Platform Development and Design Evaluation of the Indonesia Open Educational Resources

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Abstract: Around two-hundred million Indonesians live in the country's over 17 thousand islands, leaving a big 'homework' for the government regarding education, particulary on how to increase the participation rate and quality of educational services. Online distance education can be used to improve the quality of education and increase the number of students. In addition, openly available distance education may encourage prospective students to pursue their education. The Association of College and Universities in Indonesia, which offers educational programs in computing, information systems, and technology (APTIKOM), has successfully designed a framework for Indonesia Open Educational Resources (I-OER). The framework consists of three components: Open Content (OCT), OpenCourseWare (OCW), and Open Education (OED). The present paper aims to discuss the concept of I-OER and the development of I-OER platform. The OCT, OCW, and OED are integrated into the I-OER platform. The platform is currently developed by a team at a reputable university in Indonesia. Specifically for OCT, ontology-based learning object searching technique is applied. Through OCT everyone can share their learning content freely and openly. Moreover, the learning contents on OCT can be reorganized by applying instructional design principles to create complete course materials under OCW. Education professionals (e.g., lecturers, teachers, practitioners and experts from schools, universities, and research centers) are welcome to become contributors. In addition, APTIKOM introduces OED to encourage students and Indonesian citizens in general to obtain certifications or credit points for credit transfer in the future.

Keywords: learning platform; open educational resources; open content; open course ware; open education

1. Introduction

Geographically, Indonesia is vast and consists of various religions, ethnicities, and cultures. The condition creates challenges to deliver educational services equally. For example, the capacity of existing universities in Indonesia is still limited. It is closely related to the ratio between the number of students and the number of existing faculties. Based on data from the Higher Education, the number of lecturers is currently about 270,579, comprising of 179,965 full-time and 90,614 part-time lecturers. When compared with the number of students (3,874,161), clearly, we must increase the number of educators to provide better education services.

Education Statistics Center of Ministry of Education and Culture of Indonesia (Education Statistics Center, 2010) reveals the urgency to improve the qualification of lecturers in each college, in which there are only 5% educators with doctoral degree, 32% with master's degree, and 56% with bachelor degree. Furthermore, the availability of academic programs is still limited. This is indicated by the availability of courses, which is around 58.55%; 8.69% for Master program and only around 1.99% for Doctoral program (Sailah, 2011). More than 50% of available courses still have accreditation C (Hasibuan, 2012). Furthermore, around 3,011 colleges are scattered in 12 regions, where half of the institutions centralized in Java. In fact, most lectures (59%) are working in Java. In addition, the deployment of learners is still not balanced with almost 64% of students enter colleges in Java.

In addition, Indonesia's Central Statistics Agency (BPS) also released data on workforce educational levels Indonesia which indicate that the majority of the workforce in Indonesia is dominated by workers at the level of primary school education/Islamic elementary schools (SD/MI) (about 50%), while the labor force with the Diploma and Bachelor education is very low, which each

comprising of only about 3% and 5% of the total workforce (Nuh, 2012). With I-OER, we aim to fulfill the mission of the Ministry of Education and Culture:

- *Availability*: I-OER offers flexibility; all education stakeholders can provide educational services anywhere, anytime, and in any way.
- *Affordability*: I-OER can save a lot of resources such as cost and time, so it can lower the cost of education.
- *Quality*: I-OER offers an opportunity to improve the quality of education by providing a comfortable, integrated environment.
- *Equality*: I-OER enables the implementation of education that no longer makes geographical, regional, ethnic-related conditions and others obstacles in building knowledge.
- *Certainty*: I-OER can assure all Indonesians access to the right education.

The purposes of the present study are: (1) to develop an Open Educational Resources platform by considering local contexts; (2) to apply multi-methods approach in evaluating user experience; and (3) to provide recommendations for improving the platform.

2. Relevant Literature Review

2.1 Open Educational Resources Movement

Atkins and his colleagues define OER as "teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use or re-purposing by others. Open educational resources include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge" (Daniel, 2007). The primary goal of OER is to use information technology to help equalize access to knowledge and educational opportunities across the world without being limited by differences in geographical, economic and social, with the Internet as the primary means with the final goal it will advance human knowledge, creativity and social welfare.

As we know, MIT is one of the key players in the development of OER. Over 100 institutions have joined the OpenCourseWare (OCW) initiative started by MIT. Today, the OER movement is clearly gaining strength. In general, OER provides some benefits such as providing open access to educational resources for everyone; avoiding opportunity loss; becoming a branding tool for institutions that provide services; becoming an alternative mechanism to obtain feedback on the quality of teaching materials presented; and making profit.

Open Educational Resources paradigm is also already known in Indonesia, where this paradigm can support the realization of the mission of the government in improving educational equity in Indonesia. One of the initiatives related to Open Education Resources in Indonesia was introduced by the Association of Higher Education Computer Science (APTIKOM), called APTIKOM Open Educational Resources (OER) Paradigm and Principles Guidelines.

2.2 Online Learning in Indonesia

Officially, the government has also released several ICT-based educational programs in various levels of education, such as Edukasi.net, Home Learning, ODL PGSD, and others that focus on the learning process (Cenka, 2012). Implementation of e-Learning in Indonesia is getting better, and now more than 100 universities in Indonesia (the top 100 Webometrics) have implemented it. Based on observations conducted by Priyogi (2014), about 86 of the 100 universities have e-Learning facility for students. For example, 67 out of 76 higher education institutions (HEIs) in Java have e-Learning facilities. In Sumatera, 10 out of 13 HEIs have the facilities. The utilization rate of e-Learning from each college was different; nevertheless, the availability of e-Learning indicates awareness of e-Learning's benefit in supporting the learning process.

One example of the implementation of e-Learning in higher education is SCeLE (Student Centered e-Learning Environment) which is used by the Faculty of Computer Science, University of Indonesia since 2004 (Hasibuan & Santoso, 2005). SCeLE has become an integral part as supporting the learning process for the distribution of learning materials, gathering online assignments, and

discussions related to the module's topics through forum, so that students and professors can interact more easily.

3. I-OER Platform Development

The proposed Indonesia Open Educational Resources is based on the APTIKOM OER. In Figure 1 below we see that APTIKOM OER Paradigm and Principles Guideline consists of three components: Open Content (OCT), OpenCourseWare (OCW), and Open Education (OED). Those three components are explained on subsections 3.1, 3.2., and 3.3 below.
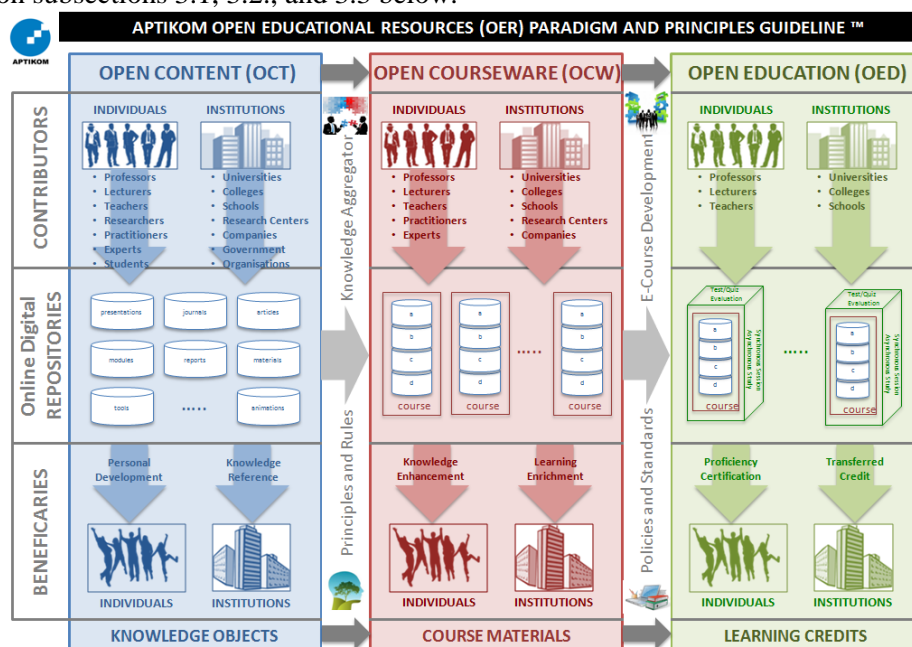

Figure 1. APTIKOM OER (Indrajit, 2014).

3.1 Open Content

Open Content (OCT) is a place where all the learning contents are stored and managed. OCT contributors are people or organizations that have learning contents in the form of presentation slides, e-books, articles, modules and others. The target of this OCT is the open learning contents that can be used by anyone as a reference and personal development. In the OCT, any person or organization that registers to the system can upload their learning contents, while maintaining its ownership. The data in the OCT can be downloaded by anyone freely and openly. These data are also the data sources for OCW and OED, thus the OCT is the center of the learning contents for I-OER.

The most important features in the OCT are sharing and searching of learning contents. Besides the ability for users to download the learning contents, ontology learning object is developed to support the openness of learning content that is based on previous research (e.g., Banlue, Arch-int, & Arch-int, 2010). The basic idea of the ontology design is to separate all sub-materials on any material, so that the data stored on the ontology are formed granularly. These data should be small enough to be reused, but should still be able to represent relevant context to a sub-material (Ashley, Davis, Pinsent, 2008). The data on the OCT in the beginning are stored in the local database as the primary data layer. Furthermore, all materials contained on OCT are mapped into OWL/RDF-based ontology as a secondary data layer. If someone wants to create a new material, the user does not have to use all the content in an existing material, but he can only take the relevant contents through sub-materials that have been separated before. Additionally, the data that are already mapped into the ontology can be reused further by other systems by applying semantic web technology that supports OWL/RDF format.

Ontology-based learning object searching technique is applied to conduct a search of existing learning contents. The searching system applies semantic web technology using data that is already mapped into the ontology. Information displayed by search results are learning contents available on the OCT. In addition, the system also displays the sub-material corresponding to the keywords entered by the user. With this feature, users not only can take existing materials as a whole, but they can also take

the needed sub-material without having to take all the material. This can be achieved because those data already exist in the form of granular learning content. In addition, by applying semantic web technology, a material or sub-materials, which are not the keywords entered by user but related to the search results, can also be displayed by the system.

Figure 2. Open Content

3.2 OpenCourseWare

The knowledge offered in Open Content is still in separate files, which means there is no explicit information about the connectedness of its content. Whereas, some files may represent same or similar topic and may complete each other in terms of comprehensive study on a topic. Therefore, in Open Courseware, the learning resources are arranged into more organized structure which represents their content toward a topic. Furthermore, the topics are also grouped into related course which means in Open Courseware the learning resources can be accessed as one package of a courseware.

Usually, the OpenCourseWare served learning resources that are also used in regular face-to-face lectures, which are then uploaded to make it accessible online. Massachusets Institute of Technology (MIT) is a pioneer in this matter, as in 2001 they started to publish their courseware via MIT Open Courseware. In one occasion, they emphasized that MIT Open Courseware was only giving away the courseware, and not the education service itself (Pisutova, 2012). MIT states that the courseware they provided is not a substitute for regular lecture, because the real education service is a combination of direct interaction of learner with the lecturer, other learners, and also the learning resources.

Accordingly, this Open Courseware (OCW) service offers learning resources in group of courseware. Information about the course is provided as much as possible, so that the learner can anticipate the content before downloading the files available. The learning resources available include but are not limited to slide, lecture note, video, and audio. The self-assessment material is also included, so that the learner is able to measure the result of their learning activity. OCW also provides searching facilities based on keyword in course description or in the learning resources itself. This service can be fully accessed without any registration or any payment involved.

3.3 Open Education

Open Education can be viewed as the further development of Open Courseware, which does not only offer learning resources but also education services online. This concept is also a development of e-Learning concept in terms of openness and scalability, in which Open Education focuses to open the learning opportunity to everyone without any boundaries and is also designed to support massive number of participants. Open Education is also known as Massive Open Online Course (MOOC), first introduced in 2007 by David Wiley from Utah State University in United States. The first MOOC class was held as a lecture on topic of "Open Education", virtually attended by around 50 learners from 8 different countries (Pisutova, 2012). Then, since early 2012, a number of similar services have flourished, such as Coursera, Edx, and Udacity.

Accordingly, this Open Education service offers a complete learning environment to support learner's learning activity. The learning environment includes learning resources, learning assistant (lecturer), and assessment activity. Furthermore, there may be other learning activities such as discussion and online live lecture that occurred synchronously or asynchronously, depending on the needs of each course. Its main focus is to facilitate the learner with thorough assistance and well designed learning activity. The timeline may vary from one course to another, and in the end of each class the learner receives a certificate of completion which should reflect the learner's competence in the course attended.

4. Further Work: Design of the User Experience Evaluation for the Indonesia Open Educational Resources

User Experience evaluation is essential to measure users' perception about the application. Although the Indonesia Open Educational Resources system is new, we have already created a design for the evaluation of the system. The purposes of the evaluation are: (1) to understand users' experience while using the proposed Indonesia Open Educational Resources platform; and (2) to apply multi-methods approach in evaluating user experience. The evaluation will not only benefit the OER developers, but also User Experience researchers.

We will use User Experience Questionaire (UEQ, Laugwitz, Held, Schrepp, 2008; Laugwitz, Schrepp, Held, 2006; Laugwitz, Schubert, Ilmberger, Tamm, Held, & Schrepp, 2009) to measure users' experience while using the I-OER. The UEQ has been used in a variety of research contexts, such as business software evaluation (Rauschenberger, Hinderks, & Thomaschewski, 2011), web sites and web services evaluation (Hartmann, 2011), and social networks evaluation (Hartmann, 2011). The questionnaire contains 6 scales with 26 items in total:

1) *Attractiveness*: annoying/enjoyable, good/bad, unlikable/pleasing, unpleasant/pleasant, attractive/unattractive, friendly/unfriendly.
2) *Efficiency*: fast/slow, inefficient/efficient, impractical/practical, organized/cluttered.
3) *Perspicuity*: not understandable/understandable, easy to learn/difficult to learn, complicated/easy, clear/confusing.
4) *Dependability*: unpredictable/predictable, obstructive/supportive, secure/not secure, meets expectations/does not meet expectations.
5) *Stimulation*: valuable/inferior, boring/exciting, not interesting/interesting, motivating/demotivating.
6) *Novelty*: creative/dull, inventive/conventional, usual/leading edge, conservative/innovative.

Furthermore, at least one hundred Computer Science students at one of reputable universities in Indonesia will be invited to use and complete the UEQ. The students will be informed about the I-OER and purposes of the study. In addition to the questionnaire, we will ask three experts to perform heuristics evaluation and at least five users to conduct usability testing. To perform usability testing, we will create relevant task scenarios.

Acknowledgements

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