

DEVELOPING E-LEARNING FOR INTRODUCTION TO COMPUTERS COURSE USING MOODLE

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Abstract

Nowadays e-Learning has been widely used to support conventional learning activities because this application provides some advantages for both students and teachers. Combination of this system and face to face sessions in class rooms is known as blended learning. E-Learning uses Learning Management System (LMS) to facilitate "anytime, any place, any pace" access to learning content and administration.

We have been developed e-Learning using Moodle for Introduction to Computers course to support student's learning activities outside classrooms. Introduction to Computers is a supporting course for about 1250 students from 15 majors in Bogor Agricultural University. This course adapts blended learning in which e-Learning is combined with face-to-face meeting in both class rooms and computer laboratories. The system contains 1) static course materials: text pages, web pages, links to digital files including Ms. Word and PDF format, images, and video, and links to other sites; 2) interactive course materials: assignments, quizzes, and survey; and 3) social course material: forum.

Keywords: *e-Learning, blended learning, learning management system*

INTRODUCTION

Introduction to Computers is one of supporting courses for students from 15 majors in Bogor Agricultural University. This course is offered in both odd and even semester. Number of students is about 800 in odd semester, and about 450 in even semester. This course presents an overview of computer technology including hardware, software, data base, information system, computer network and the Internet. This course is intended for undergraduate students in second and third level. Students will be expected to know about computer technology and will be expected to learn to use computers. Learning activities are conducted in class rooms and computer laboratories using printed and digital course material. To support student's learning

activities outside the classroom, we have developed e-Learning using Moodle. The e-Learning contains course contents and evaluation modules such as quizzes. All materials are stored in electronic form that can be easily downloaded by users. Quizzes and assignments will evaluate student's progress in learning activities. Communication between students and teachers take place via online media such as emails and forum.

DISCUSSION

E-Learning

E-Learning is the delivery of a learning, training or education program by electronic means. E-learning involves the use of a computer or electronic device (e.g. a mobile phone) in some way to provide training, educational or learning material. Clark and Richard (2003) define e-Learning as instruction delivered on a computer by way of CD-ROM, Internet, or Intranet with the following features:

- Includes content relevant to the learning objectives;
- Uses instructional methods such as examples and practice to help learning;
- Uses media elements such as words and pictures to deliver the content and methods;
- Builds new knowledge and skills linked to individual learning goals or to improved organizational performance.

Nowadays e-Learning has been widely used to support conventional learning activities because this application provides some advantages for both students and teachers. Below are some advantages of e-Learning:

- Learning is self-paced in which personal learning is managed by individual student. Students can organize speed of their learning activities
- Learning is self-directed, that allows students to select content and tools in accordance with their interests, their needs, and their skills
- E-Learning eliminates geographic barriers
- E-Learning reduces cost of study
- E-Learning will improve user's computer literacy.

Blended learning (also called hybrid learning) is the term used to describe learning or training events or activities where e-Learning, in its various forms, is combined with more traditional forms of training such as "class room" training (Derek

Stockley, 2003, <http://derekstockley.com.au/elearning-definition.html>). Combination of technology-based materials and face to face sessions in class rooms is an example of blended learning. E-Learning can be developed in form of CD-ROM-based applications, Intranet-based or Internet-based applications that allows students to learn course materials any place and any time. Course materials in the system include text, audio, animation, and virtual environment.

E-Learning can be grouped into two categories: asynchronous and synchronous. In asynchronous learning, students decide their own schedule to get course materials. Communication can be conducted anytime via online bulletin boards, online discussion groups and e-mail. In synchronous learning, the schedule is defined before the class begins. Real time discussion is one of features in this learning where teachers facilitate online learning and all students will study the same material at the same time. Synchronous learning can be effectively implemented in the following situations: 1) The systems have reliable network connectivity; 2) Students are required to not doing others activities in their learning steps; 3) Every student has the same level in language ability; 4) Students can provide time as needed.

Quality of e-Learning is determined by not only course content but also methods to deliver the content. Types of course content include images, text, audio, video and combination of them. When course developers select types of content, they need to consider learning methods (Table 1).

Table 1. Types of content related to learning methods

Learning methods	Content
Reading	e-books, textbooks, and other references
Listening	audio for explaining concepts
Looking how something is done	graphical demo to deliver an idea
Doing	assignments, quizzes, exams and examples
Speaking/ Communicating	email, chat, or discussion groups for sharing and feedback

Display on screen should be managed to provide interactive activities such as games and quizzes. Other important features in e-Learning are feedback and interaction facilities. Immediately feedback is required to evaluate student's learning process. Feedback should be available to students as soon as possible because every step in

learning activities is developed based on previous steps. The success of e-Learning also depends on interaction between students and teachers. Online communication via chat rooms, discussion boards, instant messaging and e-mail, will improve the quality of e-Learning.

Learning Management System (LMS)

LMS is a software for training management. Generally LMS is a web-based to facilitate "anytime, any place, any pace" access to learning content and administration.

Below are some examples of open source LMS platforms:

- ATutor - Open Source Web-based Learning Content Management System
- Claroline - Claroline is a free LMS
- Dokeos - Elearning and course management web application
- eFront - Open Source Learning Management System
- ILIAS - Open Source Learning Management System
- LON-CAPA - Open Source Learning Management System with Linked Domains
- **Moodle** - Open Source Course Management System
- OLAT - Open Source Learning Management System

LMSs have some following characteristics:

- Manage users, roles, courses, instructors, and facilities, and generate reports
- Course calendar
- Learner messaging and notifications
- Assessment/testing capable of handling student pre/post testing
- Display scores and transcripts
- Grading of coursework
- Web-based or blended course delivery

One of LMS platforms that has been commonly used in education is Moodle. Moodle stands for Modular Object-Oriented Dynamic Learning Environment. It is an open source learning management system that enables teachers to create online learning courses. Moodle is designed to support interactive learning that provides three categories of course materials: 1) static course material in which students can read the materials but do not interact with them; 2) interactive course material in which students

interact with the materials by answering the questions, writing texts and uploading files;
 3) social course material, where students and teachers interact with one another.
 Categories of course material in Moodle are detailed in Figure 1 (Rice 2006).

static course material	interactive course material	social course material
<ul style="list-style-type: none"> • A text page • A web page • A link to anything on the Web (including material on your Moodle site) • A view into one of the course's directories • A label that displays any text or image 	<ul style="list-style-type: none"> • Assignment (uploading files to be reviewed by the teacher and/or students) • Choice (a single question) • Journal (an online journal) • Lesson (a conditional, branching activity) • Quiz (an online test) • Survey (with results available to the teacher and/or students) 	<ul style="list-style-type: none"> • Chat (live online chat between students) • Forum (you can choose the number of online bulletin boards for each course) • Glossary (students and/or teachers can contribute terms to site-wide glossaries) • Wiki (Wikis can be inserted into courses, or a Wiki can be the entire course) • Workshop (workshops support collaborative, graded efforts among students)

Figure 1. Categories of course material in Moodle

Static course materials can be uploaded into Moodle in various format files: Office files (word processing, spreadsheet, and presentation), images, MP3 files, Flash files, Adobe Acrobat documents and other types of files that commonly used in web-based applications. Interactive course materials include assignment, choice, journal, and lesson (see Table 2 for more detail).

Table 2. Interactive course materials

Activity	Description
Assignment	<ul style="list-style-type: none"> • An assignment is an activity completed offline, outside of Moodle. • the student can upload a file for the instructor's review • the student receives a grade for the assignment.
Choice	<ul style="list-style-type: none"> • A choice is essentially a single, multiple-choice question that the instructor asks the class. • The result can be displayed to the class, or kept between the individual student and instructor.
Journal	<ul style="list-style-type: none"> • Each student can create an online journal. • A journal can be seen only by the student who writes it, and the instructor.
Lesson	<ul style="list-style-type: none"> • A lesson is a series of web pages displayed in a given order, where the next page displayed depends upon the student's answer to a question.

Another form of interactive materials is quizzes that are created for a certain course and can be used for other courses. Below are types of standard quiz in Moodle (Rice 2006):

1. **Calculated:** to create individual numerical questions by the use of wildcards (i.e {x} , {y})
2. **Description:** some text (and possibly graphics) without requiring an answer
3. **Essay:** short answers of a paragraph or two
4. **Matching:** have a content area and a list of names or statements which must be correctly matched against another list of names or statements
5. **Embedded Answers (Cloze Test / Gap Fill):** consist of a passage of text (in Moodle format) that has various answers embedded within it, including multiple choice, short answers and numerical answers
6. **Multiple Choice.** There are two types of multiple choice questions - single answer and multiple answer
7. **Short Answer:** the student types in a word or phrase in response to a question (that may include a image)
8. **Numerical:** looks just like a short-answer question. The difference is that numerical answers are allowed to have an accepted error. This allows a continuous range of answers to be set.
9. **Random Short-Answer Matching:** this looks just like a matching question. The difference is that the sub-questions are drawn randomly from the Short Answer questions in the current category
10. **True/False.** A student is given only two choices for an answer in this kind of question: True or False.

Social course materials include some activities that facilitate communication between students, between teachers, and between students and teacher:

1. **Chat** creates a chat room where students can have real-time, online chats
2. **Forum.** Anyone with access to the course will have access to the forums
3. **Glossary.** Allows participants to create and maintain a list of definitions, like a dictionary
4. **Wiki** enables students to collaborate on a book-like writing project

5. Workshop provides a place for the students in a class to see an example project, upload their individual projects, and see and assess each other's projects

Moodle runs on a web server that supports programming language PHP and databases. This software can work well in Apache web server and DBMS MySQL.

Moodle occupies three places for web host:

- Application located in a directory with some subdirectories for various modules.
- Data files students and teachers upload, such as photos and assignments that are submitted by students, located in the Moodle data directory.
- Course materials located in Moodle database. These materials include all contents created using Moodle (web pages, quizzes, workshops, lessons, etc), grade, users information, and user log.

In addition to students and teachers, Moodle also manages other user categories: administrator, course creator, and guest (Table 3).

Table 3. User categories in Moodle

User Category	Description
Administrator	Administrators can usually do anything on the site, in all courses
Course creator	Course creators can create new courses and teach in them
Teacher	Teachers can do anything within a course, including changing the activities and grading students
Non-editing teacher	Non-editing teachers can teach in courses and grade students, but may not alter activities.
Student	Students generally have fewer privileges within a course
Guest	Guests have minimal privileges and usually can not enter text anywhere
Authenticated user	All logged in users

E-Learning for Introduction to Computers Course

Introduction to Computers is a supporting course for about 1250 students from 15 majors in Bogor Agricultural University. The main goal of this course is to improve both student's knowledge about computer technology and their skill in using computer for completing daily tasks and problem solving. This course adapts blended learning in which e-Learning is combined with face-to-face meeting in both class rooms and computer laboratories. E-Learning has been developed using Moodle in a form of Internet-based application that allows students to learn the course material any place and every time. The system contains 1) static course materials: text pages, web pages, links

to digital files including Ms. Word and PDF format, images, and video, and links to other sites; 2) interactive course materials: assignments, quizzes, and survey; and 3) social course material: forum. We use the three main features in Moodle to develop an e-Learning system for our lectures: 1) Creating courses including evaluation modules; 2) User management and 3) File backup.

The main page displays short explanation about this course and a main reference used (Figure 2). This page contains some contents including 1) News forum in which teachers can post some topics, and students can reply these topics; 2) More about references; 3) About the lecturers that displays a list of the teachers.

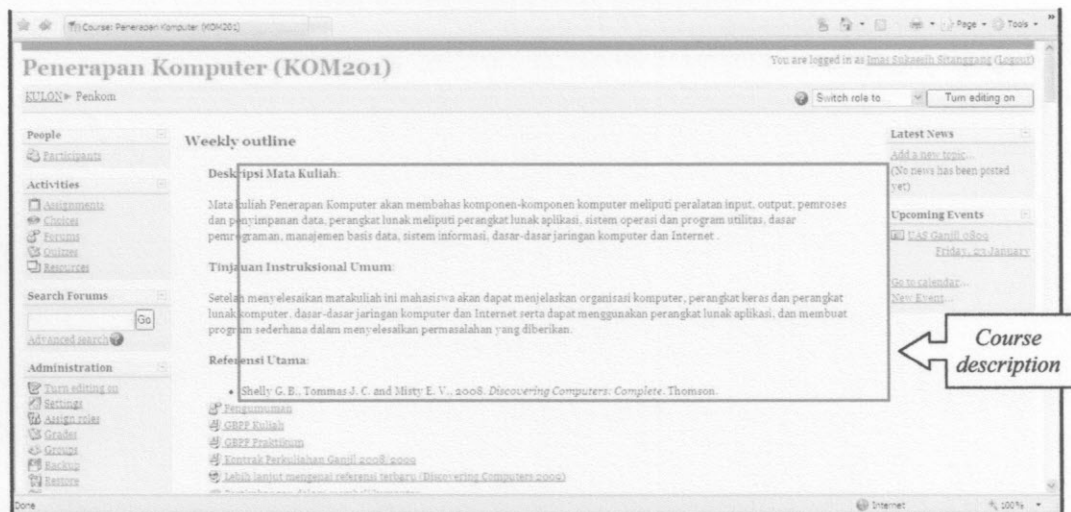


Figure 2. Main page in e-Learning.

Users as an administrator or course creators can create a course with set of some properties including Category, Full Name and Short Name, ID Number, Summary, Format, Course Start Date, Enrolment Period, and Number of Weeks/Topics. This course has weekly format which contains 14 weeks for delivering course materials and 2 weeks for a mid-term exam and a final exam. For each week, the system will provide some materials for the students:

1. Topic and sub topics for each week,
2. Course materials in form of PDF files or Power Point files
3. Assignments (optional)
4. Quizzes (optional)
5. Others additional files such as pictures of computer hardware, or video.

The page of lecture week 1 is in Figure 3. Figure 4 shows the assignment given in lecture week 1. This assignment requires students to upload a file with 1 MB for maximum size.

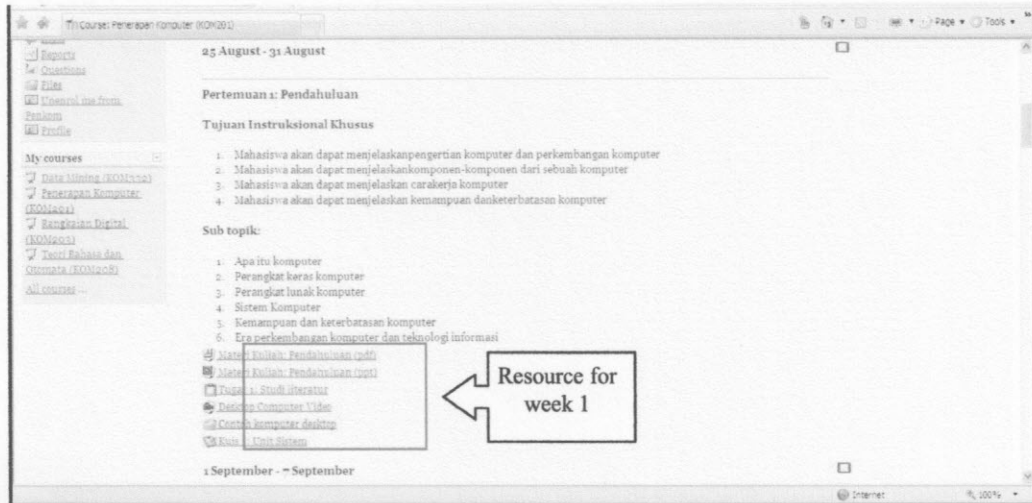


Figure 3. Lecture week 1.

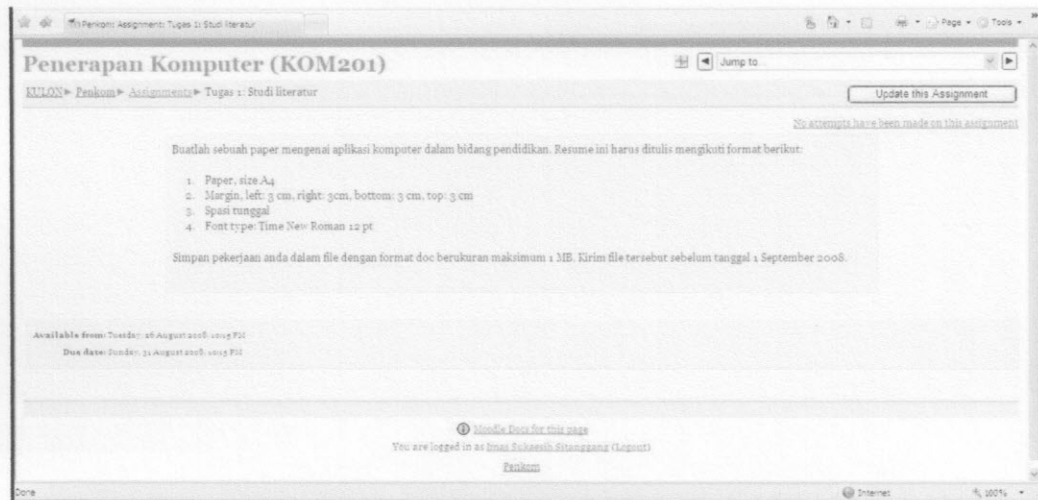


Figure 4. Assignment in week 1.

Quizzes are created to evaluate learning process for a certain topic. For example, in week 2 some matching questions are provided to students who finish the materials in lecture 2: Input and output devices (Figure 5a and 5b). The system will post the questions randomly and students need to select one of possible short answers provided. After completing the quiz, students will have their grade that the system calculates based on correct answers.

Below are properties for creating a new quiz:

- Name of quiz
- Short description
- Timing: when the quiz will be available to students, time limit (minutes) for completing the quiz, time delay between first and second attempt
- Display: number of questions per page
- Attempts: number of attempts allowed when students answer the questions
- Grade: grading method and penalties
- Overall feedback for each grade boundary.

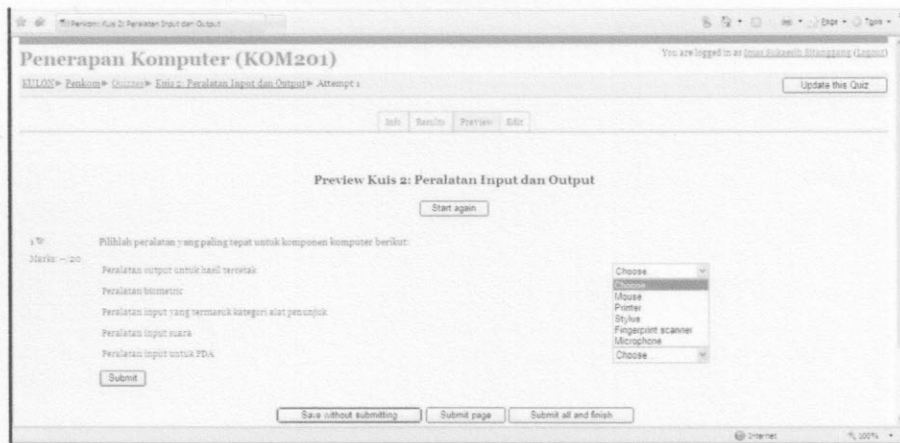


Figure 5a Random Short-Answer Matching for Week 2.

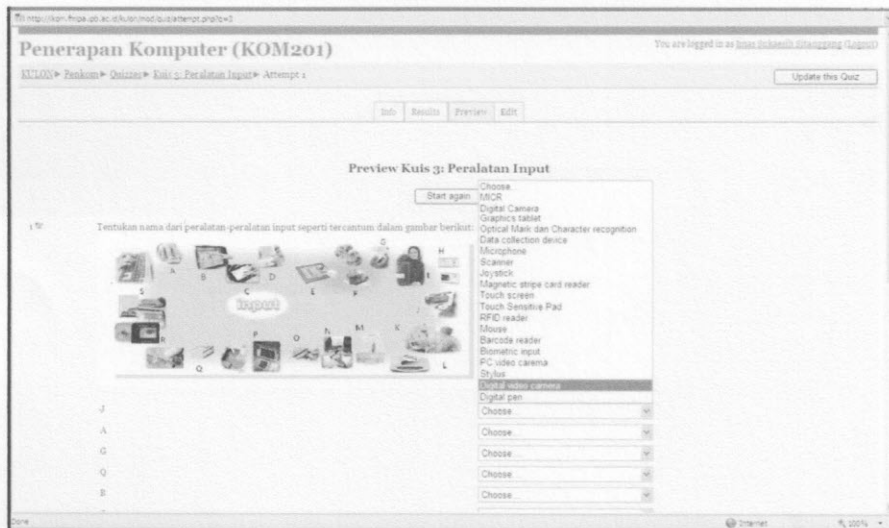


Figure 5b Random Short-Answer Matching for Week 2.

Another interactive media in the system is survey that allows students or teachers give their opinion about a specific topic. Users can view the results in form of bar chart. Figure 6 shows a survey about characteristics that need to consider if users will buy a new computer. We create general forums to facilitate communication between students and teachers. Users can choose the number of online bulletin boards for the course.

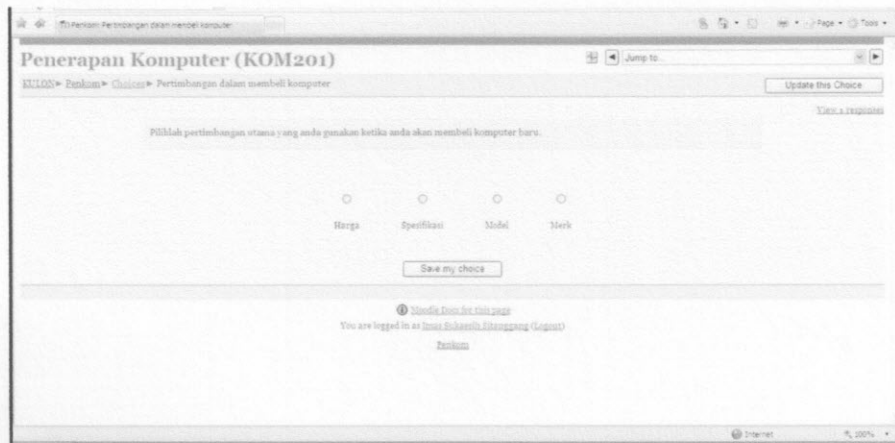
The image shows a screenshot of a Moodle survey interface. The browser window title is "Penerapan Komputer (KOM201)". The page content includes a breadcrumb trail: "MULOS > Berikan > Pilihan > Pertimbangan dalam membeli komputer". Below this, there is a text prompt: "Pilihlah pertimbangan utama yang anda gunakan ketika anda akan membeli komputer baru." There are four radio buttons corresponding to the options: "Harga", "Spesifikasi", "Model", and "Merk". A "Save my choice" button is located below the options. At the bottom of the page, it says "You are logged in as Irena Sukarni.Hidayat (Logout)" and "Berikan".

Figure 6. An example of survey

CONCLUSION

Introduction to Computers is a supporting course for undergraduate students from 15 majors in Bogor Agricultural University. This course adapts blended learning in which e-Learning is combined with face-to-face meeting in both class rooms and computer laboratories. E-Learning has been developed using Moodle in a form of Internet-based application that allows students to learn the course material any place and every time. The system contains 1) static course materials: text pages, web pages, links to digital files including Ms. Word and PDF format, images, and video, and links to other sites; 2) interactive course materials: assignments, quizzes, and survey; and 3) social course material: forum.

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