

Needs Assessment of E-Learning Vocational Education

Unung Verawardina^{a*}, Nizwardi Jalinus^b, Krismadinata^c, Ratih Widya Nurcahyo^d, Arden Simeru^e, ^{a,b,c}Faculty of Engineering, Universitas Negeri Padang, Jl. Prof. Dr. Hamka, Air Tawar Bar., Kec. Padang Utara, Kota Padang, Sumatera Barat 25132, Indonesia, ^dIKIP PGRI Pontianak, Jl. Ampera No.88, Sungai Jawi, Kec. Pontianak Kota, Kota Pontianak, Kalimantan Barat 78116, Indonesia, ^eSekolah Tinggi Teknologi Pekan Baru, Pekan Baru, Indonesia, Email: ^{a*}unungverawardina@gmail.com

This research aims to conduct an assessment of the needs of e-learning development. It utilises survey methods. The subjects in this study were students of the Informatics and Computer Engineering Education Study Program and Automotive Education at Universitas Negeri Padang. The data was collected using indirect communication through a questionnaire given to students to measure the need to learn electronic learning components through e-learning. The conclusion of the research findings show that the need for learning e-learning components on the internet receive the highest ranking, while computer components and storage devices are at the lowest rank. The t-test results reveal an insignificant relationship between gender and the needs of the e-learning component. In addition, the One-way ANOVA test results show that there were no significant differences between the types of study programs and different subjects (visual programming and autotronics) on the needs of the e-learning component.

Keywords: *Needs assessment, e-learning, blended learning.*

Introduction

Vocational education intends to prepare individuals to enter the workforce which requires various skills and knowledge. In the 21st century, Universities have an important role to equip students with the ability to play an active role in developing capabilities, especially as the world is now entering the era of the Industrial Revolution 4.0 where information technology has become the learning basis in all fields including Science and Technology. Indonesia is considered to be a country with a high potential to encounter the Industrial Revolution 4.0. (Nasir, 2018; Verawardina, 2018; Rizal, et al. 2019).

What must be considered is that the social change facing the Industrial Revolution 4.0 is technological change, which includes the influence of rapid mobility. The education sector must be able to adapt to change by exploiting all potential brought by the Industrial Revolution 4.0. or it will be left behind. Teachers, governments, educational institutions and parents must be able to adapt to the disruption of the Industrial Revolution 4.0 (Afrianto, 2018; Jalinus, Syahril and Nabawi, 2019).

Therefore, learning patterns based on information and communication technology (ICT) are needed in digital form. The application of ICT in learning will change the labour market by digitising jobs and demanding new professional skills (Eberhard, *et. al.*, 2017). Teachers must be able to learn new mindsets, possess digital literacy, and learn new internet-based technologies, one of which is through learning that can be accessed online through e-learning. The rapid increase in the use of the Internet usage has had an impact on online instruction which is currently widely adopted in Universities and other educational Organisations (Kabshi., *et. al.* 2016). In addition, the recent learning process has been a technology-based process in Universities and in vocational education following changes in the educational paradigm from teacher-centred to student-centred learning strategies (Ituma, 2011). Therefore, one of the learning processes that support student-centred classes is e-learning (Dharmayanti., dkk:2018).

According to Bandhu & Raje (2014), *e-learning* is the use of internet technology for educational purposes, which functions to store learning materials in various forms such as electronic print, drawing, animation and video. The use of e-learning can provide many benefits for students who can learn from anywhere, anytime, and save money on travel, textbooks, and many other study materials. Students can communicate with each other and the lecturers are given the opportunity to complete repeated testing to find out the knowledge gap for students (Drotárová., *et. al.* 2016). E-learning also supports technological progress with various technological components. The application of e-learning can be integrated through blended learning, which combines online and offline learning. It is also suggested to integrate classroom activities with several online platforms through blended learning (Subekt., *et. al.*, :2018; Jalinus and Nabawi, 2018).

The development of e-learning in vocational education needs to be greatly considered, especially as vocational education encourages students to learn in order to have expertise competence. Therefore, the researcher offers conducting a need assessment of an e-learning development that is done in accordance with blended learning. The purpose of this study is to determine the needs of the e-learning component based on how certain demographic variables (male and female, type of institutions such as Universities/Polytechnics and subjects/majors) affect the assessment of learning needs among College students.

Literature Review

E-Learning

E-learning (electronic learning) is generally known as electronic learning. It is an educational system that uses electronic applications to support teaching and learning through the internet, computer networks and standalone computers (Tim Pengembang LMS:2010). Through e-learning, the learning process becomes more flexible with various components. E-learning has developed rapidly by popularising advances in multimedia and network technologies such as high-speed Internet, high-definition video, smart devices, and intelligent learning management system functionality (Cidral, *et. al.*, 2018). The e-learning environment in higher education institutions is a learning ecosystem that integrates digital technology with teaching and learning practises as a significant educational innovation by advancing platforms that support technology (Eze, at al, 2018). Therefore, e-learning is inseparable from the role of technology. Various benefits can be experienced from using e-learning in the teaching and learning process. Some of these include improving accessibility to information, making it easier to update content, personalised instructions, ease of distribution of teaching materials, having standardised content, and accountability (Bandhu & Raje:2014). The involvement of students and their digital readiness as mediators in the use of e-learning that supports academic achievement are very important (Verawardina:2017).

According to Kim, *et. al.*, (2019) students must have well-developed digital skills to conduct learning and be committed to being fully involved in the context of academic learning in the University's e-learning environment. Consequently, for effective e-learning, students as e-learning users must also be able to utilise e-learning technology. According to Khan (2005), the e-learning components that can also be implemented are organised into seven categories which can be modified : Instructional Design (ID), Multimedia Components such as Text and Graphics, Audio Streaming, Video Streaming Links, Internet tools including Computers and Storage Devices, Connections and Service Providers, Authoring / Management Programs, Servers and related applications.

Blended Learning

In developing e-learning, to the implement method must also be considered. Challenges in e-learning can be overcome through blended pedagogy to make it more effective (Nezamzade & Mohammadnejad:2014). Blended learning is a combination of online learning activities and face-to-face learning for classroom teaching or other training modalities to help students develop new knowledge and skills that can be transferred to the workplace environment (Hilliard:2015). The use of blended learning has developed globally both in educational and tertiary institutions . According to Bauk., *et. al.*, (2014) blended learning is the most popular educational model applied by Universities for teaching and learning. This model combines

online and face-to-face learning environments to enhance learning with the adoption of new web technologies and tools in the learning process. The use of blended learning model provides an opportunity for instructional facilitators to personalise learning for each student both online and offline.

Blended learning is intended to increase the level of knowledge construction of students to create learning skills . It can help students to be innovative graduates who are able to meet the demands of work through creativity and innovation. Universities and other learning institutions must continue to promote the blended learning approach through a shared learning system with the Internet to enable effective learning through technology especially in developing countries (Kintu., *et. al.*, 2017). Therefore, an appropriate management system and competence in the use of technology such as computers are needed to avoid the failure of development and use of e-learning for learning effectiveness.

Needs Assessment

Needs assessment is conducted to identify needs, goals, content, implementation, target population, and intervention results (Cohen *et al.*, 2007). It is important to find information about a particular need. Needs assessment is conducted to discover Institutional needs for the development of e-learning since a University that wants to develop and implement e-learning needs to be aware of the needs expected by students and lecturers. These needs involve short and long-term needs as well as technology in the development of e-learning, strategies and models (Hui & Wei, 2013).

Study Needs and Significance

This research was conducted to determine the required e-learning needs assessment. It is important to prepare the design related to target users of e-learning according to the needs of students, lecturers, Universities. Then prepare content, teaching materials, subject matter, tests and feedback, student activities such as discussions, to have mutual collaboration, testing and evaluation strategies implementation in the teaching process (Mutalib & Ahmad, 2012). Online learning through e-learning can provide flexible learning without being limited by time and distance . According to Khan (2007), the implementation of e-learning needs to design and develop effective student-centred learning involving students which are interactive, affordable, efficient, effective, accessible, flexible and meaningful. In the context of e-learning, lecturers play a very important role as role models and facilitators in teaching students. E-learning is similar to blended learning (a combination of face to face and online instruction), which can be an effective innovation in the teaching and learning process especially in developing countries (Kintu., *et. al.*, 2017). Furthermore, in terms of the effectiveness of blended learning, one of the big challenges concerns how technology can be successfully used



and ensuring the commitment of participants considering individual student characteristics and meeting with technology (Hofmann:2014). Therefore, in order for it to be a significant development, e-learning can be implemented according to the concept of blended learning, so that learning in vocational education becomes more effective.

Method

This research is a quantitative descriptive study. The survey method was considered appropriate to conduct a needs assessment as an overview of the e-learning development. The aim of this study is to investigate the differences between references to the required e-learning component system.

- a) Male and female students
- b) Informatics Engineering and Automotive Education Study Programs
- c) Visual programming and Autotronics Courses.

This research was carried out at an affiliated educational college at Universitas Negeri Padang. According to Sugiyono (2011), the sample is part of the number and characteristics of the population. It was chosen through a purposive technique which has a specific purpose. Therefore, two classes in each study program in Informatics and Computer Engineering Education and Automotive Education were chosen. The sample collection uses a survey method which is the most suitable for this study. The data was collected using a questionnaire that was designed and distributed randomly to the sample consisting of students at Universitas Negeri Padang.

E-learning Need Tool

The instrument is needed to conduct a needs analysis to measure e-learning components needed by students through questionnaires. The needs assessment questionnaire consists of two divisions :

Part A: Demographic Information

Part B: Requirements for e-learning system components

The Demographic Information has three main parts:

- 1) Gender: Male / Female
- 2) Study program: Informatics Engineering, Automotive Education
- 3) Subjects/Courses: Visual programming and Autotronics

There are seven categories of e-learning components (Khan:2005) but after the process of instrument validity and reliability, only 5 categories remain . The other two categories are omitted since they are very technical and difficult for students to understand. Those 5 categories are:

- 1) Instructional Design (ID)
- 2) Multimedia Component
- 3) Internet Tools
- 4) Computers and Storage Devices
- 5) Connections and Service Providers

The assessments for each item begin with a minimum need for learning (<25%) and a maximum need for learning (100%).

Instrument Validity and Reliability

The instrument of this research was a questionnaire that was adopted from the research (Azimi:2014). and based on the e-learning component theory (Khan:2005). Data analysis was performed by calculating the results of the questionnaire about e-learning needs assessment descriptively, then using statistical tests with independent samples t-test and one-way ANOVA using the SPSS 25 application.

Results and Discussions

The results of the study indicate the need for a suitable e-learning component both in terms of consideration of male and female variables, Universities/Polytechnics and study subjects/majors. Based on the findings of the needs assessment, the priority of e-learning components needed include: 1) Instructional Design which includes learning theories, instructional theories, instructional strategies and techniques, 2). multimedia components such as graphics, audio, video, text and link, 3) Internet tools including Synchronous, chat, Messaging, Internet Navigation Tools, Search Tools & Engines, 4) Computers and Storage Devices including Operating Systems and storage devices, along with the results of the identification of the development of mobile learning, 5) Connections and Service Providers that consists of Mobile technology. The following are the results of the identification of e-learning components.

Table 1: E-learning Component Results

Identification of e-learning components		Mean	Rank
Instructional Design Components	Learning theory	3.39	15
	Instructional / teaching theory	3.52	12
	Teaching strategies and techniques	3.82	2
Multimedia Component	Text	3.46	13
	Graphics	3.67	6
	Streaming Audio	3.27	16
	Streaming Video	3.43	14
	Link (Hypertext links, Hypermedia link, link 3-D, map, etc.)	3.58	9
Internet Tools Component	Asynchronous (discussion forum, etc.)	3.73	3
	Synchronous: Text-based (e.g. chat, message, etc.)	3.69	4
	Synchronous: Tools/Audio Video Conference tools	3.55	11
	Tools/ Internet Navigation tools	3.62	8
	Search Tools & Engines	3.86	1
Computer Components and Storage Devices	Mobile technology, Operating System (Android, Windows, Macintosh, Linux)	3.67	5
	Hard drive, CD ROM, DVD, etc.	3.64	7
	Tablets, iPods	3.12	17
Connection Components and Service Providers	Cellular technology (connected wireless, wireless LAN, WAN, PAN, or private area network)	3.56	10

Based on the results of the *need assessment collages of e-learning vocational education*, e-learning component needs on the Internet tools component receive the highest rank, while computer components and storage devices are at the lowest. The ranking order of the required e-learning components can be seen in Table 1. Furthermore, the results of the needs of the overall e-learning component on average > 3.56 have a very good category. The next step is to do a statistical calculation of the results of the required e-learning component questionnaire as follows:

T-test testing to determine the differences between males and females regarding the results of required e-learning components.

Table 2: T-test Results of E-learning Components Need To be Based on Gender

Gender		N	Mean	Std. Dev	t-values	p.value
E-learning Components	Male	75	60.53	5.832		
	Female	38	61.47	4.112	0.888	0.377

Table 2 is the result of t-test testing between male and female students who obtained an average value of 60.53 for males and an average value of 61.47 for females. It shows that both males and females statistically have the same value regarding the needs of the e-learning component. Furthermore, the t-value is 0.888 which means that it is not significant (p-value of 0.377). It is then concluded that there is no significant difference in e-learning needs.

One-way ANOVA testing is used to find out the e-learning component needed by students from two study programs: Informatics Engineering Education and Automotive Education at Universitas Negeri Padang.

Table 3: One-way ANOVA Results regarding the Need for E-learning Components based on the Study Program

Study Program	N	Mean	Std. Dev	F.Value	P.Value
Informatics and Computer Engineering Education	61	61.67	6.090		
Automotive Education	52	59.88	4.081		
Total	113	60.85	5.315	3,238	0.075

Based on Table 3, it is known that the average value of e-learning needs of students in those two study programs at Universitas Negeri Padang respectively are 61.67 and 59.88, while the overall average is 60.85. Moreover, there is no significant difference in the learning needs of e-learning components of students in the study program as indicated by the F-value of 3.238 which is not significant with a probability value of 0.075.

Furthermore, one-way ANOVA testing is conducted to determine the e-learning components needed by students based on the courses in two study programs: Informatics Engineering Education and Automotive Education at Universitas Negeri Padang.

Table 4: One-way ANOVA results regarding the need for E-learning Components based on subjects

Study Program	N	Mean	Std. Dev	F.Value	P.Value
Visual programming	61	61.67	6.090		
Autotronics	52	59.88	4.081		
Total	113	60.85	5.315	3.238	0.075

Table 4 shows the average value of e-learning needs of students in Informatics Engineering Education in visual programming courses and Automotive Education in autotronics courses. Based on these results, the F-value of 3,238 was found to be insignificant with a probability value of 0.075. Therefore, it was concluded that there were no significant differences between the two subjects.

This finding is also supported by the research of Qiao, & Wang (2011) which found that the Instructional Design component has a moderate rating in terms of needs. The research also studied pedagogy to integrate classroom and online teaching that has a high priority in teacher training in ICT. Based on the results, it appears that instructional online teaching is needed, for instance, the application of blended learning. They also show that most respondents were asked to study web design software, Learning Management Systems, and e-mail and internet electronic resources. In addition, the results of the calculation of descriptive and statistical analysis reveal that these findings are consistent Azimi's (2014) research, which shows that the e-learning component on the internet tool is needed.

Conclusions

Based on the findings, students, educators and Universities can plan and carry out the necessary and related training programs to expand knowledge and skills on Internet technology-based learning and lead to more efficient use. In addition, students should be equipped with the knowledge to be aware of the potential of various e-learning technologies to improve teaching and learning. In this case, educators need strategies and techniques in teaching using e-learning, such as blended learning-based teaching. The results of the overall study show that e-learning needs to be developed. It seems that the technology is very much needed since learning today requires learning requires learning to take place anywhere and anytime which can be accessed flexibly online.



The weakness of this research is the need for incentive clarification and efforts to eliminate obstacles in integrating e-learning, prepare various devices to access e-learning, and require memory capacity. It also requires an online teaching strategy and technique and preparing various stimulating synchronous and asynchronous activities. In addition, it is recommended that educational institutions c plan and provide socialisation to increase students' acceptance of e-learning, prepare various e-learning components needed, prepare strategies and teaching techniques in online learning.



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