

Identification of E-Learning Development in Information and Computer Technology Education

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Abstract. This research aimed at identifying the needs for developing e-learning. The method used in this study is a survey. The research subjects were students and lecturers of Information and Computer Technology Education Study Program at IKIP PGRI Pontianak. Data collection is done using direct communication through interviews and through questionnaires for e-learning components. The conclusions drawn from the study found components of high scores for multimedia components and the lowest scores for computers and storage devices.

Keywords: identification, e-learning, e-learning, online learning

1. Introduction

The information technology development and the digital transformation along with the era of industry revolution 4.0 and the learning in the 21st century allow variable fields of science including information technology and communication to start to be improved in the learning process in educational world in Indonesia especially at higher education. The combination of those fields of science cannot be avoided so that online learning is created and it is known as e-learning in the education world, which the concept is developing from time to time. Generally, e-learning is often defined as the learning using an electronic that allows the learning process to happen everywhere and whenever without any limitation of space and time. Ref [1] e-learning is a part of a new dynamic that is resulted from a combination of various fields of science such as information, communication technology, and pedagogy. The needs to learn change so fast, so that the concept and the function of e-learning should be continuously adapted with the needs.

Basically, by the existence of e-learning, the students can learn without any space and time limitation and they also can learn independently by constructing their own knowledge through an active learning activity, while the role of an educator/teacher is as a facilitator to guide the students along with the era of industrial revolution 4.0 and the learning in the 21st century. E-learning can be accessed online through a web-based using a Personal Computer or a laptop. In addition, it can be accessed and it is presented in mobile-based using a Smartphone device, PDA, and the like. Increased use of e-learning among educational institutions has caused changes in higher education. In the e-learning process, students work independently, can speak effectively [2]. Additionally, in this era of industrial revolution 4.0, it is common for digital natives to use a smartphone in accessing various contents online.

At ICT Education Study Program of IKIP PGRI Pontianak, e-learning is still not provided in these days. The thing that is existed is only a website that contains information about the study program. Therefore, either online learning or blended learning is not applied yet, and the learning process is done offline or through a face-to-face meeting in a classroom. Thereby, the researcher offered a development toward the e-learning products so that learning can be conducted wherever and whenever without any limitation of space and time. The first step is the identification on the needs of e-learning development toward the students and the lectures of ICT Education Study Program in IKIP PGRI Pontianak so that the product that is being developed is appropriate to the needs and relevant.

2. Literature

2.1 E-Learning

E-learning is defined as the use of digital technology comprising the Internet server and web browser to facilitate the learning in delivering the material of online course in an asynchronous way [3]. There are various online learning activities; they are e-learning, web-based learning (WBL), web-based instruction (WBI), web-based training (WBT), Internet-based training (IBT), distributed learning (DL), advanced distributed learning (ADL), distance learning, and mobile learning[4].

Through e-learning that can be done online, the process of delivering the learning material can be more effective and it can achieve the learning objective. Besides, by using e-learning, the learning process can be more efficient in terms of time, cost, and energy. E-learning system provides mobility services where the students can access the learning content everywhere through a proper device such as a computer available in a house or in an office, laptop, and PDA with wireless connection so that the learning can be done in mobile-based [5].

The types of e-learning according to Ref [6] comprising as follows: 1) Standalone courses: It is the course taken by someone independently. It is independent without any interaction with the instructor or classmate; 2) Virtual-classroom courses: It is a structured and online class like a course class; 3) Learning games and simulations: learning by conducting a simulation activity that needs exploration and results in discovery; 4) Embedded e-learning: E-learning is input in another system such as a computer program, diagnostic procedure, or Online assistance; 5) Blended learning: The use of various learning forms to achieve a certain objective. It might be a combination of traditional and e-learning class or various forms of e-learning; 6) Mobile learning: It is assisted by a mobile device such as PDA and Smartphone; 7) Knowledge management: the wide use of e-learning, online document, and conventional media to educate all populations and organizations, not an individual.

Along with the development of technology, the students i.e. the digital native generations that have already been familiar with and accustomed with the technology in their daily life in mobile-based through a gadget incidentally can use mobile learning in their learning activity. It is because mobile learning can fulfill the students' needs such as flexibility, easily accessed data that is not limited in terms of time and space[7]. In addition, the existence of e-learning makes the students be able to choose between the face-to-face meeting component (offline) and online blended learning that can improve the flexibility in learning[8]. It is expected that it can produce a representative electronic learning media that has a multimedia component such as text, graphic, audio/visual, and containing an instructional design in learning. Besides that, e-learning should also be equipped with an online instruction such as chat room or a forum so that the students can interact with other students or with their teacher and the experts to collaborate, participate for cooperating, forming a social network, and building a social presence. The students should be able to interact in the context of personalizing the information and building their own sense of learning [9].

2.2 E-Learning Component

According to Ref [4] the e-learning components are organized into seven categories that can be modified and added. They are: 1) Instructional Design (ID) such as Learning Theory, Technical and

Instructional Strategy; 2) Multimedia Component such as Text and Graphic, Audio Streaming, and Video Streaming Links; 3) Internet tools comprise of 1). Communication tools such as Asynchronous (E-mail, Listservs, Newsgroup, Synchronous, like chat, IRC, messaging, and audio-video conferencing tools. 2). Remote Access Tools. 3) Internet Navigation Tools (Access to database and Web document) such as Browser Text-based browser, Graphical browser, Plug-ins. 4) Search Tools such as Search Engines, and other Tools; 4) Computer and Storage Device comprising a) GUI based operating systems such as Unix, Windows, Macintosh, Linux, and non-GUI based operating system such as DOS, and mobile devices such as Personal Digital Assistant (PDA) and other platforms. b) Hard drive, CD ROM, DVD, and the like; 5) Connection and Service Provider comprising Modem, Dial-in, Mobile technology (LAN wireless WAN, wireless PAN) d) Application Service Provider (ASP), Hosting Provider (HSP), Gateway Service Provider, Internet Service Provider (ISP), and so on; 6) Authoring/ Management Programs, Enterprise Resource Planning (ERP) Software, and Standard comprising Scripting Languages/web programming language. b) Learning Management Systems (LMS) and Learning Content Management Systems (LCMS), c). HTML Converters and Editors, d).Authoring Tools and Systems. e) Enterprise Application or Enterprise Resource Planning (ERP).f) Interoperability, accessibility, and Reusability Standards; 7) Server and Related Applications including a) server HTTP, software HTTPD, b) Server Side Scripting Languages such as JSP, ASP, ColdFusion, PHP, and Common Gateway Interface c) Wireless Application Protocol (WAP).

2.3 Identification of E-Learning

The identification towards the need for e-learning is used for adjusting the needs of a subject i.e. the students and the lectures as the teachers in a course program existed in the development of e-learning. Ref [10]the need analysis is used for identifying the needs and the goal, the content, the implementation, targeted population, and the result of an intervention. Therefore, an identification can provide information on the needs, technology, and etc. that are needed in developing e-learning.To find the identification of e-learning, it should cover some components listed as follows [4] : 1) Instructional Design (ID); 2) Multimedia Component; 3) Internet Tools; 4) Computers and Storage Devices; 5) Connections and Service Providers; 6) Authoring/Management Programs, Enterprise Resource Planning (ERP) Software, Standards, and Server and Related Applications; 7) Server and Related Applications.

3. Method

This research was quantitative descriptive research. To identify and provide an illustration of the assessment toward the need for developing e-learning product, a survey method was the most appropriate method used in this research. The research subject was the 6th-semester students in academic year 2018/2019 and the lectures of ICT Education Study Program of IKIP PGRI Pontianak. The data collection technique used in this research was a direct communication by using an instrument for an interview and an indirect communication i.e. by distributing questionnaires.The technique for data analysis used here was describing the result of the direct interview with the students and the lectures about the identification toward the need for e0learning development. Then, the result was described as the basis for developing a product. Meanwhile, the responses collected from the questionnaire were used for figuring out the required e-learning component.

4. Results and Discussions

The objective of this research was to find out the need for developing e-learning product toward the students and the lectures of ICT Education Study Program of IKIP PGRI Pontianak. Developing the e-learning product using programming was done to make it easier to be designed according to the needs and the demands of the users. Thereby, it could produce a relevant online learning media product.

Based on the findings of the identification of the needs, it was obtained the component of e-learning development containing information about 1) Instructional Design including learning theories,

instructional theories, instructional strategies and techniques, 2). the multimedia components such as graphic, audio, video, text, and link, 3) Internet tools comprising Synchronous, chat, Messaging, Internet Navigation Tools, and Search Tools & Engines, 4) Computers and Storage Devices comprising Operating Systems and storage devices. The following is the result of the identification on e-learning development i.e., 5) Connections and Service Providers i.e. Mobile technology. The following is the result of the identification of e-learning components.

Table 1 Result Identification on e-learning components

Identification on e-learning components		Mean	Rank
Instructional Design (ID)	Learning theories	3.40	13
	Instructional theories	3.57	7
	Instructional strategies and techniques	3.50	10
Multimedia Component	Text	3.73	2
	Graphics	3.82	1
	Audio Streaming	3.60	6
	Video Streaming	3.70	3
	Links (e.g., Hypertext links, Hypermedia links, 3-D links, image maps, etc.)	3.57	8
Internet Tools	Synchronous: Text-based (e.g., Chat, Messaging, etc.)	3.65	5
	Synchronous: Audio-Video Conferencing Tools	3.38	15
	Internet Navigation Tools	3.48	11
	Search Tools & Engines	3.37	14
Computers and Storage Devices	Operating Systems (android, Windows, Linux)	3.43	12
	Hard drives, CD ROMs, DVDs, and so on	3.32	16
	Tablets, iPods	3.55	9
Connections and Service Providers	Mobile technology(e.g., connected wireless, wireless LAN, WAN, PAN or personal area network)	3.68	4

Based on the result of the identification, it was known that the needs for developing the e-learning components obtained the highest score on multimedia component and the lowest score on computers and storage devices. It can be seen clearly from rank 1 to 16. Yet, overall components needed for e-learning development had an average score of > 3.40 that was categorized as very good. These research findings were supported by research done by [11], showing that the multimedia components on the need assessment of e-learning or online learning are the most required component.

Meanwhile, based on the result of an interview with the students and the lectures about the needs of e-learning, the information can be described briefly as follows:

4.1 Students' Needs Analysis

The students want an e-learning concept that could be accessed online with a website based and it could be accessed in mobile-based on a Smartphone to make it more flexible. The multimedia content is equipped with text, image, audio, and video. The display of e-learning design is user-friendly and easy to be used, and the navigation is made in the form of an interesting icon. For interaction, a chat as a facility is needed here and it should be easily seen by everyone who is online and there is a forum for someone who wants to give a comment. There should be an instruction to use the media to facilitate the students and there should be a 'help' menu if there is a difficulty in accessing the media. The existence of Search Tools & Engines is used for facilitating the user in doing the 'searching' activity. The facility that can change profile on the student's page is equipped with the learning achievement that can be easily seen. It is equipped with task notification and other information. The learning is made clearly and it contains everything that should be learned by the students. Other learning sources

such as a digital library or other sources should be existed in supporting online learning. E-learning application is created in apk format so the students are able to download it on Play Store.

4.2 Lecturers' Needs Analysis

The lecturer wants to add materials in various formats such as doc, ppt, pdf, swf, audio, video, inputting text, image, and animation through e-learning product. If they use video, it is better to link it anyway so that it will not take more space. The availability of information (delivering the news or announcement) should be complete such as personal contact for study program identity, and clarity of course category.

E-learning has an interesting Intercafe and it is efficient, the availability of themes that can be selected or customized or changed by the user so that they will not feel bored. Navigation can be performed using an icon and the description is simple. Chat can be used for an interaction between the students and the teachers, and between one to another student. The availability of a forum is used for discussion and narrowing the topic of discussion. Tasks for the students should be completed with a certain deadline. Quizzes are also important to know how far the students understand the material and it should be completed with evaluation results. The existence of a digital library (e-library) that is created in a simple form that contains the supported course material such as an e-book. It will be better if there is a video conference as an additional facility so that the live learning session can be conducted. The admin can set the user, course schedule, and perform the e-learning management. It should be equipped with learning instruction such as competence standards/basic competence, learning objective, and materials. Then, the decision toward the application of e-learning whether it is as the additional, the core of learning, the supplementary of learning, or the substitute. Based on the result of identification toward the e-learning product, it will be followed up as the basis of the development of e-learning product.

5. Conclusions

The research finding shows that e-learning is strongly needed to be developed since the current learning process can happen everywhere and whenever in a flexible way and it can be accessed in mobile-based. In addition, the identification information toward the component of e-learning has been collected i.e. the highest score is on multimedia component and the lowest score is on computers and storage devices. Overall, the component of e-learning development has an average score of > 3.40 in 'very good' category. Additionally, it results in the information on e-learning needed by the students and the lectures at the ICT Education Study Program of IKIP PGRI Pontianak. They are the prior need i.e. multimedia component, display, navigation, chat, forum, learning instruction, and other components. The educational institution is suggested to be able to design a plan and conduct some courses and socialization to improve the acceptability of the students and the lectures towards e-learning.

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