

## OPEN-SOURCE IMPLEMENTATION FOR E-LEARNING SYSTEM IN INDOONESIAN UNIVERSITIES

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### ABSTRACT

University and educational organizations have different strategies in deploying E-learning systems, one of which is the use of open-source e-learning systems. This research is designed to analyze the implementation of e-learning system using open source in the Indonesian universities. The survey result shows that the majority of e-learning system from public and private universities in Indonesia use open source which is integrated to the university portal. The integration is considered favorable as it generally improve the content quality of e-learning system. This survey shows that the most frequently used open system system in Indonesian university is moodle. The finding also indicates that the content of e-learning websites of the Indonesian Universities is relatively low in quality compared to world class universities e-learning website.

### Keywords :

### I. INTRODUCTION

The environment of higher education is continually evolving. Rising cost, shrinking budgets and an increasing need for distance education causes educational institutions to reexamine the way that education is delivered (Report, 2007). In response to this, e-learning is being implemented more and more frequently in higher education, creating new and exciting opportunities for both educational institutions and students.

E-learning, or electronic learning, has been defined in a number of different ways in the literature. In general, e-learning is broadly used to describe "instructional content or learning experience delivered or enabled by electronic technologies"(Ong, 2004). Other definitions of e-learning are more restrictive than this one, for example Jones (2003) limits e-learning as is a content delivery via the Internet. The broader definition, is used in this article, thus e-learning in this article can include the use of the Internet, intranets/extranets, audio and videotape, satellite broadcast, interactive TV, and CD-ROM, which are not only for content delivery purpose, but also for interaction among participants (Canada, 2001).

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The variations in the configuration of e-learning features can be described through a number of attributes which can be classified into the dimensions of synchronicity, location, independence, and mode. An e-learning course component can be described by indicating which one of the two attribute values from each dimension is applicable for instance e-learning can be synchronous (real-time) or asynchronous (flex-time). Synchronous e-learning includes technology such as video conferencing and electronic white boards (Romiszowski, 2004), thus requiring students to be present at the time of content delivery. Meanwhile, asynchronous applications include programmed instruction and tutorials that allow students to work through the screens at their own pace and at their own time. Most of the courses available on the Internet are based on this asynchronous model (Greenagel, 2002). Students can be involved in e-learning from distributed locations, as in distance-learning, or from the same place, such as using a group support system in a classroom to work on an assignment (Gunasekaran, 2002).

There are three strategies can be used during the implementation of e-learning system:

1. Purchasing software from an external vendor in which an external resource either provide a system or acts as a representative of one. One of the advantages of doing so is to speed up the process of creating an E-learning system and its contents for the requesting university. By using this approach, the university does not have to be burden with the possible technical problems of the system, since such problems are of the vendor responsibility. In addition, the required manpower is mainly provided by the vending company. However, there is some withdrawal experienced by using this method. Firstly, the university does not have much choice on the rules or capabilities of the virtual education system or its user interface and cannot expect much more from what the system offers. Secondly, the cost of such systems is very high and in most cases the budget needed for purchasing them is out of the question. Finally, perhaps the most important disadvantage of this option is the user interference and the conflict of the interests of the two parties involved which are a commercial company seeking higher profit resulting from admitting more and more students into various fields of studies conflict with the university interest to maintain its quality of education.

2. Purchasing software from an external vendor and producing the contents internally. By using this approach the university responsible in developing content. This solution has more economic. However there are very limited options in producing the contents, as well as limited choice on how to produce the contents. On the other hand, it is obvious that software system developers have special methods for creating contents for their software which even if their method is not fully compliant with the existing educational standards, it will have better performance. This, in turn, requires extra money and efforts of the university personnel and the faculty members. Therefore, if money is not an issue, the first solution seems to be more viable than the second one, unless the university insists on producing its own contents. (Angelova, 2003)
3. Designing and implementing the E-learning system internally. The third approach is to design an electronic educational system using the university's internal resources and expertise. By applying this approach, the university has access to a full range of design options, able to design the desired capabilities and produce the appropriate contents. However, despite all these advantages, this approach has some adverse effects too. One of those is that university personnel will experience time consuming software development. In addition, the expertise chosen for the production team must be fully familiar with the standards of E-learning systems for which in most cases, some training classes are held to educate the team. In other words, to produce such systems, it demands a close collaboration between the IT professionals and the educational experts. The truth is, reaching such coordination between various professional groups in a university can not be achieved easily and the current structure of the IT groups in universities may not have the technical knowledge to produce such software. Therefore, if the production team's output is low, the actual overall expenses for this approach would be higher than the solutions A and B (Bouras, 2006).
4. Deploying the open-source E-learning systems. Using the open source E-learning systems can be thought of as a mid-way solution that includes the advantages offered by the previous solutions. Presently, there are several open-source E-learning systems which support different capabilities. Some of the advantages of using such systems are their diverse available capabilities that can be selected and used by the university based on its needs. On the other hand, the open-source

provides opportunity to add specific features to such systems according to the universities needs by in-house professionals. In addition, since this type of systems usually belong to a very large group of programmers, they are regularly updated and in each release their found technical problems are resolved and upgraded. Moneywise, all these open-source programs are freely available to the general public. Nevertheless, there are shortcomings in using these systems too one of the most important shortcomings of using the open-source systems is the security issue. Of course, because of the frequent upgrading of such systems, any aroused problem would be solved quickly, but some special security issues will still remain (Cole J., 2007).

Today, it is estimated that there are already more than 250 providers of commercial Learning Management Systems (LMS). In addition, there were recently identified more than 40 open source LMS offerings (some of the most well known are Moodle, ILIAS, eduplone, claroline and SAKAI). Most of these products have extensive developer communities and present strong arguments for considering open source applications like an alternative to commercial products. Some of the criteria that are in favor of making a decision regarding an open source software applications are related to cost savings, stability, performance and access to code. On the other hand, for ensuring that users in the near future as well as the longer term have access to the best available applications, these open source software applications should be built on open standards. It remains to be seen if open source e-learning technologies will capture the current or future market share from commercial providers, but the important thing in the process of making a decision regarding the adoption of certain e-learning software for education is to consider all software options and make a choice based on their merits. Specifically, in the open learning environment, open source model promotes freedom to choose, increases user access/control, encourages link to a global community, promotes quality, and enhances innovation in teaching and learning (Coppola, 2004).

Based on evaluation to identify the most suitable open source e-learning platform for extending to an adaptive one, nine open source platforms were analyzed in detail, and moodle obtained the best results in the general as well as in the specific adaptation evaluation (Graf, 2005).

**Table 1.** Results of the Adaptation Category (Graf, 2005)

	adaptability	Personalization	Extensibility	Adaptivity	Ranking
Maximum values	*	#	*	*	
ATutor		#	#		3
Dokeos		0	*	+	2
dotLRN	+	+	*	0	2
ILIAS	+	#	*	0	2
LON-CAPA	+	#	#		2
Moodle	#	+	*		1
OpenUSS	#	#	#	0	2
Sakai	0	0	*	0	3
Spaghettilearning	+	#	+	0	3

There are many dimensions of e-learning website quality, and each measure will pertain to a particular website in varying degrees. One of the dimensions is content. Number of the links, or link popularity is one of the off page factors that search engines are looking to determine the value of the e-learning webpage content. Most of search engine will need a website to have at least two links pointing to their site before they will place it to their index, and the idea of this link popularity is that to increase the link popularity of a e-learning website, this website must have large amount of high quality content. Number of links to website improves access growth and helps to generate traffic (Page, Brin, & Winograd, 2003).

$$PR(A) = (1-d) + d(PR(t1)/C(t1) + \dots + PR(tn)/C(tn))$$

PR = page rank

t1 - tn = are pages linking to page A

C = is the number of outbound links that a page has

D = is a damping factor, usually set to 0.85.

Search engine such Google make a citation analysis to rank hits, then a website which has a many links to it will have a higher ranking compare than a website with a few links. This indicator can be used to measure the quality of web site.

## II. DISCUSSION

### 1) Problem Identification

The problem addressed in this study was to investigate implementation of elearning system using open source in the Indonesian universities. To conduct the study, we raised the following some research questions:

- How many percentages Universities in Indonesia implement e-learning in their learning process?
- How many percentages Universities in Indonesia use open source software as e-learning system?
- What is the most frequently used open source Learning Management System (LMS) implemented in Indonesian Universities?
- Is the e-learning system of Indonesian universities already well implemented and recognized by search engine and easy to access?

## 2) Data

In order to get the data for this research, we examined the entire list of 50 best universities in Indonesia issued by higher education directorate Indonesian ministry of education (DIKTI) and another 10 universities in Indonesia based on link popularity tools provided by [www.google.com](http://www.google.com). By doing this approach, it is expected that the the study of the e-learning websites in this survey is justifiably represent the condition of Indonesian university generally.

### III. RESULT AND ANALYSIS

The results of the open source implementation in the Indonesian universities are showed in table 2. This table consist of two groups of universities, public and private universities. Every group consist of 30 data and the data show the percentage of university provide e-learning facility, the percentage every type of LMS is used, the most frequently used LMS and the portion of e-learning facilities integrated with university portal.

**Table 2.** Open-Source implementation in Indonesian Universities

<b>E Learning</b>	<b>Public University (N=30)</b>	<b>Private University (N=30)</b>
Provide E-learning facility	20 (66.6%)	19 (63.3%)
Open source based LMS	17 (85%)	13 (68.5%)
Appropriately software LMS	1 (5%)	1 (5.3%)

Own development software LMS	2 (10%)	5 (26.3%)
Most frequently used LMS software	Moodle (11/64.7%)	Moodle (13/100%)
Connected to university website	16 (80%)	15 (79%)

Data analysis from table 2 shows that the rate of University provides e-learning system is quite good and the overall result describes this condition (66.6% for public university, 63.3% for private university). The majority of the software implemented in e-learning system is based on open source software, 17 out of 20 for public universities (85%) and 13 out of 19 for private universities. The most frequently used open source based LMS is Moodle. This can be seen from the table 2, that almost 64.7% public universities and 100% private universities use this software. Almost 80% of all e-learning system connected to the university website which is a good indication as the integration will improve the content quality of e-learning system.

**Table3.** Testing Result for Number of Link in Search Engine

Number of link		Public Universities (N=20)	Private Universities (N=19)	World Class University (N=28)
Google	0	3	4	0
	<100	17	15	0
	>100	0	0	27
	> 1000	0	0	1
Yahoo	0	1	1	0
	<1000	13	14	0
	>1000	6	4	21
	>10000	0	0	2/28

Table 4 shows that World Class University outperforms Indonesian universities in term of link popularity. 100% of World Class University has more than 100 links using google search engine, while none of Indonesian University reach that figure. By using yahoo search engine, Less than 50% of Indonesian Universities has more than 1000 links, while 78% World Class University reach this level.

#### IV. CONCLUSION

There are many approaches to employ an E-learning system in universities and educational institutes, one of which is to use open source based Learning Management

Systems (LMS). In this paper, the implementation of e-learning system using open source in the Indonesian universities is investigated. The result of this study confirms that most of Indonesian Universities are seriously encouraging the development of online teaching and learning by embedding the e-learning facility in their web service and the majority of the software implemented in e-learning system is open source software. Moodle is the most frequently used LMS because of its adaptability performance. Future research directions lie in evaluating e-learning performance websites from usability and content criteria and also the quality views from user's perspective.

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