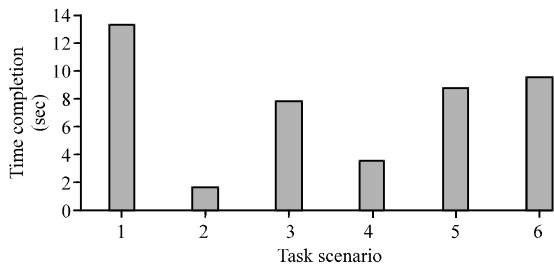


Fig. 5: Second prototype evaluation time completion

- Make logo clickable users will be able to go to home page by clicking at the logo in top-left of the page
- Add the breadcrumb menu to smoothen navigation among pages
- Place redirect to home link at the footer
- Translate English sentences into Indonesian

After the second prototype development, usability testing, the SUS questionnaire and open-ended questions are used to evaluate the interaction design. Overall, the second prototype achieve better results than the first prototype. Looking at usability evaluation results in (Fig. 5) task completion time has been reduced and participants now can complete all tasks given. Additionally, in general participants reported that this version of I-OER is better than the previous version and they look forward to using it in the future. Besides usability evaluation and open-ended questions the SUS questionnaire is also used. For the results, the second prototype SUS score is 68.375. This score indicates the second prototype is scored better than overall websites

which is 68 (Sauro, 2011). The final version of the prototype development was created based on second prototype evaluation. Furthermore, several adjustments need to be done which are:

- Remove login button from the OED page header
- Add labels in the registration form
- Translates English sentences into Indonesian
- Resize small-font into bigger ones

As a result, the final version of prototype which uses interaction design principles at the development is successfully developed.

### CONCLUSION

After seeing the results, it can be concluded that evolutionary prototyping is suitable to achieve a good interaction design. This conclusion is based on second prototype results which are better than the first prototype. The participants also gave positive responses to the current developed prototype based on their answers in open-ended questions.

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