

Development of Learning Management System (A Case Study Approach)

Yohannes Kurniawan and Ratna Sari

Abstract—XYZ is a company in education sector that provides the experts to teach Information Technology (IT) and programming language courses. The XYZ company met several things problem using the traditional method (face to face), which the students have the limited time met with the instructor. So we proposed the system to solving the current problems in the organization. The purposes of this research is to identify the needs and problem that faced by XYZ. In conducting the research, authors use the field study as method of data collection that consisted of interviews and questionnaires, and using ADDIE Model as a method to analysis and design the system. Based on the questionnaires results, there are several problems, such as XYZ doesn't have specific media can be accessed anytime to provide course material and also discussion between instructor nor students. Therefore based on the results of the analysis of problems, the next step of this research was designed and built a Learning Management System application for XYZ

Index Terms—Learning Management System, Analysis, Design, Web, Development

III. INTRODUCTION

Information and Communication Technology (ICT) has become an important part of the curriculum in various educational institutions. Learning supported by information and communication technology is a new technology in education called *E-Learning*, which is teaching and learning process includes such as variety of format and use of software, internet, CD-ROM, online learning or other interactive media. The company need information systems (networked learning or not) as a media to support learning process in organization [1]. E-Learning is not only focus on training and instruction the materials, but focus to serve learning process for learner. There are six objective of e-learning focus: practitioner confidence and skills; learner access; customizable systems; cost-effective technical infrastructures; e-learning policies and processes; support for work-based learning [2].

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E-Learning was defined as an electronic learning media to support teaching and learning process, which the procedure aims is to influence the construction of knowledge for individual learning experience. Application and process of E-Learning consisted web-based learning process, computer-based system, virtual classrooms, and digital collaboration. And the content of E-Learning will be sent via the internet, intranet or extranet, audio, satellite TV, and CD-ROM that will used by educational institutions to enhance and support teaching globally [3]. Learning tools (2.0) will give the great potential for organization to growth and it will help the learner to expand the other area of education [4,5]. The important point for e-learning is not only for the learning process, but how to validate and evaluate the learning process. Because the current problems from e-learning is possibility of students to copy and paste the answers from the other sources [6]. The important point for e-learning is how to make the student more creative than before.

E-learning will help the organization to improve the learning process more efficient and it will help the learner more engage to the organization via good presentation styles, using game for exercise, and concern to management of course contents (updating) [7]. Learning process is related to some aspects, like pedagogy, curriculum, syllabus, and learning objectives to meet the learner needs [8]. Learning management system is the media to facilitate the users to getting the relevant information through the information system [9]. The personalization strategy is the right way to manage learning process more accurate, the learners will getting the documents of data sources from learning management system database.

A lot of research shows a lot of benefits from learning management system to support teaching and learning process [10]. It will transform the focus from content based learning to process based learning. And it will change the pattern of learning from passive to active learning, because learning management system focus to make the learner as a center for learning process (student center learning). And using learning management system will help the education institution more engage to the learning process, and it will give the impact to the number of student intake and facilitate active interaction between learners and instructors in the organization [11]. Now learning management system shift the focus to the new era, learning management system focus to give the learners more learning experience rather

than the contents of the courses. According to Pardamean & Suparyanto [12], E-Learning consists of three key elements; the process of teaching (teacher), learning (students) and the content or knowledge (delivered through the internet media), which of these elements creates five types of relationships like shown in table 1.

TABLE 1
RELATIONS BETWEEN ELEMENTS

No	Relations	Example
1	Student – Student	Chat, Forum, E-mail
2	Student – Content	Download, Search, View, Create
3	Teacher – Teacher	Chat, Forum, Email
4	Teacher – Content	Upload, View, Create
5	Content – Content	Link File, Index

Therefore the learning process of E-Learning utilizing information and communication technology as a tools that available for the students and instructors anytime and anywhere to overcome the constraints of time and space. XYZ is one of company in education sector that provides the experts to teach Information Technology (IT) and programming language courses. And this company needed to create a new learning method in the web-based platform. The XYZ company met several things problem using the traditional method (face to face), which the students have the limited time met with the instructor. The limited time are still as an obstacle that causes stunted learning process for the students who taken courses in the programming language in XYZ.

Moreover, XYZ does not have the tools to manage and distribute learning materials or knowledge relating to the programming language, especially in the field of Information Technology (IT). The aimed of this company is to provide the better education services for students who access the E-Learning website itself, thus XYZ need to create a Learning Management System applications included E-Learning teaching methods used web-based platform, so the course can be accessed anytime and anywhere to support the learning process and the business process in XYZ.

E-Learning is one educational media based on technology developed to support the learning process by using the internet, intranet or other network media. With the implementation of E-Learning, that allows the learning process without being tied by place and time.

IV. METHOD

The method of design used for developed the Learning Management Systems is ADDIE Model, which will be divided into several parts:

- In the analysis part is divided into two methods of analysis: performance and requirements analysis.
- Furthermore, on the Design part, will continue with learning method design for the front end site, that focus on implementation of Learning Management System, while the back end site will focus on the design of registering process.
- In development part, will used the UML (unified modeling language) notation. And for Application

development system itself using ASP (Active Server

Pages) programming language for the system used for the internal purpose and PHP (Personal Home Page) programming languages for external purpose.

- In implementation part will be explained about system implementation planning that will use in the company.

Questionnaires were distributed to the 53 instructors who teach courses on XYZ. The result is total of 9 answers (16.98 %) for the question “what facilities are supposed to be on the website of E-Learning is **exercise**”. Total of 17 answers (32.08 %) for the question “what facilities are supposed to be on the website of E-Learning is **discussion forum**”. Total of 24 answers (45.28 %) for the question “what facilities are supposed to be on the website of E-Learning is **access the key answer of exercise**”. And as much as 3 answers (5.66 %) for the question “what facilities are supposed to be on the website of E-Learning is **games**”.

V. RESULTS AND DISCUSSIONS

In the following table will explain Absorb, Do and Connect in the learning process from existing system at XYZ.

TABLE II
ABSORB, DO AND CONNECT IN THE LEARNING PROCESS FROM EXISTING SYSTEM AT XYZ

<i>Absorb</i>	<i>Do</i>	<i>Connect</i>
<p>Presentation: Instructor explain the content of course using power point.</p> <p>Stories By a Teacher: Instructor explain the content of course using white board.</p> <p>Reading: XYZ will provide guidebook of programming language in e-book version (pdf format) for every student who taken the course in XYZ company.</p>	<p>Practice Activities: In the classroom, the instructor provides the opportunity for students to try and solve the exercise according to the new material that has just been taught by the instructor.</p>	<p>Questioning Activities : In the classroom, instructor provides some question to answer by the students, include with exam to students who attend special programming language class course for the company.</p>

A. ADDIE Model

ADDIE is one of the classic Instructional Design Model (IDM) which systematic and simple. ADDIE Model consists of several phases:

1. Analysis

- Perform Analysis

Perform analysis is using to identify and clarify whether the performance problems faced by XYZ match with the solutions, that require the organization of new learning programs or management improvement. Therefore the result

of the solution to solve the identification of problems can be seen in Table 3.

- Gap Analysis

Gap analysis conducted to identify supporting and resistor factor in process of learning, which requires the ability to choose and determine the appropriate learning media. One of analysis conducted to observe the needs is analyzing the characteristics of the students and the instructors.

TABLE III
 ANALYSIS (PROBLEM AND SOLUTION)

Problem	Solution
Limited hours of lesson in the course and unavailability tools that can be used by the XYZ to provide the information about the programming language course after class. This led to the arrival of complaints from students about the adequacy of time in the programming language course XYZ.	Design and develop a Learning Management System application whose has the tutorial feature thus allowing the XYZ to provide information about programming language and can access by students after class.
Unavailability tools for discussion between students and instructors after class because the discussion can only be done during the class.	Provides features discussion forum in <i>Learning Management System</i> that can be used by students as media for discussion among fellow students or with the instructor.
Difficulties in accessing course materials before or after class because lessons just provide during the course and it set the limitation to the student who absent or can not take the course.	Provides features in Learning Management System website which allows instructors to upload the content or material therefore students can download the material according to the course.
Lack of practice nor exercise that were given in class by the instructor because of the limited time and mostly used to describe the subject of content, thus the instructor difficult to devote time and provide the exercise as homework for the students	Provides new feature in <i>Learning Management System</i> website which allow the instructor uploaded the exercise so the students can download and practice by themself after course .

TABLE IV
 ANALYSIS OF CHARACTERISTICS OF STUDENTS AND INSTRUCTORS

Characteristics	Student	Instructor
Age	the average age is under 20 years.	The average age was between 20-30 years.
Profession	For the students in regular course was student from collage and for the special course was employee in organization.	Most of the instructor in XYZ has a profession as student in collage.
Understanding of learning	The students who taken the course in XYZ have an average understanding of the programming language lessons, because most of them choose the topic accordance with the subject in their collage.	The Understanding of the instructors according to content and material is above the average and exceed from the students
Understanding of technology	For students who taken courses in XYZ has sufficient characteristics or above average understanding in using information technology.	Instructors in XYZ has deeply understanding in using information technology and also has excellent ability to manage software and hardware.
Problems	The students in the XYZ based on analysis of the questionnaire is learning process considered less effective, the process of learning only occur during the course. In addition, many factors of technologies that unavailability.	The instructor in the XYZ also has disadvantages similar to the students, learning is considered less effective because it only occurs during the course, as well as question and answer process that can only be done between students and instructors during the lesson.

2. Design

- Design of Learning Method (Front-End)
Classroom learning methods used are face to face. Which students and instructors meet during the course and learning process. The new learning method that will be used is using e-learning to support learning activities after course. Students can download the exercises that have been uploaded before by the instructor to help students to improve their knowledge and understanding to the course material, after doing the exercises the students can match their answer with the key answers and also the explanations. Students can download the course material that is provided in order to facilitate the students who can take the course. If there are any material that would be discussed with the instructor, students can use the discussion forum as a tools to discuss with the instructor after course.
- Design of Learning Method (Back-End)
The design for the Back-End is using ASP.NET - C# language which the process of student registration will be conducted by admin, students who apply the course must meet the requirements at least four people and a maximum total of 6 people. The registration process can be represented by one person, the administrator will entering the identity of prospective students and course schedule, and the administrator will create a class for prospective students.

Prospective instructors who want to join must register in advance and follow the entrance test, when they pass the exam, the instructor will choose the schedule to teach. And at the end of the semester, the human resources managers in XYZ will access the reports of total number of students and the attendance.

3. Development

In this stage, describe the process of system development using UML tools. According to Satzinger, J. W., Jackson, R. W., & Burd, S. D [13]. Figure 1 below explain about information system use case e-learning for front end, which include with eighth use case that related with system and three actors who involve as an user.

4. Implementation

In implementation stage, authors just given recommendation for the new system implementation to support learning process in XYZ (the existing system in XYZ has documented and attached in this research). And for the infrastructure preparation will execute by XYZ. This is the important point as a recommendation for the implementation phase of the new system in XYZ:

- Computer hardware will use multitier architecture, specifically is multicomputer architecture.
- Deployment architecture will use centralized architecture, thus the server will focus in one place.

5. Evaluation

In conducting the evaluation for the new system, XYZ need to consider the Learning Management System application as a new system that implemented in XYZ. And the company should provide the training for how

to use the Learning Management System application before implementation the system to the instructors and administrators.

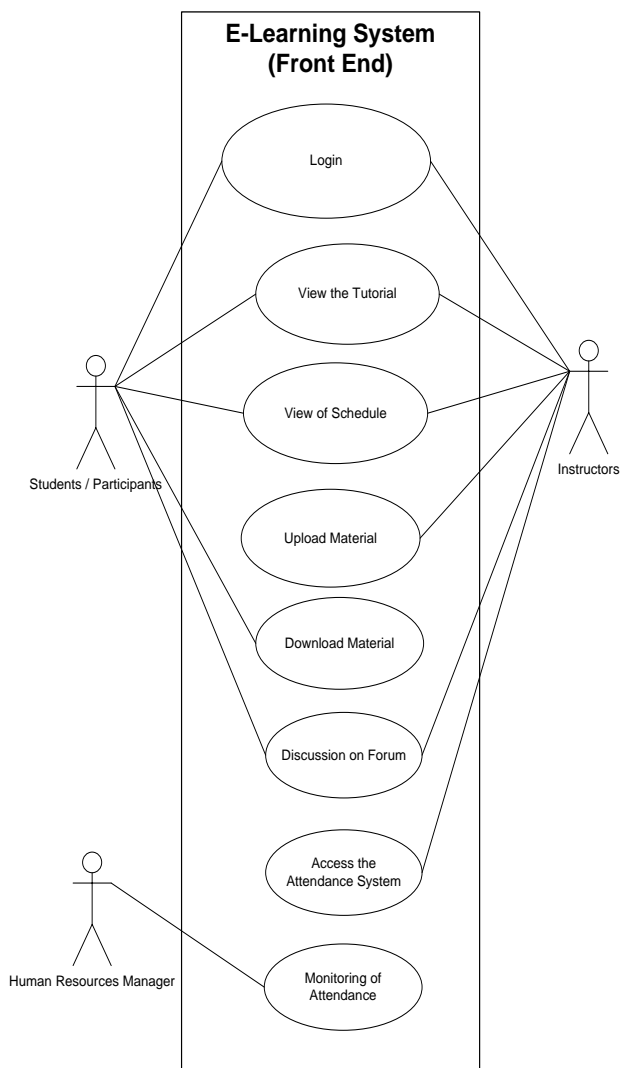


Fig. 1. Information System Use Case for *E-Learning Front End site*

VI. CONCLUSION

According to system analysis in XYZ, there are some problems faced by XYZ:

- Complaints come from students because of unavailability tools for deliver the material of programming language after the face to face meeting. Because of this problem, we provide the solutions by designing and developing of Learning Management System applications to provide information that can be accessed by students after face to face meeting.
- Lack of media discussion between students and instructors in XYZ to accomodate the discussion after course. Because of the problem, we provide solutions by providing a discussion forum features in the Learning Management System application which can be used by students as a tools of discussion between fellow students nor instructor.

- Difficulty in access to the subject material before or after the lesson, and to solve the problem we provide solutions by providing features in Learning Management System application which allows teachers to upload material and students can download it.

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