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Adaptive Hypermedia System Development Based on Moodle to Overcome the Diversity of Learning Style on Vocational Education in Indonesia

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Abstract. The inputof vocational education college does not come from one source, but several sources, from high school or other kind of high schools and from vocational high schools or other kind vocational high school, so students have diverse learning styles.This research is type of R&D (Reseach and Development), the research procedure consists of: 1) make the needs analysis of products that will be developed based on the potential and problems of moodle-based adaptive hypermedia; 2) reviewing the study of literature and information by observation; 3) designing basic products; 4) expert validation; 5) revision of product design; 6) designing media; 7) perform a functional trial; 8) first product revision; 9) user trials; 10) second product revision; 11) product implementation. The results of this research are adaptive hypermedia with link http://www.evodu.net/, adaptive hypermedia is designed specifically for college students in vocational education with diverse learning styles.

1. Introduction

In order to prepare students for the challenges of the industrial revolution 4.0, they are required to be experts in various fields of science and technology, the use of the internet for instruction is one of the examples. Adaptive hypermedia is basically combination of hypermedia technology and adaptive systems. E-learning system (adaptive hypermedia) needs to accommodate the conditions or characteristics of users and support all this information in the user model and then the system will utilize this information as a basis for conveying learning [1].

Moodle is open source software that supports learning operations. Important features of learning support include assignments, quizzes, communication, collaboration, and key features that can upload various formats of learning material [2]. With internet connection, it is flexibility, comfort and easy for access to study anywhere and anytime.Another advantage of Moodle is the ability of students to adapt and communicate with friends without distance and time limit.
Hypertext is usually interpreted as an interface page to display text that contains automatic references to other documents called hyperlink. Hers in [3] says "text linked in a non-linear fashion is termed

hypertext". Hypertext is text that is associated with non-linear mode, hypertext is generally made in the world wide web, while hypermedia is an interface page that can display more than just text, but multimedia content and its links.Furthermore, he also explains "the hypermedia terms that are often used to describe systems that use hypertext combined with other non-contextual information".

Brusilovsky in Surjono [4] said that adaptive hypermedia is basically between hypermedia technology and adaptive systems. De Bra in Surjono [4] said that the user model obtains information about users by monitoring interactions, browsing behavior, and testing. Invernizi, et.al, Wasik, Hock, et.al in Surjono [4] argues that adaptive e-learning systems (adaptive hypermedia) are developed on the assumption that individual learning models are able to provide better results than other learning models. Adaptive hypermedia is not just e-learning but several levels higher than that, where the content is not only in the form of text but also other multimedia such as audio, video, flash, even direct interaction between users through audio and audio video.

The adaptive hypermedia system in this study will be developed through the Moodle Learning Management System (LMS).This is one of the LMS that is widely used in the world of education, because it is user friendly and can be installed several additional tools in it, such as YouTube, Skype and so on, as Brusilovsky [5] explains that the AH System (Adaptive Hypermedia System) can be used completely in several applications with different users goals and knowledge. For example, the user is only aiming to download material or the intended user wants to interact directly with other users, all of which can be covered with the AH System. Because it is web-based, it can be accessed by users whenever and wherever as long as the user is connected to the internet.The user model in the AH System is illustrated by him in the Figure 1 below:
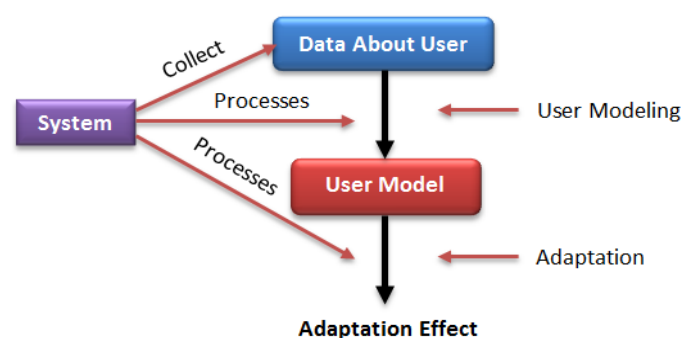

Figure 1. User modeling-adaptation in Adaptive Hypermedia System

Moodle is a Course Management System (CMS) or Learning Management System (LMS) developed by Martin Dougiamas, an educator and computer expert who spends his time on CMS development at University in Pert, Australia [6] Cole and Foster. Currently Moodle can be found at http://www.moodle.org, the latest version of moodle is 3.5.

Researchers chose to use Moodle because it has several advantages such as supporting a learning philosophy called social construction pedagogy as explained by Nash [7] "many of the features in moodle are carefully processed to support the philosophy of learning called social constructionist pedagogy". Furthermore, Nash [7] explained that the instruction style and teaching in Moodle are based on four concepts: constructivism, constructionism, social constructivism, and connected. LMS Moodle can be used at various levels of education as stated by Cole and Foster [6] "Moodle is an open course management system (CMS) that universities, community colleges, K-12 schools, businesses, and even individual instructors use to add web technology to their course". In this there are important tools to support instruction, namely: download material, view videos, synchronous chat and asynchronous chat, assignments, quizzes, as well as the main features that can upload various formats of learning materials such as Doc, PDF, excel, etc.

Many experts categorize learning styles, one of them is educator Bernice McCarthy who identifies 4 basic learning styles, namely: imaginative (imaginative), analytic (analytic), common sense (common sense), and dynamic (dynamic) LeFever [8]. Northey [9] states that there are four learning style categories, these categories are output if we do the "The Learning Type Measure", these learning styles are innovative learners, analytic learners, common sense learners, and dynamic learners.

Other learning style categories are learning styles known as VAK (Visual, Auditory, and Kinesthetic). Surjono [4] stated "This VAK model is very popular but quite simple in its implementation. The VAK model identifies trends in student learning styles that are related to visual aspects (for example: images, diagrams, and graphics), audio aspects (for example: narration, sound effects), and kinesthetic or movement aspects (eg holding, doing). Northey [9]said that, to find out our learning style whether Visual, Auditory, or Kinesthetic can be tested online at http://www.howtolearn.com/ provided by Dr. Pat Wayman.

Actually the three classifications of learning styles mentioned above have in common, these similarities can be seen from the following Table 1:

Table 1. Learning style similarity

Learning Style Classification 1	Learning Style Classification 2	Learning Style Classification 3
Imaginative Learner	Innovative Learner	Visual
Analytic Learner	Analytic Learner	Auditory
Common Sense Learner	Common Sense Learner	Kinesthetic
Dynamic Learner	Dynamic Learner	

Bennet in Hanafi [10] defines that vocational education includes all forms of education that are technical and vocational and organized by various forms of educational institutions, whether government or society, in the form of formal or non-formal, with the aim of helping people obtain education and training based on principles lifelong learning. Therefore, this paper presents adaptive hypermedia systemdevelopment based on Moodleto overcome the diversity of learning style on vocational education in Indonesia.

2. Related Works

The theme in this study has actually been carried out by previous researchers:

- Research by [2] Herman Dwi Surjono with the title Development and Evaluation of System Based Adaptive Hypermedia on Multiple Student Characteristics (2006).
- Research by [1] Herman Dwi Surjono with the title Adapative E-Learning Technology Utilization to Overcome the Diversity of Learning Styles (2013).
- Research by [11] Dorota Górska under the title E-learning in Higher Education (2016).
- Research by S. [12] Tosheva, et al. under the title Implementation of Adaptive "E-School" System (2017).
- Research by [13] H. Obeidat, M. Meccawy and P. Blanchfield under the title Authoring for Adaptive Web-Based Learning Systems: A Case Study (2009).
- Research by [14] F. Mampadi, P.A. Mokotedi with the title Towards Effective Combination of Prior Knowledge and Cognitive Styles in Adaptive Educational Hypermedia Systems (2012).
- Research by [15] F. Colace, M. De Santo and L. Greco with the title E-Learning and Personalized Learning Path: A Proposal Based on the Adaptive Educational Hypermedia System (2014).

- Research by [16] Maja Gligora Marković, Nikola Kadoić, and Božidar Kovačić with the title Selection and Prioritization of Adaptivity Criteria in Intelligent and Adaptive Hypermedia e-Learning Systems (2018).

3. Proposed Research Method

This research uses R & D method which includes in the category of research "need to do", which is research whose results are used to assist the implementation of work so that if the work is assisted with products produced from R & D it will be more productive, effective and efficient (Sugiyono, 2013 : 528). The product in this study is a moodle-based adaptive hypermedia learning, the product can be accessed through the http://www.evodu.net/. R&D steps can be seen in the following Figure 2:
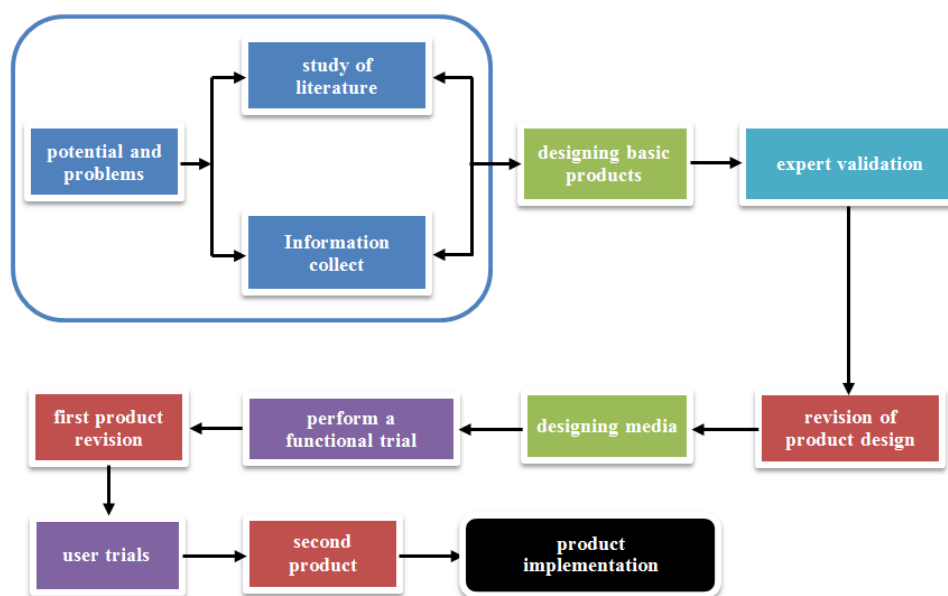

Figure 2. AH System Research and Development Procedures

4. Result and Discussion

The results of this study are e-learning media with access page http://www.evodu.net/. The moodle-based adaptive hypermedia system is designed specifically for students in vocational education with a variety of learning styles. The pages in adaptive hypermedia are in the Figure 3 below:
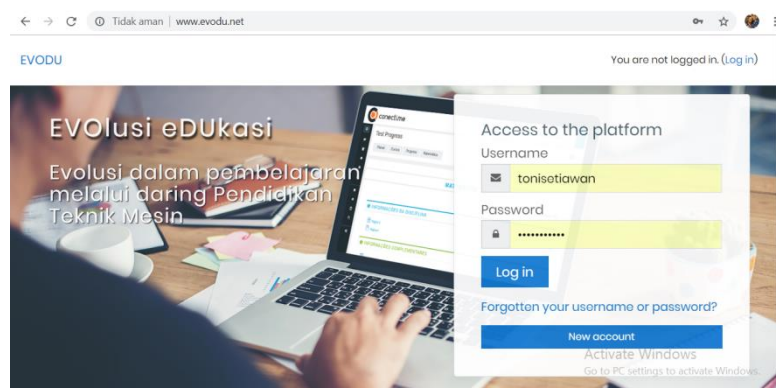

Figure 3. Page of EVODU

One of the features in EVODU that supports or can accommodate learning styles is that there are *Skype* and *Interactive Content* applications embedded in the adaptive hypermedia. Display of pages of these two features in the figure below:
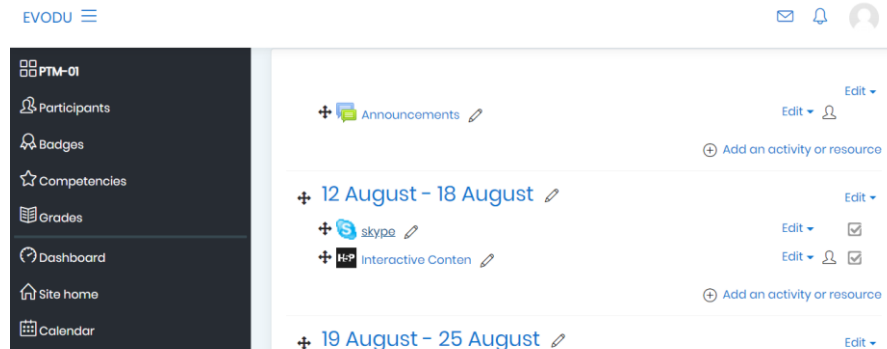

Figure 4. Skype and Interactive Content embedded in EVODU

5. Conclusion

This study has presented presents adaptive hypermedia systemdevelopment based on Moodleto overcome the diversity of learning style on vocational education in Indonesia there are several conclusions: (a) The moodle-based adaptive hypermedia system is designed specifically for students in vocational education with a variety of learning styles; (b) Adaptive hypermedia moodle-based systems can be accessed via the http://www.evodu.net/ page; (c) Evodu with the link http://www.evodu.net/ can be accessed with internet links.

6. Acknowledgment

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