

## Synchronization Interfaces for Improving Moodle Utilization

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### Abstrak

Sebagian besar perguruan tinggi telah menerapkan e-learning dengan menggunakan lebih dari satu LMS (learning management system) seperti Wordpress dan Moodle. Pemanfaatan e-learning di negara berkembang menimbulkan kesulitan yang terutama disebabkan oleh keterbatasan dan mahalnya infrastruktur internet. Oleh karena itu, untuk meningkatkan penggunaan Moodle dalam e-learning, maka dua antarmuka sinkronisasi ditampilkan pada paper ini, yaitu antarmuka untuk Moodle dan Wordpress, dan antarmuka untuk Moodle portabel yang berfungsi sebagai LMS offline dan Moodle yang berfungsi sebagai LMS online. Moodle portabel diinstal di dalam notebook guru dan murid, sedangkan Moodle dan Wordpress terinstal dalam server. Tujuan dari penelitian ini adalah untuk meningkatkan penggunaan Moodle dalam pembelajaran. Ada pun hasilnya sangat memuaskan. Guru dan murid mampu menggunakan kedua antarmuka ini dengan mudah dan aman, karena diperlukan guru/murid ID, mata kuliah ID, username dan password untuk login ke dalam sistem.

**Kata kunci:** antar muka, learning management system, Moodle, sinkronisasi

### Abstract

Many universities have applied e-learning on more than one LMS (learning management system) platforms such as Wordpress and Moodle. In addition, difficulties implementations in developing countries have occurred. Those are mainly caused by limitations and expensive of internet infrastructure. Therefore to increase Moodle application as an e-learning system, the paper proposed two synchronization interfaces. The first interface is for Moodle and Wordpress. This assists teachers to migrate their learning material in their blog in Wordpress into Moodle. Second interface is for Moodle portable performing offline LMS and Moodle performing online LMS. Moodle portable was installed in teachers and students notebooks. Moodle itself was installed and run in e-learning server. The aim is to improve Moodle utilization in the class. The results showed satisfied outcomes. Students and teachers could employ the interfaces easily and secure as they have to login using student/teacher ID, course ID, username and password.

**Keywords:** interface, learning management system, Moodle, synchronization

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### 1. Introduction

Mostly higher education institutions have been improving their way of learning process by utilizing LMS (learning management system) or CMS (content management system). Many kinds of open source LMSs or CMSs as e-learning system to be chosen such as Moodle, Blackboard, Wordpress, and Joomla. In order to improve e-learning service to teachers and students, an integration or synchronization between them is needed.

Moodle is a popular open-source LMS that is applied in many education institutions [1]-[4]. Accordingly everyone allow to add module or plug-in to improve its capability. However LMS implementation is still relatively difficult especially in developing countries. Such difficulties are mainly caused by limitations of Internet infrastructure and its cost. Hence both students and teachers cannot stay online to access the LMS all the time. One possible way to overcome this problem would be the use of LMS offline. Students can do their assignments and learn all materials without Internet connection. When they finish all the assignments, then they access Internet to submit them easily. Therefore interface is required to synchronize offline Moodle with

online Moodle. To meet these requirements, a Moodle plug-in: synchronization interfaces for Moodle were built. With this plug-in, both teachers and students can improve utilization of Moodle in their class. As a result the paper proposed two interfaces to synchronize Moodle and Wordpress, and offline Moodle with online Moodle.

## 2. Learning Management System and E-Learning

E-learning could be implemented for both face-to-face meeting and distant learning. The purpose of the use of technology to deliver training material to a target audience in a cost-effective, productive and sustainable manner is essential especially in higher education system. However the implementation of the learning systems requires high creativity that is time consuming. This applies to both the system and the educational content. Some papers report that technology application in learning process yielded better students' performance. The results were the increase of the students' scores; most of the students expressed their interest to the subject, their understanding of the subject benefit in science and engineering, and their approval of utilizing learning media [5]. Furthermore is a report from U.S. Department of Education [6]. The report confirmed that on average, students in online learning conditions performed better than those receiving face-to-face instruction. The difference between student outcomes for online and face-to-face classes-measured as the difference between treatment and control means, divided by the pooled standard deviation-was larger in those studies contrasting conditions that blended elements of online and face-to-face instruction with conditions taught entirely face-to-face. The effects of competitive learning on the satisfaction and the academic achievement of telecommunications students were examined in [7]. The paper presented significant results on the use of competitive e-learning tools in university students' outcomes and satisfaction.

There are several factors to be examined before adopting an e-learning solution. A comprehensive e-learning solution comprises three key elements has been proposed in [8], as shown in Figure 1. Technology, content development, and services should be considered to achieve a viable and sustainable e-learning system. Technology plays a fundamental role in facilitating e-learning by allowing for a range on content delivery options. Figure 2 illustrates the range of technologies that have positioned E-learning as a viable institution training option.

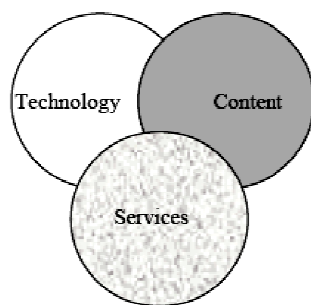


Figure 1. Comprehensive e-learning solution [8]

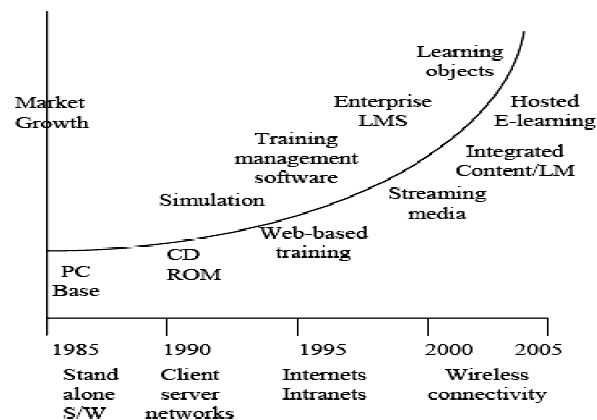


Figure 2. E-learning technologies [9]

The global economic expansion, networking advances, together with the expansion of the Internet and the emergence of e-learning encouraged the development of LMS products. LMS provided the means for human-resource managers to manage both classroom training and the growing body of e-learning content. LMS is a software product that automates the administration of training events [10]. The LMS registers users, tracks courses in a catalogue, and records progress from learners; it also provides reports to management. An LMS is typically designed to handle courses by multiple publishers and content providers. LMS is a web-technology based, such as WebCT, Moodle, etc., conferencing and discussion systems, and

rich multi-media content. Moodle application is getting popular in education institutions as it is open-source products under GNU license. Moodle is packet software that consists of Moodle, Apache, MySQL and PHP applications [1].

Other proprietary LMS product named adaptive hypermedia courseware (AHyCo) has been implemented in a blended e-learning model [11]. The model is based on a mixture of collaborative learning, problem-based learning (PBL) and independent learning, in a course in Information Science, at the University of Rijeka, Croatia. The results showed that students were satisfied with the pedagogical approach, and their academic achievements were also better than expected. Particularly important is that the dropout rate was greatly diminished, which could be related to students' satisfaction with the support they received from the instructor and the system.

Display of a web lab through a browser delivered by an LMS as a part of SCORM standard packaging and a service-oriented architecture which allow integrating multiple LMSs (Moodle, .LRN, Claroline, etc.) with iLabs and multiples web a remote labs were proposed in [12]. On the other hand, a prototype of offline web application and task synchronization in e-learning activity addressed issue of an expensive Internet infrastructure [13]. This system utilizes the offline application capability and web storage of HTML5 enabled mobile web browser to bring an offline user interface to students. Using this system students are able synchronize their mobile phone with campus Moodle for task retrieval/submission during their time in campus and later doing the task at home without having to get online. Besides giving the concept, a prototype has been implemented to show its functionality. Furthermore intelligent Avatar for 3D tutor in e-learning system has been proposed in [14]. The Avatar which is called Emo-Avtar, is a multimodal expression of human senses. Most users gave positive response to the 3D tutor.

### 3. Implementation Phase

Implementation phase consists of two stages, i.e. a preparation and development stages. In this phase, Moodle was proposed to be implemented in e-learning system in electrical engineering department, Udayana University. The full package application was installed in local server and acted as online LMS. Then Wordpress was installed in web server as teachers' personal blogs. In addition Moodle Portable was installed in teacher and students notebooks and acted as off-line LMS.

#### 3.1. Preparation Stage

Some works should be accomplished in preparation stage. Details of works were preparing hardware and software, exploring all features and plug-ins of Moodle portable, Moodle, Wordpress, designing and implementation of synchronization interfaces tools. Figure 3 displays Moodle portable. Server, personal computers, and notebooks are major hardware in this stage.

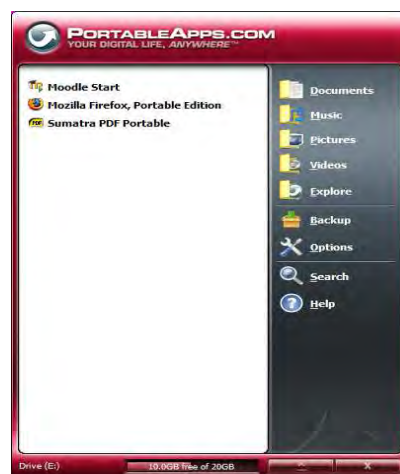


Figure 3. Moodle Portable

Moodle as the main application was downloaded from <http://www.moodle.org> and run in Linux environment. The interface required supporting from other applications, i.e. PHP, MySQL, SSH, Apache, HTML, and Java script.

## 3.2. Development Stage

### 3.2.1. Interface of Wordpress and Moodle

In development stage, two-ways synchronization interface was designed and developed. Synchronization only can be done by authenticated users for example authentication of course id, student id, username and password. Therefore the system is secured. Moreover the interface will help teachers to insert their learning materials automatically from Wordpress into Moodle by simply clicking interface button. Figure 4 describes the synchronization process between Moodle and Wordpress.

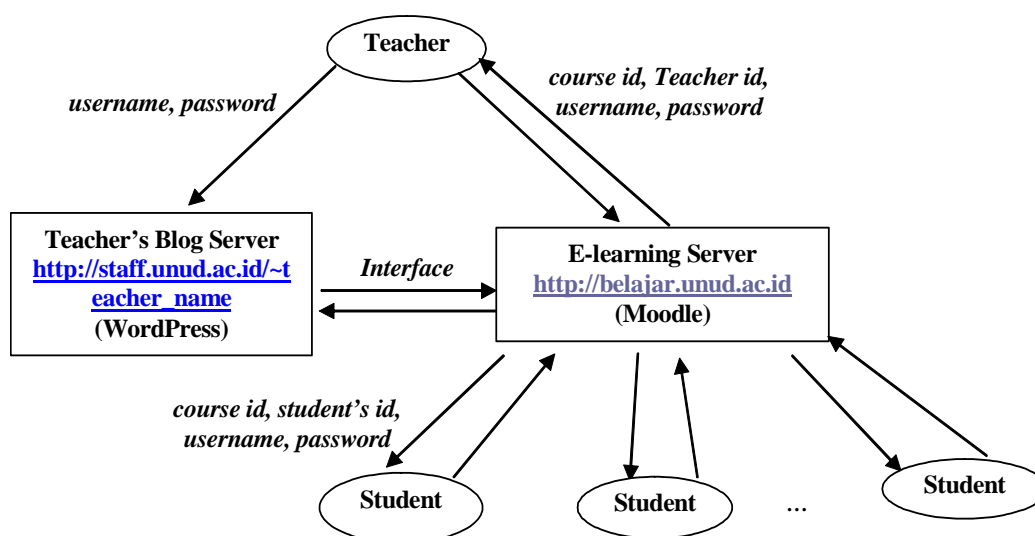


Figure 4. The synchronization design of Wordpress and Moodle

### 3.2.2. Interface of Moodle Portable and Moodle

Similar with interface of Wordpress and Moodle, the system is designed secure. Barely authenticated users be able to log into the system. Moreover the interface will help students and teachers in doing the assignments, learning and preparing materials in Moodle without Internet connection. They can upload their assignments and materials directly into Moodle in e-learning server by simply clicking interface button. The assignments will be inserted automatically into their students' pages in Moodle. Figure 5 describes the synchronization process between offline LMS (Moodle portable) and online LMS (Moodle in the server).

When the students need to upload or download from Moodle to their Moodle portable or vice versa, they have to choose synchronization types. They select *server-to-client synchronization* when they download assignments or learning material from Moodle. In addition, *client-to-server synchronization* is selected, when the students upload their assignments or quiz. At synchronization process, *Insert Into* of PHP function for MySql is applied to insert database from master to slave. Moreover, *update* function is used to update the database in both Moodle and Moodle portable.

## 4. Results and Analysis

### 4.1. Synchronization of Wordpress and Moodle

A two-ways synchronization interface for Wordpress and Moodle yields good results. The synchronization has good security as it is implemented only by authenticated users. Figures 6 and 7 present the interface implementations.

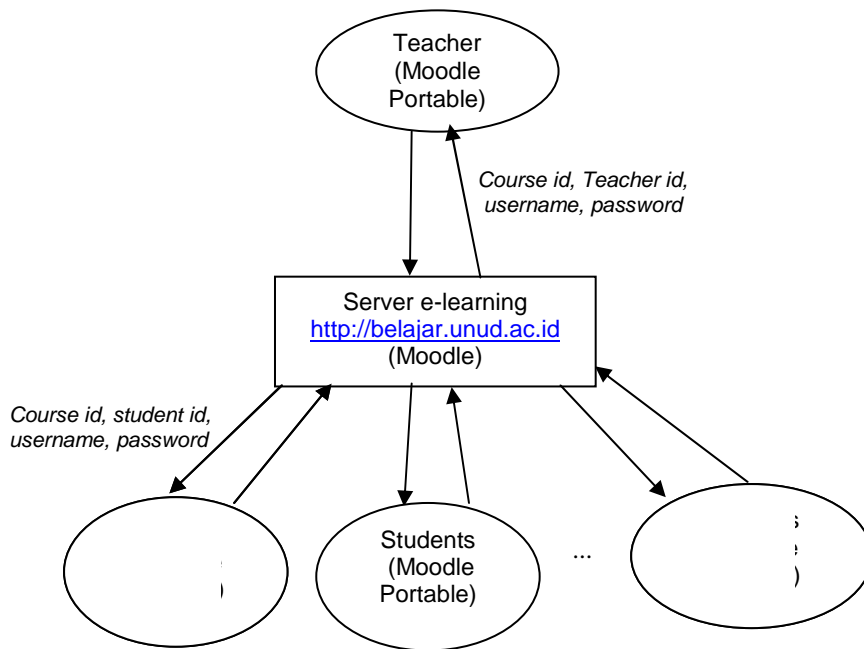


Figure 5. The synchronization design of Moodle Portable and Moodle

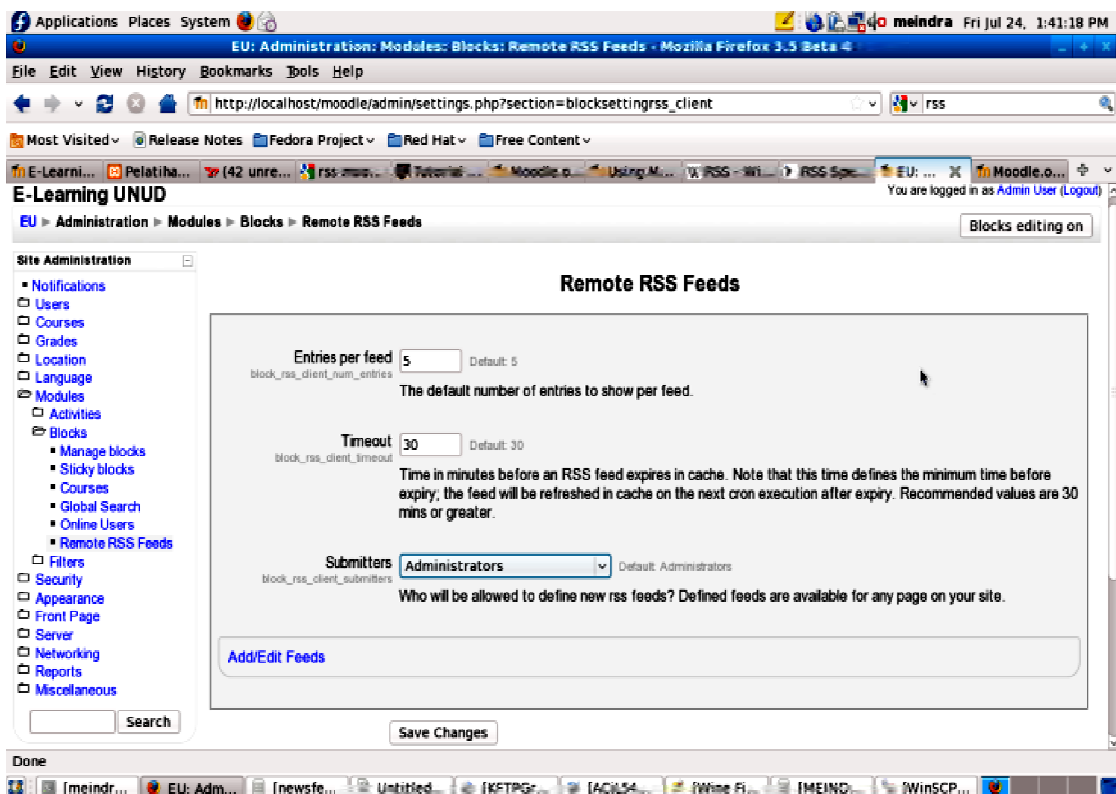


Figure 6. RSS feeds configuration in Moodle

**4.1.1. Interface of Wordpress to Moodle**

Below are steps to display personal blog used Wordpress into e-learning system used Moodle:

- Address of RSS (Rich Site Summary) of the blog (wordpress) has to be identified, for example <http://www.unud.ac.id/eng/?feed=rss2>. Moodle in default mode has no RSS service of any sites; therefore a plug-in must be added. *Newsfeed* is the plug-in to be added to display RSS of a site.
- Add *newsfeed* plug-in.
- Place *newsfeed* file in blocks directory of Moodle.
- Login Moodle as an administrator, and then choose notifications.
- If there is no error occurred, choose continue.
- Then administrator has to set RSS feed as follows. In administrator page, choose modules, then blocks and remote rss feeds. There are three options as seen in Fig. 6, i.e. 'Entries per feed' is for number of RSS, 'Timeout' is for decision of RSS feed expired, and 'Submitters' is for someone who has authorization to add or edit RSS feed.
- Click add/edit feeds, followed by RSS address of site and click Add, then Save Changes.
- 'Editing on' menu for adding or editing the RSS feed.

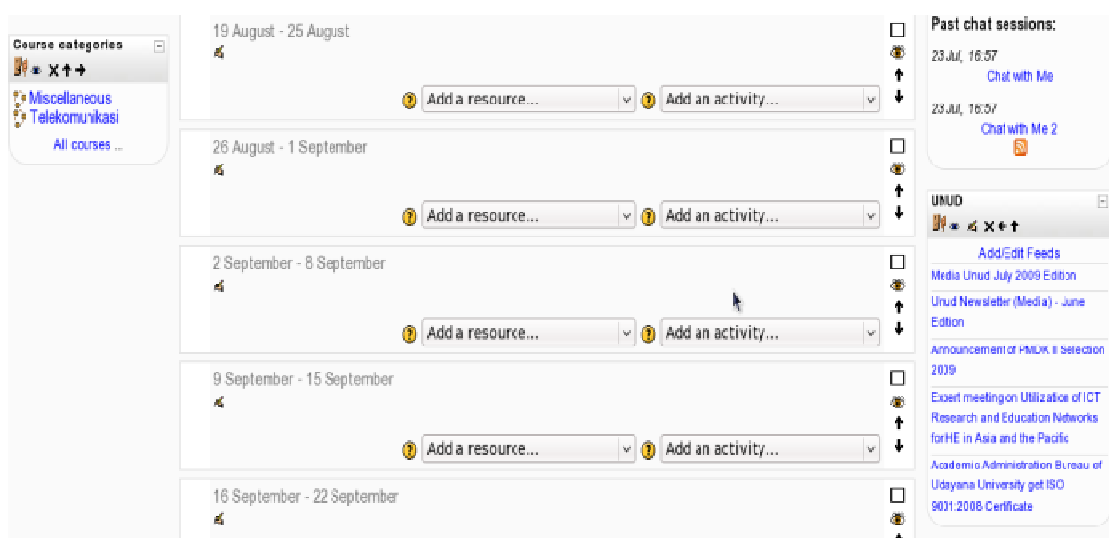


Figure 7. Blog (Wordpress) displays in Moodle

#### 4.1.2. Interface of Moodle to Wordpress

On the other hand, learning contents in Moodle can be displayed in Wordpress using RSS too, as presented in Figure. 8. However RSS of Moodle has to be created in Moodle itself as follows:

- Copy file *block\_recent\_activity.php*, *config\_instance.html*, and *rsslib.php* into directory */blocks/recent\_activity/*.
- Copy file *file.php* into directory */rss*.
- Login Moodle as a teacher in the course page which the RSS will be presented.
- Click turn editing on button, then at blocks, choose *recent activity*.
- Set on *recent activity* by activating enable *rss feeds*.
- Display RSS Moodle in wordpress by login as an administrator in wordpress; add pages, followed by copying script below into wordpress page (HTML).

```
<iframe name="Menampilkan Moodle ke dalam wordpress"
src="http://172.16.40.113/Moodle/rss/file.php/3/3/block_recent_activity/46/rss.xml"
marginwidth="0" marginheight="0" readonly="false" vspace="0" hspace="0"
allowtransparency="true" scrolling="yes" width="800" frameborder="0" height="600"></iframe>
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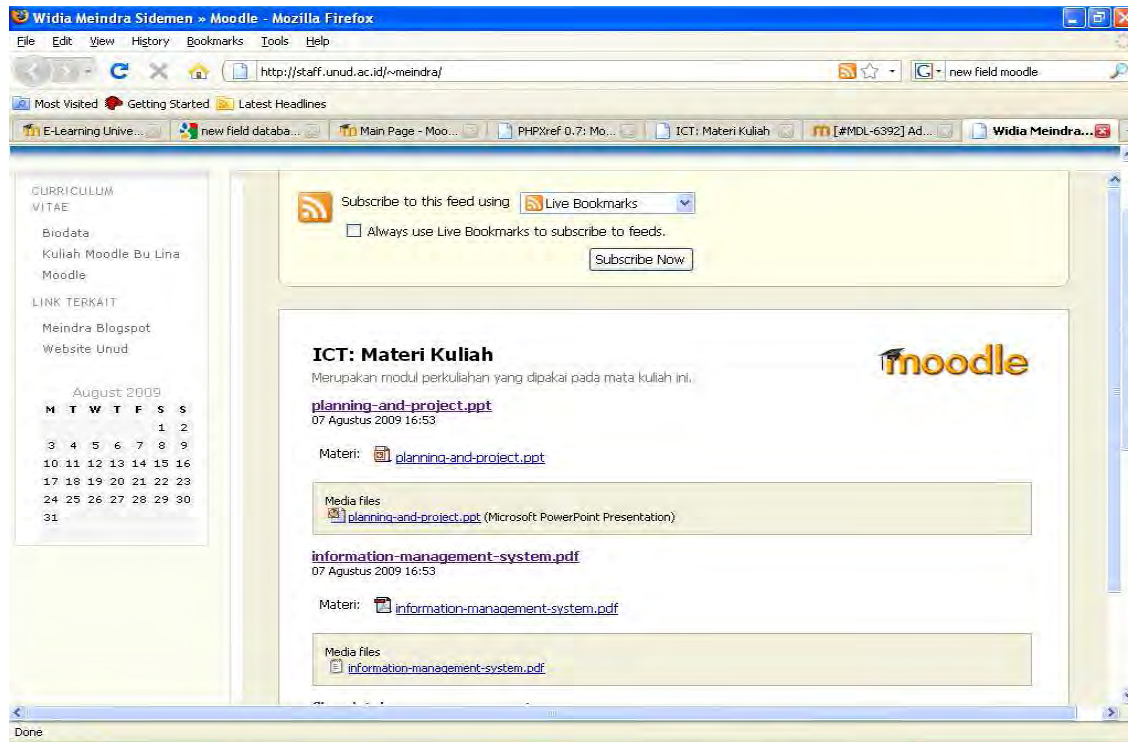


Figure 8. Moodle displays in Wordpress page

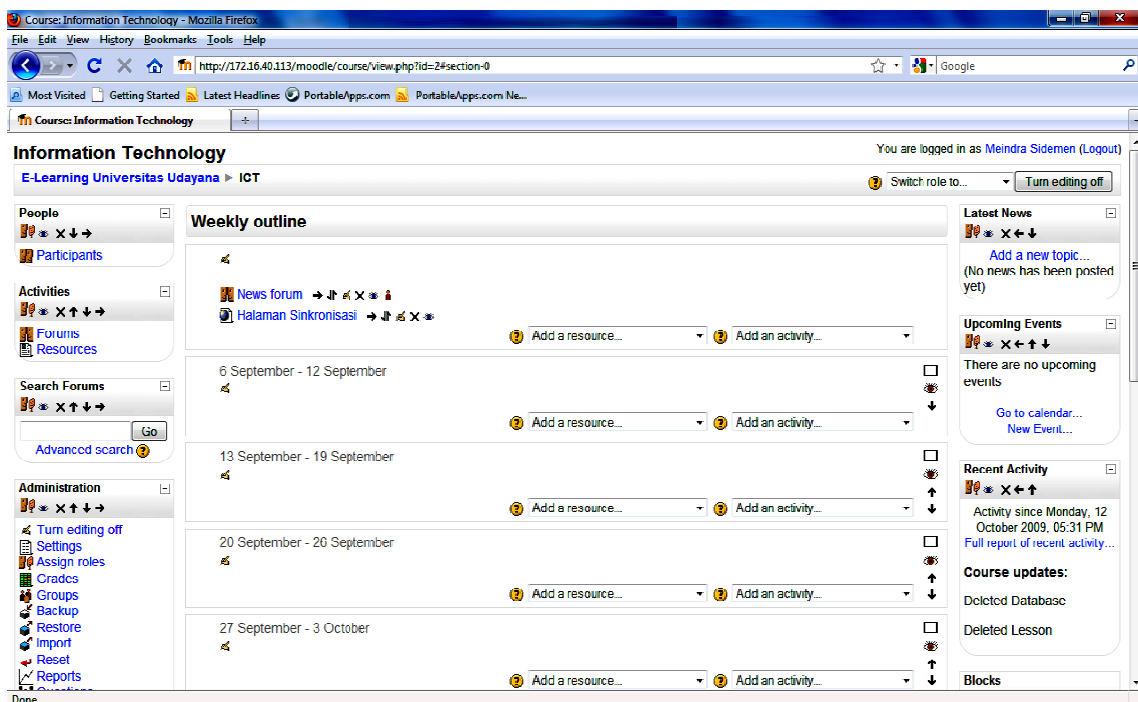


Figure 9. The synchronization command in Moodle

#### 4.2. Synchronization of Moodle Portable and Moodle

A two-ways synchronization interface for Moodle Portable (offline LMS)-Moodle (online LMS) yields good results. The interface application has to recognize as a teacher or a student.

As a teacher, someone has to set up a course in e-learning server and register in the server (<http://172.16.40.113/moodle/>) to get username and password. When the teacher or student uploads or downloads learning materials, she/he selects synchronization command and login in (<http://172.16.40.113/sinkronisasi/>), as seen in Figure 9 and 10.

Figure 10 presents that both students and teachers have to type the username and password in the synchronization page. The username and password have to be the same as in the Moodle account. Then Figure 11 displays the synchronization types, either *server-to-client* or *client-to-server* options. *Server-to-Client* command is for downloading and *Client-to-Server* is for uploading from users sides.

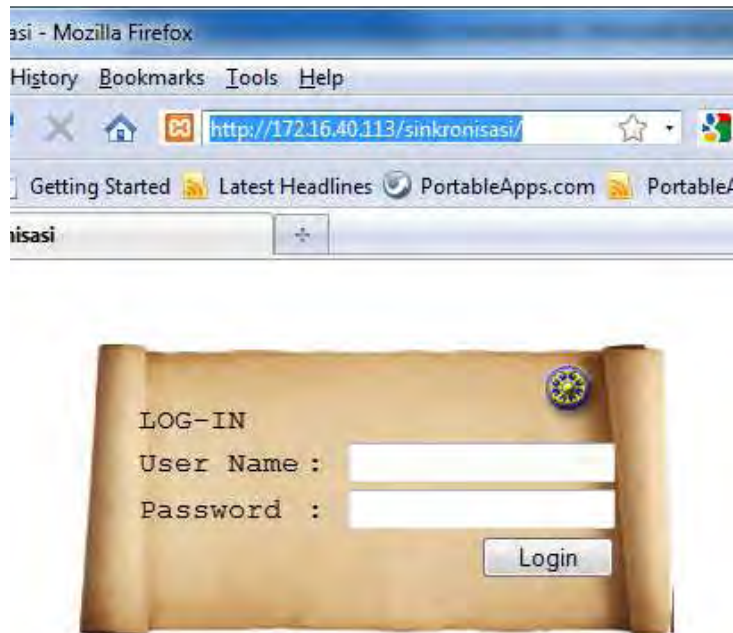


Figure 10. The synchronization web-page



Figure 11. The synchronization option



In the Moodle portable (<http://localhost:8101/moodle/>), both teacher and students can create and prepare quiz, lesson, slides, etc. in any type of file such as .doc, .pdf, .ppt, etc. To do that, they have to login with the same Id as in the Moodle in e-learning server. In particular to upload .doc, .pdf, .ppt file, they have to open web browser <http://localhost:8101/ftp/> as shown in Figure 12. The synchronization utilized php and mySQL scripts, i.e. *insert into* and *update* functions. The synchronization has its own webpage, however employs database of Moodle.



Figure 12. Upload file webpage

## 5. Conclusion

Throughout the research, Moodle has been enhanced its features for e-learning by developing two-ways synchronization interfaces for both Wordpress with Moodle, and Moodle Portable performing offline LMS with Moodle performing online LMS. The interfaces have worked well to assist teachers and students using Moodle, especially in developing countries where the Internet connection is still a big issue. They are simple to use and have high security system, since course id, user id, user name, and password are required to login the system. Thus the interface is expected to increase the efficiency of teaching and at the same time is effective for learning. Therefore, they can take advantage of the synchronization interfaces. Further work will develop the interfaces for mobile learning with various mobile devices.

## Acknowledgement

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