Blended Learning implementation in introduction to artificial intelligence courses using the System Development Life Cycle method

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Abstract. Indonesia is an island nation with geographical conditions that are bounded by many seas and mountains. The situation causes the condition of the islands that are far apart from one another. This certainly affects the conditions and social, economic, technological, and related interactions in daily life, one of which is the level of educational progress in one region / island with other regions / islands. The level of educational progress is certainly influenced by how the learning system is implemented in that place. To overcome the obstacles in improving the quality of learning and equal distribution of learning opportunities in different geographical, cultural, socioeconomic conditions, one solution is created, namely Blended Learning by utilizing devices connected to the internet. Methods that can be used in this research include SDLC (System Development Life Cycle). The optimism of the successful implementation of the Blended Learning system is very high because the facilities and atmosphere of various parties are very supportive plus the needs will become priority needs for everyone in this case students. In the province of East Nusa Tenggara has the geographical conditions of many islands, therefore the Blended Learning system is good enough to be applied, because in addition to the above mentioned transportation limitations for students and educators also become obstacles in conventional learning.

1. Introduction

The development of information technology in recent years has been developing at a very high speed, so that this development has changed the paradigm of society in seeking and obtaining information which is no longer limited to print media, radio and television, but also makes global network technology, the Internet one of one main source of information.

One of the fields that has had a significant impact with the development of this technology is the field of education, where basically education is a process of communication and information from educators to students containing educational information, which has educative elements as sources of information, media as a means of presenting ideas, ideas and educational material as well as the students themselves, some parts of this element get a touch of information technology media, thus triggering the birth of ideas about e-learning [1].

Lack of access to educational technologies and innovations (sometimes termed the digital divide) continues to be a challenge with novel educational technologies [2]. One of the promises of online technologies is that they can increase access to non-traditional and underserved students by bringing a
host of educational resources and experiences to those who may have limited access to on-campus-only higher education [3]. However, the increasing availability of distance education has provided educational opportunities to millions [4].

In order to expand the learning opportunities, the Ministry of National Education, through several policies has given birth to IT-based education programs, such as the presence of the National Education Network (JARDIKNAS), INHERENT (Indonesia Higher Education Network), and several other ICT grant programs, in addition to the model distance education that already exists such as the Open University (UT) [5].

With the aim of expanding these learning opportunities, the University of Nusa Cendana, developed a distance learning model with a Blended Learning approach which is a combination of the implementation of conventional education and IT-Based education. Besides that, with the concept of blended learning, a learning model was developed using an Open Source-based Learning Management System (LMS) (Figure 1 and 2).

Based on the background of the problems above, the focus of the problem in this study is developing a blended learning model in the Department of Computer Science, Faculty of Science & Engineering, Nusa Cendana University.

Theoretically, the results of this study will enrich the repertoire of the field of Educational Technology, especially in aspects of learning models. Practically, the results of this study will help lecturers to develop and implement blended learning, so that they can integrate the power of online learning and face-to-face learning models. Besides that, with the results of this study the lecturers will have the learning model set, so students of the Department of Computer Science FST UNDANA can access the material anywhere and anytime according to the conditions of the students.

Hefzallah says that some unique characteristics possessed by the Internet and its potential applications to be implemented in education are: The unique characteristics of the Internet stem from its nature as a global information system [6]. The Internet as its root in connecting people to share ideas and information and in connecting people with sites that store information. These are the reasons for existence and tremendous growth. Besides that, with the content capabilities possessed by the internet, a developer of the e-learning model to utilize multiple media in the online courses he developed, so as to make the course more interactive and informative [7].

Teaching strategies are defined as a number of steps that are engineered in such a way as to achieve certain teaching objectives. Syah says that this teaching strategy includes several stages [8], such as:

- The strategy of formulating the target of Teaching and Learning Process (TLP), which is related to the strategy that will be used by teachers in determining teaching patterns to achieve the TLP goals.
- Teaching and learning process planning strategies, related to the implementation steps to achieve the set targets. In this stage, including planning about teaching media that will be used.
- The strategy of implementing the teaching and learning process, is related to the teaching system approach that is truly in accordance with the subject matter of teaching material.

In its implementation, the technique of using and utilizing media also contributes greatly in attracting the attention of students in TLP, because basically the media has two main functions, namely the media as a tool and the media as a source of learning for students. In addition, the media can be accessed anywhere, anytime and by all students.

Teaching media is one of the important elements in learning and learning that can enhance the learning process, so that in the end it is expected to enhance learning outcomes [9]. Furthermore, according to Nana Sudjana, there are several reasons why teaching media can enhance learning outcomes. Information technology and information literacy are technologies that can be used to support the educational process, with the aim that students can construct their knowledge. This is defined as "accessing, evaluating, managing and communicating information," and as a pre-requisite for constructivist learning [10].
The first reason is that the use of teaching media in the teaching process can produce more varied teaching methods, the learning material will be clearer, can attract the attention of students / students and cause motivation to learn. The second reason is regarding the level of thinking and the ability of humans to absorb different material according to the level of development of each individual.

Through appropriate learning media abstract things can be concrete and complex things can be simplified, so that students' understanding of a material can be improved.

In developing a learning media, it must always refer to the domain of teaching technology, through elaborating each element in it: instructional technology is the theory and practice of design, development, utilization, management and evaluation of processes and resources for learning [11]. From this description, internet technology with e-learning has the opportunity to be used as one of the teaching technologies, especially as it can be implemented as an information medium of the communication process in education.

Development of the Distance Learning Model (DLM) using the modified System Development Life Cycle (SDLC) Method. The phases in SDLC consist of the planning, system analysis, system design, system implementation and usage phases, but in reality, for the development of this system after a certain phase, the process can go back to the previous phase, and so on.

The development of digital technology, the internet and multimedia is very fast, the web has become a global power, interactive, dynamic, as well as a medium of learning and teaching. The internet provides an opportunity to develop learning-on-demand and learner-centered instruction and training [12]. Various terms given for these online learning activities arise such as: Web-based learning (WBL), Web-based instruction (WBI), Web-based training, Internet-Based training (IBT) and many other terms, which are summarized that e-learning is used for represent teaching that is open (open), flexible, and distributed.

E-learning can be viewed as an innovative approach for delivering well-designed, learner-centered, interactive, and facilitated learning environments to anyone, anywhere, anytime by utilizing the attributes and resources of various digital technologies along with other forms of learning materials suited for open, flexible and attribute learning environment [13].

The development of e-learning must be developed in various aspects, called the e-learning framework [13], which covers all aspects of teaching, such as pedagogic, technology, user interface design, evaluation, management, resources supporting, ethical and institutional power.

![E-learning website display](image)

**Figure 1.** E-learning website display.
2. Methods
This research is a study that aims to develop android based learning games for trauma healing in post-disaster children in disaster areas using a Research and Development (R & D) approach for conducting research. Development research seeks to create knowledge based on data systematically derived from practice [14]. Research and development is a process or steps to develop new products or improve existing products. In the field of education, products produced through R & D are expected to increase the productivity of education, such as graduates who are numerous, qualified, and relevant to their needs [15]. This study aims to develop the DLM by using the System Development Life Cycle (SDLC) Method in addition, to see the extent to which Open Source-based LMS can bridge the delivery of the educational model with the blended learning approach in developing the DLM Nusa Cendana University. This R & D research method is research based development, namely research that aims to improve the quality of education through developing and validating products, as well as to provide solutions to problems that are practical in education and learning. The place of research was carried out in the Department of Computer Science, Faculty of Science and Engineering, Nusa Cendana University. So that research can produce effective learning media products, it is necessary to choose approaches and methods that are appropriate to the characteristics of the product being developed. The relevant approach and method is the modified model of Dick and Carey and ADDIE with the stages of analysis, design, development, implementation and evaluation.

3. Results and discussion

3.1. Results
The results of the validation of the design expert, the material and the learning media overall were very good. Trial responses to students about the acceptance and usefulness of the developed products are very good. The results of testing the effectiveness of the developed model obtained an average initial test value = 48.1667 final test = 80.1667, the difference between the initial test score and the final test = 32. this results are greater than ttable, namely 58.0908 > 1.669, have meaning that conclusively "The model of developing mobile learning has shown a real effect in improving learning outcomes of human computer interaction subjects in the Department of Computer Science, Faculty of Science and Engineering, University of Nusa Cendana Kupang".

3.2. Discussion
Blended learning (BL), or the integration of face-to-face and online instruction [16], is widely adopted across higher education with some scholars referring to it as the “new traditional model” [17] or the “new normal” in course delivery [18]. Blended Learning, according to Romi [19], is one methodology learning approach that can be done when an educational institution will implement an IT-based education model, which still applies the conventional education model with the support of IT as the
media and educational technology. Broadly speaking, when we mention e-Learning, there are three main components that make up e-Learning [19], namely: e-Learning System (LMS = Learning Management System), e-Learning Content, and e-Learning Infrastructure (Equipment). The process of implementing e-Learning, requires a Learning Management System (LMS), which serves to regulate the governance of learning in the e-Learning model.

Often also known as LMS CMS (Course Management System), CMS is generally built based on the web, which will run on a web server and can be accessed by participants through a web browser (web client). Servers are usually placed in universities or other institutions, which can be accessed from anywhere by the participants, by utilizing an internet connection. Stone and Vaz [20], says that an LMS is a well-defined and well-built pattern when it becomes a learning management application used in planning, execution and evaluation of a specific e-learning process.

Moodle is an open source CMS that is currently used by universities, educational institutions, K-12 Schools, businesses and individual instructors who want to use web technology to manage their courses [21]. Rice IV argues that Moodle is designed to support a learning style called social constructionist pedagogy, which uses interactive learning styles [22].

The social constructionist pedagogy believes that people will learn well, if they interact with learning material, build new material for other material, and interact with other participants about the material.

4. Conclusion

Comprehensive design method that emphasizes the macro aspects of governance and micromanagement about the development of e-learning learning systems is expected to be a guide in the development of e-learning learning systems. Stages of e-learning development can be more directed both from the strategic and tactical side.

In SISDIKNAS as stipulated in Law No.20 of 2003 it has regulated distance education. One solution for distance education is Blended learning. The steps in the implementation of blended learning: is to determine the types and materials of teaching materials, then design the design of blended learning, in addition to the connection of on-line learning, after testing an evaluation of the learning system with it.

References

[1] Oetomo B S D and Priyogutomo J 2004 Kajian Terhadap Model e-Media dalam Pembangunan Sistem e-Education Makalah Seminar Nasional Informatika
[2] Fairlie R 2014 Race and the digital divide B. E. J. Econom. Anal. Policy 3
[3] Dziuban C, Graham C R, Moskal P D, Norberg A and Sicilia N 2018 Blended learning: the new normal and emerging technologies Int. J. Educ. Technol. High. Educ. 15 3
[4] Parsad B, Lewis L and Tice P 2008 Distance education at degree-granting postsecondary institutions: 2006-2007 (National Center for Education Statistics, Institute of Education Sciences)
[5] SISDIKNAS 2003 Law No. 20 of 2003 concerning Distance Education
[6] Hefzallah I M 1999 The new educational technologies and learning Springfield. Charles C. Thomas. Retrieved Feb. 3 2013
[7] Wright M W 2004 Creating and using multiple media in an online course The distance education evolution: Issues and case studies (IGI Global) pp 192–213
[8] Syah M, Wardan A S, Rakmat M F and Muchlis 1997 Psikologi pendidikan: dengan pendekatan baru (Penerbit PT Remaja Rosdakarya)
[9] Sudjana N and Rivai A 2010 Media pengajaran (Bandung: Sinar Baru Algensindo)
[10] McNaught C, Poon P W T and Ching H S 2006 Issues in Organizing and Disseminating Knowledge in the 21st Century eLearning and Digital Publishing (Springer) pp 1–10
[11] Plomp T and Ely D P 1996 International encyclopedia of educational technology (ERIC)
[12] Long H B 2004 E-Learning: An Introduction dalam Getting The Most from Online Learning,
Editor by Piskurich, George

[13] Khan B H 2005 *Managing e-learning: Design, delivery, implementation, and evaluation* (IGI Global)

[14] Richey R C, Klein J D and Tracey M W 2010 *The instructional design knowledge base: Theory, research, and practice* (Routledge)

[15] Kusumandari R B, Wibawa B and Muchtar H 2019 Game Learning to Optimize Learning and Trauma Healing in Children After Disaster in Banyumas

[16] Ross B and Gage K 2006 Global perspectives on blending learning *Handb. Blended Learn. Bonk, JC, Graham, RC, Eds* 155–68

[17] Norberg A 2017 *From blended learning to learning onlife: ICTs, time and access in higher education* (Doctoral dissertation, Umeå University)

[18] Prasetyo D 2015 Pengembangan model blended learning mata kuliah interaksi manusia & komputer menggunakan metode system development life cycle (SDLC) *Seminar Teknologi Pendidikan* pp 152–62

[19] Stone D E and Koskinen C L 2002 *Planning and design for high-tech web-based training* (Artech House)

[20] Vaz M F R 2007 Modelagem e arquitetura de sistemas para monitoração e acompanhamento da aprendizagem eletrônica

[21] Cole J 2005 *Using Moodle* (USA: O’Reilly)

[22] Rice W H 2006 *Moodle: E-learning Course Development: a Complete Guide to Successful Learning Using Moodle.-Includes Index* (Birmingham: Packt Pub)