WEB-BASED LEARNING MODEL THAT CAN BE IMPLEMENTED IN LEARNING SETTINGS WITHOUT BEING LIMITED BY TIME, PLACE AND SPACE

[1]SUPRATMAN ZAKIR, [2]RAHMAT HIDAYAT

[1]Faculty of Tarbiyah and Teaching, IAIN Bukittinggi, West Sumatera Indonesia

[2]Department of Information Technology, Politeknik Negeri Padang, Indonesia

E-mail: [1] sefzaku@gmail.com, [2] rahmat@pnp.ac.id

ABSTRACT

Learning model is one of the factors that influence the learning outcomes. An educator is required to implement a variety of learning models in carrying out learning activities. One of the contemporary learning models is Web Base Learning (WBL). WBL models can be implemented without being limited by place, time and space. This study aims to produce a web-based learning model that can be used in accordance with certain environmental settings. This research uses Research and Development approach of Plomp model. The results show that WBL model can optimize the use of resources and potential owned by a college. Application of this web-based learning model is able to make learning take place anytime and anywhere without being limited by time and space. The WBL Model can access unlimited sources of knowledge and information thereby increasing the treasury of the material being studied. WBL Model is also able to improve the effectiveness and efficiency because learning takes place without considering the time of learning. WBL models are also able to instill and cultivate human values or characters such as honesty, courtesy, mutual respect, respect for the opinions of others, being able to accept, discipline, rewarding time in addition to assisting students in improving cognitive, affective and psychomotor aspects.

Keywords: *Web Base Learning, Online Learning, E-Learning, Research And Development, Learning Setting*

1.   INTRODUCTION

Web Base Learning is an idea or a system that brings information technology into the world of education. Some components in college still consider that information technology has a bad or negative influence greater than the influence of good or positive impact. With this idea it is hoped that such thoughts can be minimized, especially if the WBL development paradigm involves a scientific philosophy capable of eroding the thinking. One ism that can support the development of the WBL is the ideology of utilitarianism which states that everything must have meaning, usefulness, useful for both themselves and for others.

The development of ICTs triggers changes in the competencies of outcomes generated by educational institutions including vacational or vocational fields. This policy will lead to changes in characteristics and the upcoming working world that is very easy to change and develop according to the conditions that occur. Therefore, college graduates not only master the science and standard skills but also must be able to adapt to all changes. To prepare graduates who are able to win global competition, a deep and comprehensive study is needed such as formulating philosophical and juridical concepts of higher education in accordance with the conditions and national identity.

The survey results of the Association of Indonesian Internet Service Providers (APJII), Indonesian internet users in 2015 has reached 139 million users and APJII predicts the growth of internet users Indonesia is very significant. Meanwhile, based on data from the Ministry of Communications and Information Technology Indonesia internet users in late 2015 reached 57% of the population of Indonesia. This growth indicates the use of ICT in all domains of life will be a trend of development in the future.

Around 49% of the total internet users in Indonesia aged between 18-25 years and 35.8% the number of internet users aged 26-35 years as viewed from the age of internet users. This data shows that most internet users in Indonesia are users between 18-35 years old. The above data is reinforced by internet user data grouped by job

type. Where students become dominant in using the internet. Recorded 87.7% of the number of Internet users in Indonesia are students.

The number of internet users in the education circle is not linear with the purpose of internet usage. This is disclosed by APJII, where internet users in Indonesia is precisely dominated for the purpose of updating information of 25.3% while for the benefit of education only 9.2% of total internet users. The data above illustrates that internet usage still does not have a large portion for use in educational purposes. This is due to the lack of educational resources on the Internet when compared to other sources of information. To overcome these problems need to increase the role and learning activities. One of them is using IT products in learning by developing various models of learning

The learning model is a conceptual framework that delineates systematic procedures in organizing learning experiences to achieve specific learning goals, and serves as a guide for instructional designers and teachers in planning and learning activities (Winataputra: 2001: 3). The learning model is a specific approach in teaching that has 3 (three) characteristics, namely goals, phases and foundations. Aim; models designed to help students develop critical thinking skills and gain an in-depth understanding of the specific forms of matter. Phase; the model includes a series of steps aimed at helping students achieve specific learning objectives. Foundation; models supported theory and research on learning and motivation. Eggen dan Kauchak (2012 : 7).

Joyce *et al.* (1992**:** 4) defines the learning model as follows: "*A model of teaching is a plan or pattern that we can use to design face to face teaching in classrooms or tutorial settings and to shape instructional materials-including books, films, tapes, and computer-mediated programs and curriculums (long term courses of study).* Arends (2001: 24) states: "*Models of teaching is an overall plan, or pattern, for helping students to learn spesific kinds of knowledge, attitudes, or skills*". Based on the notion of the concept of such learning model, then each learning model serves to provide direction in the design of learning in order to help learners achieve various goals and / or competencies.

Joyce et al. (1992: 13) states that the learning model has elements: theoretical basis, strategy, and step of implementing (using) the model in the classroom or other learning settings. The theoretical basis of a learning model is an explanation of the purpose of the model, theoretical assumptions, and

the principles of reaction and the major concepts underlying the model. The strategy of a learning model is defined as a description of the operational model. The description is expressed in four concepts: syntax, social systems, reaction principles and support systems. The description is what activities should occur, and if possible in sequence of how these activities occur. The syntax or modeling model is an explanation of the operation of the model (model in action). The syntax is described in terms of a series of events called phases. The social system is an explanation of the role of teachers and learners and the connectedness and types of norms supported. In the principles of reaction is explained how teachers should look at learners and how to respond to what the learners do. Furthermore, in the support system are described what may be required in addition to the models relating to support of human skills, capacity and facilities. Implementation steps (model) in the classroom or other learning settings may be illustrations for different areas of interest, or application guidelines at a certain age level or design of specific curricula or suggestions of combining a model with other models.

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a) General Characteristics of the Learning Model

Joyce and Weill (2003) suggest that each model of learning has its own common characteristics, which are differentiated according to elements ie; Syntax, Social System, Reaction Principles, Support Systems and Instructional Impact and Companion Impact.

Syntax is the stages of activities undertaken in learning according to a particular model. The intended social system is the situation or atmosphere and norms prevailing in the model. The principle of reaction is a pattern of activity that describes how teachers should see and treat learners as well as how to respond to them. What is meant by the support system is all means, materials and tools necessary to implement a particular learning model. While the instructional impact is the result of learning that is achieved directly by directing the learners to the expected goal. The companion impact is the other learning results generated by a learning process, as a result of the creation of learning atmosphere experienced directly by learners without direct direction from the educator.

Arends (2001: 24) states that the concept of a learning model developed by Joyce et al. can be used as a source of learning process design in which the results of the implementation of the learning process design is the competence that has

been formulated. Based on this, it is suggested to implement effective learning models in the learning process to achieve the formulated competencies. The concept of learning model according to Joyce et al. and Arends is broader than strategy concepts and learning methods. Thus, using the learning model offered by Joyce et al. and Arends means to have used the methods and learning strategies are arranged systematically and have been tested through research to achieve learning outcomes in the form of specific competencies for the models.

b) Information Technology in the Learning Model

One of the most widely used models of learning today is learning models that utilize technology and information, such as web-based learning, mobile learning or other learning models that utilize the Internet as the main medium in the delivery of learning.

Web Base Learning is one of the products of ICT development. It is an idea or a system that brings information technology into the world of higher education. Some components in college still consider that information technology has a bad or negative influence greater than the influence of good or positive impact. With this idea it is hoped that such thoughts can be minimized, especially if the WBL development paradigm involves a scientific philosophy capable of eroding the thinking. One flow that can support the development of the WBL is the ideology of utilitarianism which states that everything must have meaning, usefulness, useful for both themselves and for others.

Jung and Rha (2000: 32) explains, IT is the integration between resources owned by universities, mass media companies or companies in the field of integrated computer networks that have different rules in order to form a management system and quality control system together. Jung and Rha use the term Open Cyber University (OCU) for the application of IT in learning.

c) *Web Base Learning* (WBL)

WBL is an integrated software / program that automates administration systems, tracking and reporting online learning. The WBL provides a centralized management approach to the learning system in scheduling and organizing learners, learning activities and assessment of learning outcomes. (Ninoriya, 2011: 645). In line with this (Jurubescu, 2008: 92) explains that WBL represents a multiuser environment where learning developers can create, store, reuse, manage and transmit digital learning content from main storage. In line with the above definition (Wihastyanang, Hentasmaka, & Anjarwati, 2014: 2) defines WBL as a software application for online administration, documentation, tracking, reporting and delivery.

According to (Azizi, 2016: 2112) Web Base Learning is an information technology product that professors and learners can use to facilitate the interaction and use of lessons presented on the website. All content, updates and activities are posted to this system and students can manage their interactions via messages, E-mail, and online forums.

According to (Ülker & Yılma, 2016: 20) Web Base Learning is a web-based system that allows instructors and students to share course material, make class announcements, submit and return learning tasks, and communicate with each other online. While (Sochorová & Materová, 2013: 49) defines WBL as an application that integrates tools or tools for organizing learning (discussion forums, calendars, assignments, evaluations), offers online communication (chats, messages and conferences) and also provides learning materials.

Based on the above definitions, it can be concluded that Web Base Learning is a software package that manages learning that can support various environmental conditions such as at home, public and classroom with various interaction facilities such as e-mail, forum, chat, where system user interaction is presented in the website.

Based on some considerations above, this study aims to produce a web-based learning model that can be implemented in learning settings without being limited by time, place and space.

2. MATERIAL AND METHOD

This research uses the type of research and development method (R & D) of Plomp model supported by several theories of model formation that is Waterfall model and Assure model.

a) Plomp Model

The development model has been extensively researched. Among these development models is a model of development in education that refers to the Plomp model. Many researchers use the Plomp model because the model is more general in order to solve educational problems so that the model can be elaborated by the researcher. (Rochmad, 2011: 65)

Plomp Model consist of 5 (five) phase, they are; the preliminary investigation phase, the design phase, the realization / construction phase, and the test, evaluation and revision (test, evaluation and revision), and implementation phases (Figure 1).
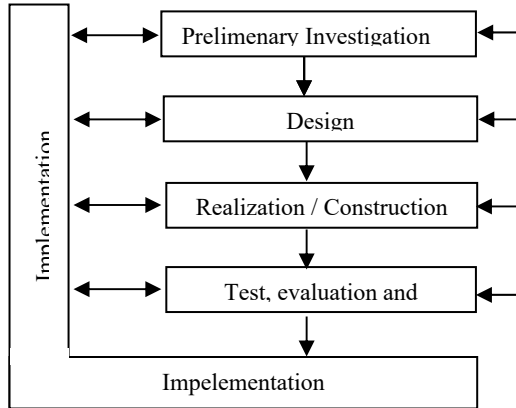

Fig 1. Plomp Model

Rochmad (2011: 66-67), describes the stages of the plomp model as follows:

1) *Prelimenary investigation*
   An important element in the design process is defining the problem. Investigation of key elements is to collect and analyze information, problem definition and follow-up plans of the project.

2) *Design*
   The activities in this phase aim to design the problem solving proposed in the initial investigative phase. The activity characteristics in this phase are generalizations of all parts of the solution, comparing and evaluating of the various alternatives, and yielding the best design choices to use as part of the solution.

3) *Realization/construction*
   Design is a work plan to be realized in order to obtain a solution in the phase of realization / construction. Design is a written plan or work plan that ends with construction or production activities.

4) *test, evaluation and revision)*
   Evaluation is the process of collecting, processing and analyzing information systematically, to obtain the realization value of the solution. Based on the collected data can be determined which solutions are satisfactory and which ones still need to be developed.

5) *implementation*
   After evaluation and obtained valid, practical, and effective product; then the product can be implemented for a wider area. In other words, it must be implemented. This implementation can be done by conducting further research on the use of product development on a wider area.

b) **Model Waterfall**

Waterfall is an approach to software development process. First introduced by Winston Royce in 1970. This approach is a simple classical approach with a linear system flow. There are 5 (five) stages in the waterfall (Figure 2).
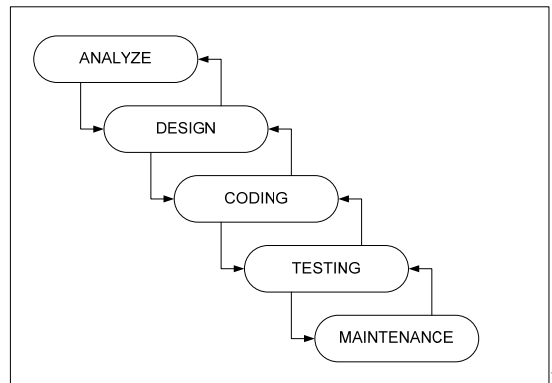
ig. 2. The steps in *Waterfall* (Rosa, 2011 : 26)

In detail the activities of each phase are as follows:

1) *Analyze*
   At this stage, we need to analyze the needs of the WBL system in detail in terms of service, limitations and objectives made by considering theories, concepts and consultations with the use of the WBL system of lecturers.

2) *Design*
   The system design is to define the needs of both hardware and software systems that build the overall WBL system architecture. These needs are created or logically designed which in the next stage will be translated into the programming language.

3) *Coding*
   At this stage the translation of the design into the form of machine language is done mechanically as a set of programs and program units.

4) *Testing*

Program units or models that have been translated into programming languages are tested as a complete system to ensure that software requirements are met. After testing independently, the system is also tested by the system user.

5) *Maintenance*

This stage is the longest stage in the lifecycle. The system is installed and used practically. Maintenance includes improving the implementation of system units and improving system services when new needs arise.

c) ASSURE Model

ASSURE model is a step-by-step planning guide for selecting and utilizing instructional media. This model was born based on the assumption Gagne (1985) that the teaching-learning process through several stages called "events of instruction". For that purpose, well-designed learning begins by arousing students' interest, which is then accomplished by presenting new material, involves feedback feedback, measuring their understanding (assesing) and passing on to the next activity. In this model, there are six steps that are "blueprints" or lesson plans that serve to describe the lesson plan itself. Here are the six steps, which are accompanied by an explanation of each step.

ASSURE Model is an abbreviation of the components or important steps contained in it, namely, Analyze the learners characteristic; **S**tate performance objectives; **S**elect methods, media, and materials; **U**tilize materials); **R**equires learner participation); **E**valuation and revision).

The ASSURE model is a learning model that combines media and technology in creating the desired process and learning activity. If media and learning technologies are used effectively, there must be a match between student characteristics and the content of methods, media, and learning materials.

3. RESULT AND DISCUSSION

The Web Base Learning model is developed based on the educational development model that is the development model of Plomp which consists of 5 (five) phases: preliminary investigation, design, realization / construction, test, evaluation and revision, and implementation. The web-based learning model is developed based on the development model of the Plomp

According to Joyce & Weil (2003) there are 5 (five) basic elements to develop a model, they are: (1) syntax that is step operational step of learning, (2) social system that is atmosphere and norm applicable in learning, (3) principles of reaction that describe how teachers should treat and respond to students, (4) support system that is all means of materials or learning environment that supports learning and (5) Instructional narturant effect that is in the form of learning results obtained directly based on the intended purpose instructional effects and narturant effects.

Based on the opinion of Joyce and Weil above then the development a web-based learning model also contains five main elements that must exist in a model:

1) Syntax

The development of a syntax model is defined as the operational step of learning. In the development of this web-based learning model there are steps or syntax as follows:

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Table 1 : The Syntax of Web Base Learning Model

No	The Syntax of Web-Based Learning Model	Indicator
1	2	3
1.	Analysis of Web-based Learning	Identified of user needs
		Identified WBL support infrastructure readiness requirements
		Identified WBL-forming system
2.	Planning and Preparation of Web-based Learning	Formulate learning objectives
		Assess the learning situation
		Assessing the social environment situation
		Creating a conducive environment
3.	Preparation of Materials of Web-based Learning	Prepare guidance on using web-based learning model
		Prepare lesson plans in the form of Semester Learning Plan (SLP)
		Preparing learning materials
		Preparing the evaluation system
4.	Presentation	How to present web-based learning materials
		Modeling or demonstration of how WBL is used or explanation of learning steps through the WBL
		Re-explain the difficult things
5.	Implementation of of Web-based Learning	Lecturers prepare materials in WBL according to SLP
		Students access the WBL and study material with various support such as: 1. Text-shaped material 2. Material shaped tutorial 3. Link the material to a wider source 4. Multimedia-based media
		Lecturers and students communicate about learning materials through chat and forum facilities at WBL
		Inter students discussed through the forum facilities at WBL
		Lecturers provide assignments and / or exams to students through the WBL
		Students submit / upload assignments and / or exams on time via WBL
		Lecturers assess the duties and / or exams through the WBL
		Students monitor the results of assignments and / or exams through the WBL
		Check the understanding and provide feedback through the WBL
		Students can still follow the lecture even though not through face to face in class
6.	Evaluation	Make notes related to web-based learning process
		Evaluate the implementation of web-based learning

2) Social System

The role of students and lecturers get a proportional portion of the web-based learning model. Students are required to be more active and more creative in utilizing WBL, as well as lecturers are required to be more active to guide, answer and provide arguments for student questions or statements about the material being studied.

The equivalent communication model is the communication principle used in this WEB-based learning model, which between lecturers and students has the principle of equality in academic communication. With this model communication

students have more "courage" courage when compared to when they follow conventional lectures. The full duplex communication model or multi-way communication model is applied in web-based learning, and the learning communication model is not tied to time and space, because web-based learning can be implemented anytime and anywhere. The principles of communication remain upheld in this web-based learning, such as honesty, courtesy, mutual respect, respect for peer opinions, non-enforcement, and democracy. So that will grow these qualities in students.

Some general principles of learning remain applicable in this web-based learning, such as the demands of student involvement by fostering a warm, personal, engaging and sensitive relationship to students, lecturers as responsible for diagnosing student learning behaviors, learning objectives remain the main target of the model this web-based learning.

3) Principle of Reaction

The reaction principle describes how a lecturer should look, treat, assess and respond to students in web-based learning. In the web-based learning model, the principle of reaction that occurs is how the lecturer creates a conducive environment such as smooth communication without being blocked by time and place. Then proceed with social interaction, where between lecturers and students have understood the duties and functions of each in this web-based learning model. At the level of application lecturers position themselves as facilitators in learning, and or also students can as a facilitator for other colleagues, so that with conditions like this are expected to bring comfort for learners in learning activities such as discussions, fulfill tasks, answer the exam so as to create learning active, interactive, creative, effective and fun.

At the level of implementation of learning berbaisis WEB lecturers can provide guidance or direct guide students how to use WBL in learning. The role of a lecturer is still important in providing feedback on student responses and providing reinforcement or elaboration of the material learned as well as providing a positive response to student responses so that students feel appreciated for their efforts and work.

4) Support System

Support systems describe the situations and conditions necessary to support the implementation of web-based learning models, including facilities and infrastructure, such as tools and materials,

room atmosphere, learning tools, readiness of lecturers and students. In this model there are several supporting systems that are needed are:

a) Internet Network and Bandwidth
Sufficient Internet and Bandwidth networks are a major supporting factor in this web-based learning. The availability of internet network with adequate bandwidth becomes one of the successful factors of implementation of web-based learning model.

b) Mangement and Organization
Class is a supporting factor in web-based learning process, with the existence of class organizations there is coordination and responsibility for the implementation of learning. In practice the leader or the head of the class is not so significant because all information is accessible to all students, but the role of the class leader will still be enabled in web-based learning one of the role and function is as a communication liaison between lecturers and students in case of Force de Majure implementation of web-based learning.

c) Learning Tool
Learning tools that support the implementation of web-based learning is SLP, syllabus, reference book.

d) The Readiness of Educators and Learners
Lecturer's readiness related to lecturer competence in web-based learning, besides pedagogic competence that must be owned by a lecturer, also must have ability or skil in planning, utilizing and using WBL in learning supported by technology readiness like computer / laptop. So also with students, of course, must be in a state ready to receive learning. Ready here interpreted with the students have been able with all the facilities to follow web-based learning, such as computer / latop and internet connection adequate.

5) Instructional Impact and Companion Impact

The impact of learning directly obtained from web-based learning is the learning outcomes achieved by students by directing the students on learning objectives that have been formulated previously. While the companion impact is the result of other learning generated by a learning process as a result of the creation of an atmosphere or scenario of learning experienced directly by

students such as the increased insight of students terakait material due to the link-ink material given, increased learning activities because students are actively discussing fellow students and with lecturers.

The direct impact of the students acquire knowledge about the material in accordance with the purpose of learning. While the indirect impact of web-based learning model is to nurture and cultivate noble values such as honesty, mutual respect, able to listen, polite and can add motivation, creativity and discipline.

5. CONCLUSIONS

The Web Base Learning model is developed based on the education development model that is the development model of Plomp which consists of 5 (five) phases: prelimenary investigation, design, realization / construction, test, evaluation and revision, and implementation. Based on the Plomp model, a web-based learning model has been developed.

According to Joyce & Weil there are 5 (five) basic elements to develop a model, they are: (1) syntax that is step operational step of learning, (2) social system that is atmosphere and norm applicable in learning, (3) principles of reaction that describe how teachers should treat and respond to students, (4) support system that is all means of materials or learning environment that supports learning and (5) Instructional narturant effect that is in the form of learning results obtained directly based on the intended purpose instructional effects and narturant effects. Based on the opinion of Joyce and Weil above then the development of a web-based learning model also contains five main elements that must exist in a model:

Web Base Learning can be applied to all courses. At the application level the application of WEB-based learning model is highly dependent on the readiness of technology, both hardware (server, personal computer / laptop), Software (operating system, and WBL applications) as well as adequate internet network (bandwidth) technology.

The implementation of this learning model can optimize the use of resources and potential owned by a college. Application of this web-based learning model is able to make learning take place anytime and anywhere without being limited by time and space. The web-based learning model can access unlimited sources of knowledge and information (the Internet) so as to increase the treasures of the material learned. Web-based learning model is also able to improve the effectiveness and efficiency because learning takes

place without considering the time lectures / learning. Web-based learning model is also expected to inculcate and cultivate values or human characteristics such as honesty, courtesy, mutual respect, respect for opinions of others, able to receive, discipline, manghargai time in addition to assist students in improving the aspects of cognitive, affective and psychomotor.

This web-based learning model not only contributes to learning outcomes in cognitive, affective and psychomotor but also provides knowledge and understanding for lecturers and students in facing today's global competition, especially with the development of information technology.

REFERENCES:

[1] Arends, Richard .I. (1997). Classroom Instruction and Management. New York: The McGraw-Hill Companies, Inc.

[2] ----------, (2001). Learning to Teach (Fifth ed.). Boston: McGraw-Hill.

[3] Azizi, B. (2016). Learning Management System Software (LMS), International Journal of Advanced Biotechnology and Research (IJBR) ISSN 0976-2612, Online ISSN 2278–599X, Vol-7, Issue-4, 2016, pp2110-2119

[4] Bu, L., Wang, Q., Chen, X., Wang, L., Zhang, T., Zhao, J., & Li, X. (2011). Toward online hybrid systems model checking of cyber-physical systems' time-bounded short-run behavior. ACM SIGBED Review, 8(2), 7–10. http://doi.org/10.1145/2000367.2000368

[5] Chen, N.-S., Ko, H.-C., Kinshuk, & Lin, T. (2005). A model for synchronous learning using the Internet. Innovations in Education and Teaching International, 42(2), 181–194. http://doi.org/10.1080/14703290500062599

[6] Ekaterina, Prasolova-Førland, Alexei Sourin and Olga Sourina, (2005), Place Metaphors in Educational Cyberworlds: a Virtual Campus Case Study, Proceedings of the 2005 International Conference on Cyberworlds (CW'05) 0-7695-2378-1/05 © 2005 IEEE

[7] Foster, I., Zhao, Y. Z. Y., Raicu, I., & Lu, S. (2008). Cloud Computing and Grid Computing 360-Degree Compared. 2008 Grid Computing Environments Workshop. http://doi.org/10.1109/GCE.2008.4738445

[8] Hafiz, M, (2013), Research and Development : Penelitian di Bidang Pendidikan yang Inovatif, Produktif dan

Bermakna, Jurnal Ta'dib Vol 16 No, 1 Juni 2013

[9]   Hastie, M., Hung, I., Chen, N., & Kinshuk. (2010). A blended synchronous learning model for educational international collaboration. Innovations in Education and Teaching International, 47(1), 9–24. http://doi.org/10.1080/14703290903525812

[10] Indrajit, Richardus Eko (2011), Teknologi Informasi dan Perguruan Tinggi: Menjawab Tantangan Pendidikan Abad ke-21. Informatika, Bandung

[11] Jung, I., & Rha, I. (2000). A Virtual University Trial Project : Its Impact On Higher Education in South Korea. Innovations in Education & Training International, 3297, 31–41. http://doi.org/10.1080/1470329001002745

[12] Joyce, B. et al. (1992). Models of Teaching (Fourth ed.). Massachusetts: Allyn and Bacon

[13] Kristen A. Renn Dawn M. Zeligman, (2005,) Learning About Technology and Student Affairs: Outcomes of an Online Immersion, Journal on The Campus September/October 2005 , Vol 46 No 5.

[14] Kruger, D., Inman, S., Ding, Z., Kang, Y., Kuna, P., Liu, Y., … Wang, Y. (2015). Improving Teacher Effectiveness: Designing Better Assessment Tools in Learning Management Systems, 484–499. http://doi.org/10.3390/ fi7040484

[15] L. Jackson, Sherri, (2003), Research Methods and Statistics : A Critical Thinking Approch, Belmot USA, Wodsworth A division of Thomson Learning, Inc.

[16] Lee Abbot, Martin and McKinney, Jennifer, (2013), Understanding and Applying Research Design, Hoboken New Jersey, John Wiley and Sons, Inc.

[17] Letters, E. (2006). Multiagent Web based Decision Support Systems for Global Enterprises : An Architectural Blueprint, Engineering Letters, 13:2, EL_13_2_16 (Advance online publication: 4 August 2006)

[18] Lin, S., & Tan, H. (2011). An application of environment education in National taiwan University of Arts E-Learning Platform. International Journal of Cyber Society and Education, 4(2), 109–116.

[19] Nieveen, Nienke, (1999), Prototyping to Reach Product Quality, dalam Plom, T; Nieveen, N; Gustafson, K; Branch, R.M; dan Van den Akker, J, Design Approches

and Tools in Education and Training, London, Kluwer Academic Publisher.

[20] ------------------, (2010), Formative Evaluation in Educational Design Research, dalam Tjeer Plomp and Nienke Neiveen, An Instroduction to Educational Design Research. Netherlands in www.slo.nl/organisatie/international/ publication.

[21] Rochmad. (2011). Model Pengembangan Perangkat Pembelajaran Matematika, 3(1974), 1–18. Jurnal Kreano, ISSN : 2086-2334 Diterbitkan oleh Jurusan Matematika FMIPA UNNES Volume 3 Nomor 1, Juni 2012

[22] Ruipérez, G. (2002), Web Assisted Language Learning (WALL) and Learning Management Systems (LMS) in Virtual Centres for Foreign Languages, International Journal of English Studies, University of Murcia.

[23] Schreiber, James and Asner-Self, Kimberly, (2011), Educational Research, Hoboken New Jersey, John Wiley and Sons, Inc.

[24] Smaldino, Lowther, Russell, (2012), Instructional Media and Technology for Learning, Kencana Pernada Media Group, Jakarta.

[25] Supratman, (2016), Local Web Base Learning : Media Pembelajaran Alternatif, Proceeding Asean Comparative Education Research Network (ACER-N), ISBN : 978-983-2267-81-2

[26] -------------, (2014), Islamic Cyber Campus dan Pengukurannya Menggunakan Paradigma ICT Pura, Proceeding KASPI UKM, ISBN : 978-967-5478-84-0

[27] Tache, Jurubescu (2008). Learning Content Management Systems, 4(4), Journal Revista Informatica Economică, nr. 4(4)/2008.

[28] Tan, Y., & Vuran, M. C. (2010). A Concept Lattice-based Event Model for Cyber-Physical Systems, 50–60.

[29] Thompson, J. F, (1973). Foundation of vocatonal education social and philosophical concepts. New Jersey: Prentice-Hall.

[30] TIM ICT Pura (2012), Profile dan Panduan Pelaksanaan Program ICT Pura, Direktorat Jenderal Penyelenggaraan Pos dan Informatika Kementerian Komunikasi dan Informatika, Jakarta.

[31] Ülker, D., & Yılma, Y. (2016). Learning Management Systems and Comparison of Open Source Learning Management Systems and Proprietary Learning

Management Systems, 18–24. http://doi.org/10.20470/jsi.v7i2.255

[32] Van den Akker, J, (1999), Principle and Methods of Development Research dalam Plopm, T, Neiven, N; Gustafson, K; Branch, R.M; dan Van den Akker, J, Design Approach and Tools in Education and Training , London, Kluwer Academic Publisher.

[33] Wardhani, IGAK, (2001), Program Tutorial dalam Sistem Pendidikan Tinggi Terbuka dan Jarak Jauh. Jurnal Pendidikan Terbuka dan Jarak Jauh, Jakarta

[34] Weitzel, D., Bockelman, B., Fraser, D., Pordes, R., & Swanson, D. (2011). Enabling Campus Grids with Open Science Grid Technology. Journal of Physics: Conference Series, 331(6), 062025. http://doi.org/10.1088/1742-6596/331/6/062025

[35] White, Ken W., et al, (2000), The Online Teaching Giude, Allyn and Bacon, Boston.

[36] Wihastyanang, W. D., Hentasmaka, D., & Anjarwati, R. (2014). Active Learning Using Learning Management System To Improve Students ' Competence, 4(1), Journal on English as a Foreign Language, Volume 4, Number 1, March 2014.

[37] Wijaya, Muksin, (2012), Pengembangan Model Pembelajaran e-Learning Berbasis Web dengan Prinsip e-Pedagogy dalam Meningkatkan Hasil Belajar, Jurnal Pendidikan Penabur - No.19/Tahun ke-11/Desember 2012.

[38] Winataputra, Udin S, (2001), Model-model Pembelajaran Inovatif, Pusat Antar Universitas untuk Peningkatan dan Pengembangan Aktivitas Instruksional Direktorat Jenderal Pendidikan Tinggi Departemen Pendidikan Nasional, Jakarta.

[39] Wu, E., Lin, W. C., & Yang, S. C. (2013). An experimental study of cyber face-to-face vs. cyber text-based English tutorial programs for low-achieving university students. Computers and Education, 63, 52–61. http://doi.org/10.1016/j.compedu.2012.11.018

[40] Zhang, L. (2012). Aspect-oriented formal techniques of cyber physical systems. Journal of Software, 7(4), 823–834. http://doi.org/10.4304/jsw.7.4.823-834