

Implementation Felder Silverman Learning Style Model for Content Support based on Ontology in Indonesia Learning Management System

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Abstract

Use existing LMS as an extension of classroom learning without involving their own learning. LMS emphasizes the availability of content and delivery to students uniformly to the user. Activity LMS ignores its personalization aspect to be adaptive and interactive. In this research, the development of the LMS. Implementation model of learning styles Felder-Silverman (FSLSM) was conducted to determine the content of learning support materials in online. Ontology used as an important part to represent the personalization of e-Learning as well as the realization of semantic knowledge resources. Ontology implemented to organize content according guidelines principal teaching, relate to the learning style of content support. In testing with varied learning styles of students, the system successfully developed in this study to accommodate FSLSM in presenting content in the style of learning support materials based on ontology.

Keywords : *Felder-Silverman, Learning Styles, Ontology.*

1 INTRODUCTION

Each student (learner) have individual personal needs and characteristics such as different prior knowledge, cognitive abilities, learning styles, motivation, and so on. These differences affect the learning process and be a reason why some students find it easier to learn in a particular case, while others have difficulty. Students have different ways of learning [1, 2]. Students with preference (preferred) Strong for specific learning styles may have difficulties in learning if the teaching does not suit their learning styles, learning styles so that students who are not supported by the learning environment may have problems in the learning process. Ideally, every student gets a different treatment according to the learning style of each. But certainly not easy for teachers to adjust their teaching to the needs of different students. How to teach each teacher may be suitable for the majority of students with specific learning style. but not suitable for students with other learning styles. It cannot be enforced because it is associated with the ability of each faculty itself [3].

Availability of learning content that exists today is not adaptive to ignore individual differences of students and treat all students equally regardless of their needs and personal characteristics, or so-called personalization [4]. Based learning with personalization (personalized learning) is a personal learning that adapts to any strengths, needs and interests of students [5]. To explain the basic concepts in a domain in this case is the subject matter content as well as defining relationships in use ontology [6]. Ontology can be used to support a knowledge management system and opens the possibility to move from document-oriented view toward knowledge are interrelated, can be combined, and can be reused in a more flexible and dynamic. Ontology is a way of representing knowledge of the meaning of objects, properties of an object, and the object relations that may occur on the domain knowledge [7-9].

Course content is based on the guidelines principal teaching in accordance with the curriculum used. Problems arise concerning how to provide personalized content subjects with attention to student learning styles. This study modeling the appropriate personalized learning styles of students to course content based on ontology. This research is to develop a Learning Management System based on Moodle by implementing Felder Silverman learning style model to obtain personalize the content that is used to support online learning. Learning style model developed by Felder and Silverman (1988) combines a four-dimensional, two-dimensional replication of the model is a Myers-Briggs and Kolb. Dimensions Perception (sensing / intuitive) analogous to Perception on the Myers-Briggs and Kolb; Dimensions Processing (active / reflective) are also found in the model Kolb. Felder-Silverman using Input dimension (visual / verbal), and Understanding (sequential / global), details the dimensions of the Felder-Silverman learning styles shown in table 1.

Table 1: In circumstances Approaching Danger Allocation Recording EEPROM

Dimension	Learning Style	Description
Processing	Active Reflexive	How students process information
Perception	Sensitive Intuitive	Related to how students perform perceptual information
Input	Visual Verbal	Types of input information such as what is accepted students
Understanding	Sequential Global	How students understand the information

Felder-Silverman learning style is model used as the basis of adaptive teaching because it is based on the following research: 1) It has been successfully implemented so that a lot of people (students) can adapt on the study material well [3, 10-12], 2) It has been approved by experts in their field / specialist pedagogy [13-15], 3) Very user-friendly and easy to interpret the results of the analysis [16], 4) The dimensions are controlled (controlled) and can actually be implemented [11], dan 5) Focus on Engineering Student implementation [8].

2 RESEARCH METHODOLOGY

The method used in this research is to perform design ontology model and the identification of learning styles through ILS instrument. Ontology is a formal explicit specification of a conceptualization [17]. Conceptualization is an abstract picture of something in the world that wants to be represented. Ontology provides a shared vocabulary that can be used to model a domain, which is the type of an object and / or concepts that exist, and property

and their relationships [12]. Determining the Felder-Silverman learning style model is done using an instrument based psychometric assessment questionnaire called the Index of Learning Style (ILS). ILS is a summary of the question of the fourth dimension FSLSM learning style model that consists of 44 questions and has a value range from +11 to -11 for each dimension. Each question has two options that will determine the strength / inclination one learning style. The answers of the ILS will be accommodated in the ILS Scoring Sheet is then determined its position by placing in the ILS Report Form. ILS value scale is divided into 3 ranges of values 1-3 means that learning styles balanced (balanced) in a dimension of learning styles, grades 5-7 means that the student comfortable with the style of learning at a dimension of learning, and the value of 9-11 means that students can only learn one style of learning at a dimension of learning.

2.1 Design Ontology Model

Making the stages of ontology based on organizational methods of information by establishing and implementing formal ontology [18-20]. Here is an iterative step in the formation of ontology : 1) Determination of the domain and scope of the ontology, 2) Consider reusing existing ontology, 3) Identification of important terms in the ontology, 4) The definition of class and hierarchy, 5) Defining Property, and 6) Making Instance.

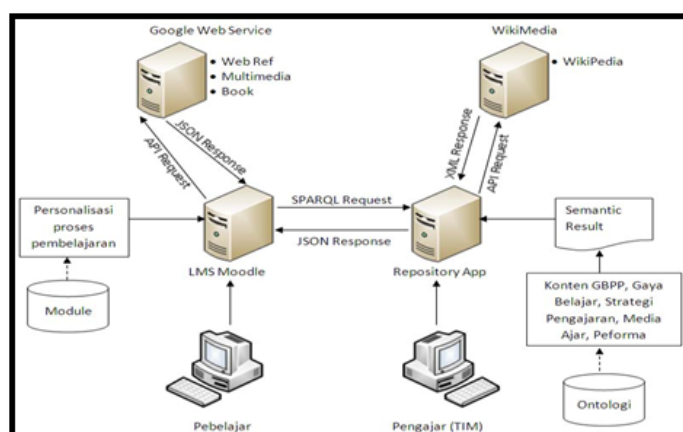


Figure 1: Architecture Design

2.2 Design Ontology Model

Learning resources is a source of additional learning support is given to students as an extension of the material being learning. So that the material learned to be more dynamic [21, 22]. Supporting the content source is obtained by utilizing the Google and Wikipedia API service whose architecture corresponding figure 1. Learning resources come from outside the system supporting learning through API Google and Wikipedia, kind, namely: web ref, multimedia, book and mind map.

Web ref is a source of learning support in the form of a text link or a link to a web page with the same context with the material being studied by the students. Web ref used to have

a dominant learning style text, and liked the detail information, then the appropriate style of learning is active, sensitive, verbal and globally.

Multimedia is a source of learning support in the form of video the same context with the material being studied by the students. Multimedia has a dominant image sequence and applied the appropriate learning style is reflexive, sensitive, visual and sequential.

Book a learning resource in the form of books or literature in accordance with the content and context of the material presented in accordance sequences being studied by the students. Learning styles appropriate for the content of this support is have good analytical skills and dominant in the media text, so that the appropriate is reflexive, intuitive, verbal, and sequential.

Mind map is a learning resource that is presented in the form of mind maps that are interrelated. Mind maps are present in accordance with the context of the material being studied students. Good learning styles to support the use of learning resources are actively like things that are realistic and dominant in visual media, so that the corresponding is active, intuitive, visual and globally.

Results relation to the characteristics of learning resources supporting learning styles Felder Silverman attention to each dimension Felder Silverman learning styles can be found in detail in table 2.

Table 2. Relation Support Content with Felder Silverman Learning Styles.

	Active	Reflective	Sensitif	Intuitive	Visual	Verbal	Sequential	Global
Web Ref	X		X			X		X
Multimedia		X	X		X		X	
Book		X		X		X	X	
MindMap	X			X	X			X

To obtain support content personalization is done by order of the steps as follows: 1) Identify the learning styles of students through ILS instruments at the beginning of online learning, and 2) Perform relation between the characteristics of learning styles with the content source support in order to obtain support content corresponding to the learning styles of students.

3 RESULTS AND DISCUSSION

The final goal of this research is the result showed the content of the courses according to the student's learning style. The case studies used in the test was a course web programming with code IF404 in Information Engineering study program. Tests carried out using SPARQL against Reflexive learning styles, Intuitive, Visual, Global. Here are some test results to obtain content on the topics taught courses on the subject of web programming:

Known learning styles: Reflexive, Intuitive, Visual, Global. The selected topic is the topic of the 5, title JavaScript. Results of content for the selected topic :

Known learning styles: Reflexive, Intuitive, Visual, Global. The selected topic is the topic of the 9, title Manipulasi XML dengan Javascript. Results of content for the selected topic :

konten	penjelasan	filependukung
Do While	<p>Sintaksnya while.	_F404_5_7_while.mp4
Method String	<p>Sebagian method yang dapat di...	_F404_5_4_string_method.mp4
Method Object Date	<p>Script JavaScript dapat ditempat...	_F404_5_11_javascript_intro.mp4
Penulisan Javascript	<p>=Math Object Methods...	_F404_5_12_objectmath_method.mp4
Method Object Math	<p>Berikut adalah property yang seri...	_F404_5_10_objecthistory_property.r...
Property Object History	<p>Operator atau penandaan assign...	_F404_5_3_operator_assignment.mp4
Operator Assignment	<p>Sintaksnya while.	_F404_5_7_while.mp4
While	<p>Berikut adalah property yang seri...	_F404_5_8_objectdoc_property.mp4
Property Object Document	<p>Switch digunakan untuk mengali...	_F404_5_6_switch.mp4
Switch	<p>Operator atau penandaan compa...	_F404_5_3_operator_comparison.mp4
Operator Comparison	<p>Pada saat anda membuat sebuah...	_F404_5_3_operator_arithmetic.mp4
Operator Arithmetic		

Figure 2: Testing and Results for topics Javascript

konten	penjelasan	filependukung
Menggunakan Parameters	<p>XSLT Processor memungkirkan p...	_F404_9_3_xml_xslt_parameter.mp4
Manipulasi Node Value	<p>Ada 2 cara untuk melakukan mani...	_F404_9_1_xml_dom_manipulasi.mp4
XSLT pada Internet Explorer	<p>XSLT digunakan untuk mentrans...	_F404_9_3_xml_xslt_ie.mp4
Copy Node XML DOM	<p>Melakukan duplikasi node XML di...	_F404_9_1_xml_dom_copy.mp4
Menghapus Node	<p>Sebuah node dalam XML DOM da...	_F404_9_1_xml_dom_remove.mp4
Dukungan XPath pada Mozilla, Firefox, ...	<p>Dalam web browser Mozilla, Fire...	_F404_9_2_xml_xpath_node.mp4
Dukungan XPath pada Internet Explorer	<p>Dalam web browser Internet Expl...	_F404_9_2_xml_xpath_ie.mp4
Menambah Node	<p>Berikut adalah node yang akan di...	_F404_9_1_xml_dom_add.mp4
Menampilkan Node XML DOM	<p>Untuk menampilkan data XML DO...	_F404_9_1_xml_dom_node.mp4
XSLT pada Mozilla, Firefox, Opera, Chri...	<p>Sedikit berbeda saat XSLT proce...	_F404_9_3_xml_xslt_node.mp4
Menghapus Node	<p>Menghapus node XML, dapat dilak...	_F404_9_1_xml_remove.mp4
Akses XML DOM	<p>Pada saat menggunakan javascri...	_F404_9_1_xml_dom_access.mp4

Figure 3: Testing and Results for topics Manipulasi XML dengan Javascript

Results of the implementation of the supporting content for testing learning styles Reflexive / Sensitive / Visual / Sequential form of a book (book) and a mind map (mind map) is shown in Figure 4. Mind map produced has the appropriate context to the subject being studied.



Figure 4: Implementation Support Content for Reflexive Learning Styles/Sensitive/Visual/Sequential

4 CONCLUSIONS

Model ontology to support content-based subjects Felder Silverman learning styles have been successfully made and tested. Ontology are implemented to organize content according guidelines principal teaching knowledge and learning styles of students. This study does not involve ergonomic aspects so that in future studies it may be included.

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