

# Analysis of Web Based Application for E-Learning Analytic Hierarchy Process Based Evaluator

**Abstract**—This research proposes the ISO 9126 quality model as a useful tool for assessing the e-learning system, particularly for teachers and education administrators. This web based evaluator model using Analytical Hierarchy Process approach demonstrates the validity of the model in a case study where the model was applied to an available e-learning system and showed that this can be used to detect design errors. The system proposes the metric that would be applicable to other e-learning systems and could be used as the basis of comparison for reporting on implementation decisions.

**Keywords**—E-learning, ISO 9126, web, AHP

## I. Introduction

Education is one of the important aspects of human life. Education can give for human the knowledge, skills and insights that they never known before. The development level of a country can be measured from the level of education. Rapid technological development provides benefits to all fields, including in the field of education. One of the benefit is the use of media informatics in the learning process in schools. Components of software and hardware technology that are easily available allow a school to develop web-based learning media. One of utilizations of web applications used in education to assist the learning process is e-learning. E-learning as a medium of teaching in the learning process to the students is developed in a wide range of system. The implementation of Curriculum 2013 in Indonesia requires educators and institutions to be more innovative in implementing the learning process.

One of the strategy is utilizing Information and Communication Technology (ICT) as a tool and media in the learning process. Many universities and schools use e-learning systems to support the "face" learning in the classroom or to implement distance learning programs. Virtual systems have had great growth in recent years thanks to the demands made

by students for programs with more flexible learning options without economic pressures in educational institutions, who see technology as a cost saving measure in the costs perspective.

There is still considerable criticism about the quality of these systems and how often they should be used. The problems include low depreciation, little use and consumption, making it difficult to meet the specific needs of each student. Furthermore, online education has often been criticized for not being an educational system that supports the needs of classroom education. Despite the widespread use of virtual systems and the considerable investment in buying or developing them at home, there is no consensus on a standard framework for assessing the quality of this. The lack of an agreement on the quality of the virtual system model is in contrast to the extensive work in software quality assurance in general [1]. This research proposes the model of quality ISO 9126 (ISO1991) as a useful tool for evaluating these system. The model ISO 9126 was developed by ISO (International Standards Organization for its acronym in English ISO) and this is one of the major groups recognized by the standards applied internationally. This research proposes that the ISO 9126 model can be used as a basis for comparison of e-learning systems in order to inform decision maker concerning the revision of existing systems and the acquisition of new systems. First of all, this paper examines the literature of elearning systems and evaluates some of the tools and software quality schemes that have been proposed. Secondly, this research introducess the model ISO 9216 quality as the basis for assessing the virtual tools and sub explain of the features and characteristics of this model. The main aim of our paper was to show how the model can be used to evaluate a system of elearning. With this in mind, we chose an Analytical Hierarchy Process (AHP) model as the basis for this research and adopt a case study approach. We apply the model to the system in the context of a field of information technology in University Study Program. The learning process will run properly supported with complete facilities and infrastructure so that the learning objectives will be achieved in a good way.

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In this research we summarize the results of the assessment system: our results generally show that the model is a good framework for assessing elearning systems even identify many possible improvements to the model. Finally this research analyze the ISO 9216 AHP quality model to evaluate and improve virtual learning systems [2]. Therefore, there must be an effective method and media in accordance with the development of increasingly sophisticated and advance technology at this time.

After further observation in CMS, e-learning systems that have been created not yet maximized well. This is because the problems of several categories in accordance with ISO standards, for example, the category of concept/design and learning process of e-learning that has been made. In the category of concept/design, problems occur in the administration of systems management difficult by teachers in managing the content to update the data and the lack of interaction activities in the use of e-learning. While the issue of category learning process is limited to a learning management system (LMS) associated with the facilities are limited and mental readiness of teachers and students to use e-learning as a means of learning. From some of these problems, the most important issue is not contained manufacture standard e-learning and assessment are good to use as a guide in evaluating study program e-learning.

The standard is only developed by a particular institution are not global, meaning can only be implemented in a particular institution. Standardization issued should be dynamic and standard is generic so it can be used and implemented in other institutions. There are differences in the standards used by the institution, eventually the International Organization for Standardization (ISO) as an international standardization organization issued a standard that is specifically used for the standardization of e-learning. ISO issued a standard for e-learning with the code ISO 19796-1, in which there are guidelines in the creation and implementation of a system of e-learning are good and qualified. The ISO-9126 standard states that any component of software quality are described in terms of one or more of six basic characteristics, which are: functionality, where a software qualify if properly managed the set of functions that satisfy the needs for which it was designed; reliability, which measures the ability of software to maintain its level of performance under normal conditions in a set time period; usability, which measures the effort required to be investing the user to use the system; efficiency, which allows to evaluate the relationship between the level of functioning of the software and the amount of resources used; maintainability, which refers to the attributes that measure the effort required to make changes to software, either error correction or increased functionality; and portability, which is the ability of software to be transferred from one environment to another. This standard was published in October 2005 by a team of SC 36 that the specific nature of learning, education and training. ISO 19796-1 provides RFDQ (Reference Framework for the Description of Quality) in the form of a framework for e-learning. This framework can be used as a reference in developing an e-learning. Thus, ISO 19796-1 as a reference standard shows a schematic description and process models that can be used to build and develop an e-

learning system quality. At first assessment of e-learning systems is difficult because the standards used in the assessment of different qualities. This is because in determining aspects of assessment requires careful consideration, so it is difficult to determine the quality [3]. From the observations made, the assessment process of e-learning system at SMK only limited monitoring and maintenance of school administrators. No school assessment e-learning system with certain standards. Assessment of the quality of e-learning can use ISO standards. The existence of standards issued by ISO that already provide the framework of quality assessment of e-learning is easy to do because the assessment process can be done by assessing the components on the e-learning and doing a comparison with a standard framework contained in ISO 19796-1. Therefore, this research was conducted with the aim to develop a human appraiser application e-learning system that can assess the quality of an e-learning developed by CMS using Analytical Hierarchy Process.

## II. Methodology

Research and Development or Research and Development (R & D) is the process or steps to develop a new product, or improve existing products. Many models of development that could be used, one of which is a model of software development SDLC or Software Development Life Cycle. Therefore, this development research using SDLC models simultaneously analyze the quality of the products developed. SDLC models used in this research is a kind of Waterfall. Waterfall model is described by the 5 stages of development, the analysis phase (requirements definition), the design (system and software design), implementation (implementation and unit testing), testing (integration and system testing), and treatment (operation and maintenance). Development steps are described in fig. 1 as follows:

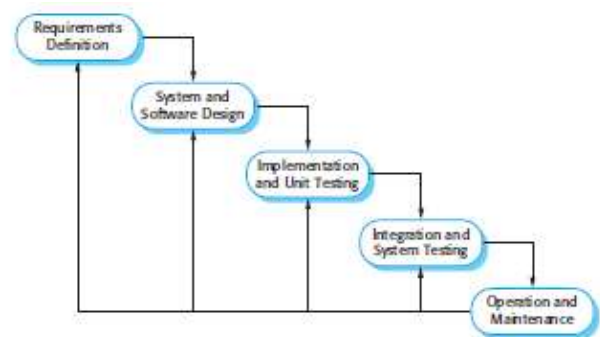


Figure 1. Waterfall Model

Researchers use the features and sub quality to evaluate an elearning system. From the point of view of the teacher, the first three features (functionality, reliability and usefulness) and the first sub efficiency features (time behavior) are easily assessable, while other characteristics are difficult to measure except by professionals trained in information and technology. For this reason we will focus on these early features. The evaluation system used in the center

of the platform by students and teachers of the subjects during one semester. The matter was being delivered in the power of technology and information and the students had some experience in using the system in the previous semester, students used the system in two rooms, the classroom and in their free time, in our research they were used various methods of evaluation. First, we focus on the system in use while observing the students were taught in the semester. Secondly our own experience as teachers using the system was recorded. Third, the contributions of students and teachers in discussion boards and group spaces were considered as evidence of activity. Fourth, we ran an evaluation of the various system tools based on the features and sub features ISO 9216 model including timing, troubleshooting and utility and functionality, overall evaluation was qualitative, although for property evaluation sub behavioral time, the time trial was conducted by a system operating on two different computers. an older one and a newer, faster machine, both operating on a fast Ethernet network, which had broadband 100 Kbps This test complemented the observation time in class when 120 students They were using the system simultaneously. This research was conducted using model "Research Development" (Research and Development).

### iii. Results

The deficiencies were identified in the assessment, these have been indicated by a number and an explanation in the registration is given below of how the system fails to meet all the criteria in this case. A Web application module applicable to Universitas Negeri Yogyakarta e-learning system, in which each student can evaluate separately each of the e-learning courses in which you are enrolled developed. Access to the application is via a user ID and password assigned to each student from enrollment. In addition the system administrator has the option of consulting results. Access to the system is given from a evaluator web based application main content. By accessing the system the welcome screen where the user must authenticate by entering your username and password in fig. 2. According to the identifier the system recognizes whether the user is a student or administrator is presented.



Figure 2. Index Home of Evaluator System

### A. Evaluation Process

.When the user is a student, once the system enters a screen where their courses with a link to evaluate each occurrence are presented in Fig. 3 in which the selected displays a sequence of screens with the survey course in Fig 3. The student must fully answer each set of questions to get to the next. When you finish filling out the survey data is recorded and the student's final screen appears.

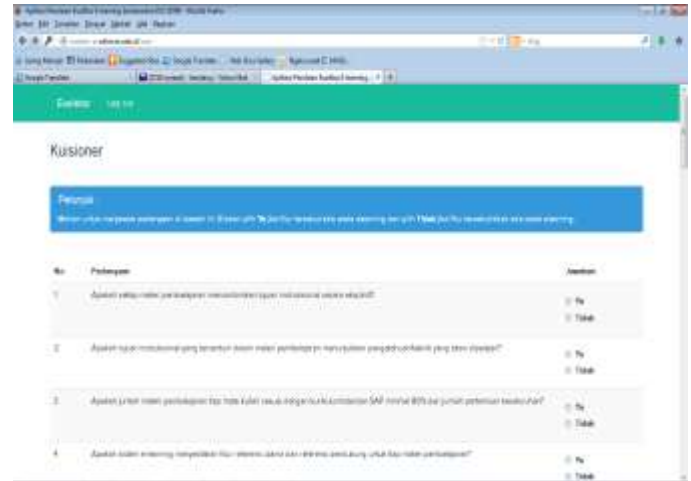


Figure 3. Questionnaire of Student Page

### B. Process Results

When you enter the administrator user has the option to view the results of the surveys. As shown in Figure 4, the system displays a graph for each question indicating the summary of student responses from a group which gives an idea of the positive and negative aspects that students perceived a group, information which can take actions for improvement.

Kategori Proses	Nilai I	Hasil agregasi
Learning Objective	0,071	0,071
Concepts of Content	0,071	0,071
Structure Content	0,071	0,071
Organizational Content	0,071	0,071
Feature Content	0,071	0,071
Conceptual Maps and Instruction Design	0,071	0,071
Media Content	0,071	0,071
Communication Content	0,071	0,071
Concepts Technical Evaluation	0,071	0,071
Content of Multimedia	0,071	0,071
Animation	0,071	0,071
Website	0,071	0,071

Figure 4. Questionnaire of Student Page

## IV. Discussion

## References

work presented here is an initiative to measure the quality of e-learning sites from the point of view of the end user. A model is proposed along with an AHP based assessment tool supported by a Web application by which the opportunity to know the perception that students have of the quality of online courses offered through an e-learning platform is provided, taking criteria evaluation standard ISO-9126 software. The model developed instrument and provide an approach to determine the degree of satisfaction that the end user has, which also allows for an improvement process giving the opportunity to make changes or adjustments to improve service. The Web application module was incorporated into the virtual classroom of the Universitas Negeri Yogyakarta, however it is feasible to adapt to other platforms making adjustments in the data access of students and groups. The ISO 9126 model provides an indication to educators and educational administrators of the quality of the system, whether they are considering purchasing and provides a basis for comparison of the different systems. Although our results showed that the model or ISO 9126 is useful for the evaluation of virtual learning systems, researchers also have some recommendations on how they should be improved. First, we believe that this can be improved by having a comprehensive feature to summarize the overall user satisfaction. To determine the level of user satisfaction, it is not possible to simply add the number of problems of sub-features Different users have different priorities that influence characteristics that will put greater emphasis. Therefore, we need to consider incorporating a final feature for the user to establish whether the particular tool being evaluated is generally acceptable.

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