

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

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## ***Abstract***

*PalComTech Student Portal, is a web-based application used by STMIK PalComTech as a form of web-based services to the entire academic community. PalComTech Student Portal provides a variety of information and services for the academic lecturer, students, staff, and alumni. Diversity of Student Portal PalComTech users, demands the usability ability for each user, especially the lectures and students for the purpose of the existence of the Student Portal can be achieved optimally. This study aimed to evaluate the Student Portal PalComTech. Usability models used in evaluating the Student Portal is Nielsens usability model. Usability criterias used adopt the Nielsens model namely Learnability, Efficiency, Memorability, Few Errors and Satisfaction. Survey is done by distributing questionnaires to students and lecturers of STMIK PalComTech, as the largest user of the Student Portal PalComTech. The results of this study will produce a matrix and tabulate scaling based on the criteria of usability model that can be recommended on the usability of the Student Portal PalComTech.*

**Keywords :** *Nielsens Model, Web based application, Usability*

## **1 INTRODUCTION**

The development of the World Wide Web, or commonly abbreviated Web has given a very significant impact in the process of access to the information available on the internet. The need for information, encourage the rapid growth of websites on the internet. The web application has been developed into a highly complex and sophisticated. Web-based applications has touched many fields, through the provision of a wide range of access to information and services required by users with diverse backgrounds and different characteristics.

Background and characteristics of web visitors are different, causing power acceptance or acceptability be different also on the information provided. This will determine whether a visitor will come back to the website or to switch to another website. The ability of a website to provide information required, ease of access and navigation with a structured layout that

can guarantee a visitor to stay at home visit website but. In other words, the acceptability of the user to a web application that relies on web usability.

Usability is an attribute of a product which has the effect or influence on the quality of the website or software. Modeling usability is a conceptual modeling and not just stated characteristics, but also indicates how each of these characteristics are interrelated. There are some usability modeling such as Model Eason, Shackel Model, Nielsen Model, Preece Model, ISO 9241-11, ISO 9126 and Quim Model [1].

Usability according to Nielsen [2] is a quality attribute that shows how easily an interface is used. Usability is defined by five quality components which include: learnability, efficiency, memorability, errors, and satisfaction. According to Preece [3], usability is a key concept of Human Computer Interaction (HCI), which focuses on making the system easy to learn and use. Usability is very important in interaction design, which includes: efficiency (efficiency), effectiveness (effectivity), safety (safety), utility (utility), easy to learn (learnability), and easy to remember (memorability). So it can be stated that according to Nielsen usability and Preece means an application or system should be easy to learn and easy to use.

## 1.1 Usability

Usability is a key theme in the human-computer interaction (HCI). Research related to HCI have long asserted that the human factor is crucial to the success of the design and implementation of device technology. Overall goal of HCI is to determine the techniques, methods, and guidelines for designing artifacts that better and more usable. The depiction of the cognitive framework of human-computer interaction, psychology is based on previous research to develop a model based on the cognitive structure of the the users driving user behavior (driving user behavior) [4].

Usability is one of the important characters in in making a website or piece of software that is useful and of high quality. Shackel [5] States that usability is the ability of the system to be easily and effectively used by specific users, based on the functional capabilities of humans, that provide support and specific training, to meet the specific tasks, in a specific environment. Preece [3] States usability as a measure of the ease of the system to be studied or used, level of safety, effectiveness and efficiency as well as the attitude of the users. Krug [6] argues that usability is making sure that something works well, where people with the ability and experience of the average or even below average could use the object for a specific purpose without feeling despair. Jakob Nielsen and Ben Shneiderman [7] identifies five key usability attributes that apply to all aspects of the system where human beings interact. The specified attribute is learnability, efficiency, memorability, error rate low, and subjective satisfaction. Some attribute is used for setting the goal of usability.

Based on the above description then usability is defined as a measure of the ease of a system to be used or it can be referred to as a quality of the usability of a system to achieve a particular goal. The size or quality of the usefulness of a system can be expressed with some attributes i.e. learnability, efficiency, memorability, errors, few satisfaction, safety, efficiency and utility.

## 1.2 Nielsens Usability Model

Nielsens Model is developed by Jacob Nielson (see figure 1). In Figure 1 the main models that are system acceptability, while usability is part of the usefulness (usefulness). Other

attributes that contribute to the main model is the utility, usability, acceptability of practical and social acceptability. Below there are 5 (five) usability attribute that is easy to learn (learnability), efficient to use (efficiency), easy to remember (memorability), little errors (a few errors) and subjective satisfaction (satisfaction).

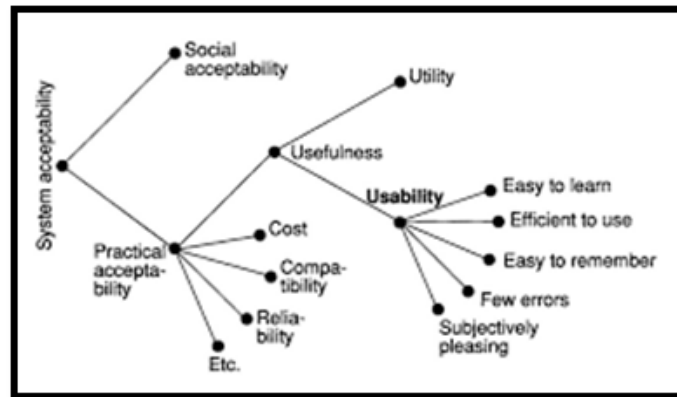


Figure 1: Nielsen's Acceptance Model

Usability according to Nielsen [8] is a quality attribute that indicates how easy an interface to use. Usability is defined through the five components of quality which include: 1) Learnability, how easy is it for users to accomplish basic tasks (basic tasks) when first using the interface? Learnability, according to Nielsen [2] is a system to ease level studied, measured through the time it takes to learn the use of the system to achieve a certain proficiency level, 2) Efficiency, once the user learn interface, how quickly can users accomplish his duties? Efficiency is the efficiency with regard to the need for resources such as effort, time and cost are used to achieve the purpose of use of the system, 3) Memorability: when users return again after some period of time does not use the interface, how easy users can rebuild the ability to use interface? Nielsen [2] argues that memorability is associated with the process of recalling (remember) how to use the system once the user does not interact with the system for a few (a period of) time, 4) Errors: how many user-generated errors, how severe the error, and how easy users can fix errors in using the interface? The frequency error is high at a time when the use of a system is an indication of poor usability of the system, and 5) Satisfaction: how pleasant to use interface? The satisfaction of users of the system who used the system to indicate that it deserves.

### 1.3 Characteristics of Web Application

According to Riyanto [9] web is a hypertext-facilities that are able to display data in the form of text, images, sounds, animations and other multimedia, where among the data intertwined and relate to one another. The website is a repository of data and information based on a specific topic. To be able to access the website needed a web browser.

The website has a large assortment of functions, namely, media promotions, media marketing, media information, media education and media communications. Technology website is constantly evolving to popping the kinds of diverse websites, namely, portals, blogs, forums,

multimedia, news, Gallery, e-commerce, e-learning, social media and more.

Website as an interactive medium, in the process of development need to heed the values related to user interaction, i.e., usability, navigation, writing, simplicity concept, acceptability, coloring, graphics and new technology. Usability (usability) is a very important thing in designing websites, due to the orientation of the user in the website is obtaining the information needed quickly despite the look of its website. As for the characteristics that affect the usability of the web application according to Bruno [10] are: 1) Users. The characteristics of web users may vary based on the level of interest of the user, the necessity of loyalty level, the level of qualifications that identifies the user, the factors that motivate and appeal as well as the cultural aspects that determine the aribut-usability attributes. The interests of the users of a web application can be categorized based on competencies, i.e. the level of beginner, intermediate, and expert levels. The competency in question can be seen from three sides, namely, knowledge of science, computer skills and experience in menggunakan web applications. If a novice user is one of the main parts of a web user, then this aspect of learnability is an important usability attributes for a note, whereas aspects of efficiency would be the main focus for user level expert, 2) Tasks. Usability is affected by the type of the task and the level of sophistication, the type of interaction that is used in performing the task, as well as the design of the interface of the web application. All these characteristics will effect directly against the attributes of usability learnability, efficiency and user satisfaction, 3) Technology. Technology characteristics of a web application has the greatest influence against the attributes of usability when compared to conventional applications. The architecture of a web application is more distributed and can rely on a variety of existing technologies, and 4) Context. Contextual property, full featured and categorization (classification) industry presents the characteristics of a web application that allows a user with a customized application environments, tasks and supporting technology. With this contextual characteristics, then the attributes of usability can be more focused.

The following Table 1. describes the relationship between the criteria of usability with the characteristics of the website.

## 2 RESEARCH METHODOLOGY

This research is a case study which is a systematic way of looking at an event, collecting data, analyzing information, and reporting the results. The method used is qualitative research methods in preparation of the interview guide and questions questionnaire. In terms of evaluation of web-based applications with Nielsens Model, this study also uses quantitative research methods to perform statistical calculations.

Types of data used in this research is the primary data and secondary data. The form of secondary Data is data that is blueprint Student Portal. Blueprint is a detailed framework as a foundation in policy making, including the setting of goals and objectives, the preparation of the strategy, the implementation of the program, and the focus of the activities and measures or implementation that must be implemented by every unit in the work environment. Primary Data obtained by means of observation, interviews, and questionnaires. Respondents who do a questionnaire consisting of lecturers and students.

The framework of the research could be seen in figure 2.

Table 1: Factors and Willis Deutsch

Criteria	Efficiency	Effectiveness	Satisfaction	Learnability	Accessibility
<hr/>					
Characteristics					
Time behaviour	✓				
Resource utilization	✓				
Attractiveness			✓		
Likeability			✓		
Flexibility		✓	✓		✓
Minimal action	✓		✓		✓
Minimal memory load				✓	✓
Operability			✓	✓	
User guidance			✓	✓	✓
Consistency		✓		✓	✓
Self-descriptiveness				✓	✓
Feedback	✓	✓			
Accuracy		✓			
Completeness		✓			
Readability					✓
Controllability					✓
Navigability	✓	✓			✓
Simplicity				✓	✓
Familiarity				✓	
Loading time	✓				✓
Effectiveness of hel web site		✓			
Effectiveness of the user documentation		✓			
Respond time	✓				✓
Completeness of description		✓		✓	✓

### 3 RESULTS AND DISCUSSIONS

#### 3.1 Respondents Description

Respondents of this study amounted to 128 people, consisting of 100 students and 32 lecturers. The number of valid questionnaires as many are 128 of the 132 questionnaires distributed. Characteristics of respondents by gender are: Men as many as 58 people, women as much as 70 people.

#### 3.2 Validity and Realibility Test

The result of validity test can be seen in table 2 below

Based on Table 2.it can be seen that the statement item questionnaire are all valid, because it has a value  $r > 0.1900$ . Reliability test performed using a statistical test Cronbach alpha of each item questionnaire statement. Reliability testing results can be seen in table 3. following:

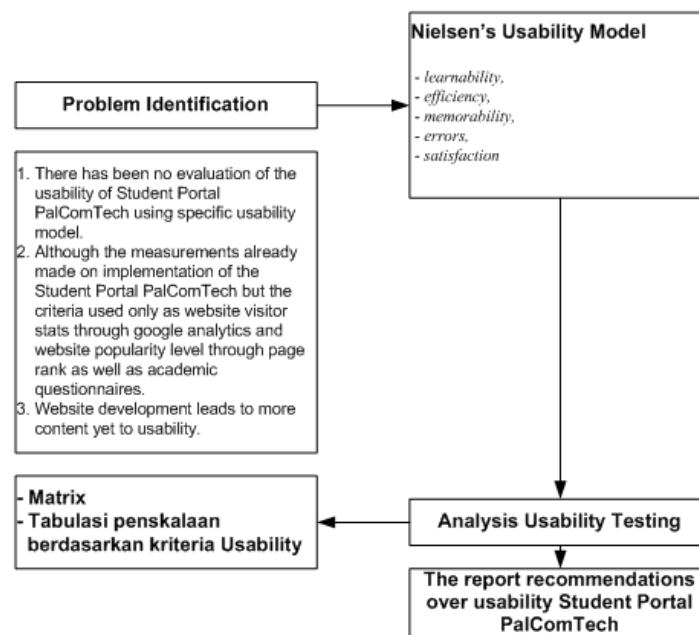


Figure 2: The framework of the research

On the table shows that the internal consistency reliability test Cronbach Alpha coefficients for all variables are at an acceptable level is above 0.60 [11].

### 3.3 Multiple Regression Result

Results of multiple regression test usability Student Portal PalComTech with Nielsen model can be seen in Table 4. below.

Based on the results of usability testing regression analysis Student Portal PalComTech with Nielsen Model in Table 4. shows that five variables are supposed to influence the usability Student Portal declared meaningful, because it has significance value less than  $p$  (Sig.  $< p$ ). Based on these allegations regression line then: 1) Constant coefficient of 2.184 means that if there is no variable learnability, efficiency, memorability, fewerror and satisfaction, then Nielsen's usability of the Student Portal PalComTech will amounted to 2,184, 2) If there is an increase in variable reliability of 0.210 or 21.0% while other independent variables constant, the Student Portal Usability based Model Nielsen will increase by 21.0% and vice versa, 3) If there is an increase in the variable efficiency of 0.213 or 21.3% while other independent variables constant, the usability Student Portal based Model Nielsen will increase by 21.3% and vice versa, 4) If thereis an increase in variable memorability of 0.226 or 22.6% while other independent variables constant, the usability Student Portal based Model Nielsen will increase by 22.6% and vice versa, 5) If there is an increase in the variable view error of 0.20 or 22.0% while other independent variables constant, the usability Student Portal based Model Nielsen will increase by 22.0% and vice versa, and 6) If there is an increase in the variable satisfaction of 0.190 or 19.0% while other independent variables constant, the usability Student Portal based Model Nielsen will increase by 19.0% and vice versa.

Table 2: Validity Test Result

Variables	Dimensions	Corrected Item-Total Correlation	Descriptions
Learnability	L1	0.427	Valid
	L2	0.754	Valid
	L3	0.706	Valid
	L4	0.612	Valid
Efficiency	EF11	0.758	Valid
	EF12	0.692	Valid
	EF13	0.846	Valid
	EF14	0.846	Valid
Memorability	ME1	0.572	Valid
	ME2	0.58	Valid
	ME3	0.791	Valid
	ME4	0.711	Valid
Few Error	ER1	0.39	Valid
	ER2	0.703	Valid
	ER3	0.694	Valid
	ER4	0.489	Valid
Satisfaction	ST1	0.605	Valid
	ST2	0.664	Valid
	ST3	0.68	Valid
	ST4	0.562	Valid
Usability	US1	0.4	Valid
	US2	0.439	Valid
	US3	0.336	Valid
	US4	0.567	Valid
	US5	0.754	Valid

Table 3: Reliability Test Results

Variabel	Cronbachs Alpha	Keterangan
Learnability	0, 799	Reliable
Efficiency	0, 921	Reliable
Memorability	0, 883	Reliable
Errors	0, 724	Reliable
Satisfaction	0, 880	Reliable
Effectivity	0, 767	Reliable
Safety	0, 767	Reliable
Utility	0, 877	Reliable
Usability	0,856	Reliable

Table 4: Results of Multiple Regression Analysis Model Nielsen's Usability

Variables	Coefficients	T	p (sig)	sig. confirmations
Variable Learnability(X1)	0,210	2,991	0,003	Bermakna
Variable Efficiency(X2)	0,213	3,104	0,002	Bermakna
Variable Memorability(X3)	0,226	2,899	0,004	Bermakna
Variable FewError (X4)	0,220	3,338	0,001	Bermakna
Variable Satisfaction (X5)	0,190	3,766	0,000	Bermakna
R Square = 0,809; F= 103,617p (sig) = 0,000; constants = 2,184				
Y = 2,184 + 0,210X1 + 0,213X2 + 0,226X3 + 0,220X4 + 0,190X5				

### 3.4 F Test Result

Model Summary Student Portal usability can be seen in Table 5.

Table 5: Model Summary Usability Student Portal

Model Summary <sup>b</sup>					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,900a	,809	,802	,75688	1,567

a. Predictors: (Constant), SATISFACTION, EFFICIENCY, FEWERROR, LEARNABILITY, MEMORABILITY

b. Dependent Variable: N\_USAB

Based on the table 5., The coefficient R of 0,900 means that the independent variables (learnability, efficiency, memorability, fewerror and satisfaction) have a close relationship with the usability model of Nielsen. While R2 (coefficient) is approximately 0.809 or 80.9%. This means, the fifth independent variable (X1-X5) can explain the usability model Nielsen on Student Portal Palcomtech with a contribution of 80.9%, while the remaining 19.1% is influenced by other factors not included in this study.

Table 6: Result of F Simultaneous Test Student Portal Palcomtech

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	296,791	5	59,358	103,617	,000b
	Residual	69,889	122	,573		
	Total	366,680	127			

a. Dependent Variable: N\_USAB

b. Predictors: (Constant), SATISFACTION, EFFICIENCY, FEWERROR, LEARNABILITY, MEMORABILITY

From Anova or F test obtained F count equal to 103.617 with a significant level of 0.000. These results indicate the probability value is much smaller than alpha 0.05, it can be said that the learnability variable, the variable efficiency, memorability variable, the variable few-



error and satisfaction variables together significantly affect the Usability of Student Portal Palcomtech using NiensensModelling.

#### 4 CONCLUSIONS

Based on results of the research, the researcher could conclude that:

1. Student Portal STMIK PalComTech meets all the criteria of usability Nielsen model.
2. Nielsen model Variables that most affect usability domain Student Portal PalComTech is the variable satisfaction, while small, their influence is variable memorability.

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