THE EVALUATION OF SOFTWARE QUALITY ON TRAINING APPLICATION FOR THE SCHOOL PRINCIPAL IN THE CENTRE OF TEACHER DEVELOPMENT AND EMPOWERMENT AND SCIENCE TEACHER

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ABSTRACT

The centre of teacher development and empowerment and science teacher as one of the Technical Implementation Unit (UPT) which has responsibility to improve and empower the competence of Teachers in Indonesia for science. One of efforts that have made in achieving the IPA P4TK profession competency standart for PTK is to give e-training for teachers. In this study, the researcher will evaluate a software on the e-training P4TK IPA Bandung application. the quality of software will evaluate based on the opinions of respondents which is the teachers about the needs to functions that exist in e-training system.

E-training is all about teaching and studying that use electronic series to deliver about learning, interraction, or guiding. In this study, the researcher will evaluate a software quality on e-training application. The quality of software will evaluate based on respondent opinion which is the teacher about the needs of function and performance on e-training system.

Based on the study of P4TK IPA Bandung e-training application, the conclude is the P4TK IPA BAndung e-training application has good quality in characteristic and fuctions option that needs of all users. However, there is a lack on each characteristic related to sub-factor and quality factor that can use as reference to develop the next e-training.

Keywords: *E - training, Quality, Software Quality.*

1. INTRODUCTION

1.1 Background

The quality of the suitability of the software is expected on all software built [1]. The quality can be seen by performance software such as reliability, training, and care, good interface, how to use, functionality and other factors. Software quality is said if there is a need for software that is the foundation of software quality measures, if the software is not in accordance with the requirements specified then kualitaspun less, if using a standard to build the software if the software does not meet these standards, the less qualified. In assessing the quality of the software could use some existing models, such as models McCall, FURPS, BBN, Star, Kazman, ISO / IEC 9126, and others. But the model of ISO 9126 is a model that has been agreed as an international standard in the measurement of software quality. Although this model is a model of international standard but more needs to be done to determine the specifications of a more dominant factor contained in a particular software.

Center for Development and Empowerment of Teachers and Education Personnel Natural Sciences (P4TK IPA) as one of the Technical Implementation Unit (UPT) which has the task to improve and empower the competence of Teachers and Education Personnel (PTK) in Indonesia in the field of science. One of the efforts that have been made in achieving the IPA P4TK professional competency standards PTK is to implement e-training for teachers. E-training is all the teaching and learning that uses an electronic circuit to deliver learning content, interaction, or guidance [2]. Based on interviews with the head of the computer lab is known that the absence of the team that conducted an assessment of the quality of application software e-training and function of what needs to be developed. While the quality of the application of e-training are necessary to become a reference by the developer of the software applications of e-training. Besides the performance of the application of e-training also need to be assessed because the current performance of e-training still has shortcomings such actions given by the application. It can lead to the developer because the developer will not know what should be improved and what should be developed on the application of e-training that they make. It can be a determinant of the quality of application software e-training. However, from the user assessment alone can not prove the quality of the software directly, as in software engineering there is a discussion to assess the quality of the software.

Based on the description above, it would require a study to assess software quality in application of e-training. The software is considered here to be an open source software that is able to develop freely. Freedom in modifying the source code causing lack of attention to the factors that affect the quality of software.

1.2 Purpose and Objectives

1.2.1 Purpose

The intent of this study was to evaluate the quality of the application software on the e-training for counseling principals.

1.2.2 Objectives

The purpose of this study are as follows:

1. Make proposals that can be given to the P4TK IPA for the development of e-training application further.
2. To declare the quality of e-training application to the IPA P4TK whether the application has a good quality or not.

1.3 E-Training

E-training is part of a collection of e-learning training (content, curriculum, instruction design) are used to help participants / employees achieve the goal of learning institutions as a condition for improving the skills and performance, delivered via electronic with oral, written, illustration, animation, video or a combination thereof [6]. According Ivancevich, training is a systematic process to change the behavior of a person's work / group of employees in an effort to improve organizational performance. Definition of e-training are actually many formulated by some IT experts, but can simply be understood as a training model to utilize the services and internet facilities, so that training is no longer to be no direct interaction. In some definitions mentioned that e-training is a continuation of the "E" which means that electronic and "training" means training. Thus e-training is training remotely by using electronic facility that uses tools such as computer technology, computer networks and the Internet. E-Training has two types, namely:

a. Synchronous Training

Synchronous means "at the same time". Thus, synchronous training

is the type of training. Synchronous training requires participants and supervisors to access the Internet simultaneously. Supervisory provide papers with a slide presentation and web conferencing participants can listen to the presentation via internet connection.

So synchronous nature similar training in the training room. However, the room is virtual (virtual) and participants scattered around the world and connected via the internet. Therefore, synchronous virtual classroom training called.

b. Asynchronous Training

Asynchronous training means "not at the same time". So,

one can take the training at different times with teachers

provide training. This training is more popular in the world of E-learning because it provides more benefits for trainees as it can access training

anytime and anywhere. Training in the form of material that can be run on any computer and do not involve interaction with supervisors or other participants.

1.4 Software Quality

The quality of the suitability of the software is expected on all software built [1]. The quality can be seen by performance software such as reliability, training, and care, good interface, how to use, functionality and other factors. Software quality is said if there is a need for software that is the foundation of software quality measures, if the software is not in accordance with the requirements specified then kualitaspun less, if using a standard to build the software if the software does not meet these standards, the less qualified. In assessing the quality of the software could use some existing models, such as models McCall, FURPS, BBN, Star, Kazman, ISO / IEC 9126, and others. But the model of ISO 9126 is a model that has been agreed as an international standard in the measurement of software quality. Although this model is a model of international standard but more needs to be done to determine the specifications of a more dominant factor contained in a particular software.

1.5 ISO 9126 Models

In software engineering, there are several models of software quality. Each model has factors that the main point in assessing the quality of the software, one of them using a model of ISO 9126. This model is one of the international standard method used to assess the software quality models. This model was chosen because the application software e-training model of ISO 9126 is required to assess each of the criteria contained in the application of e-training. Model ISO 9126 consists of two parts quality model for the quality of a software product that [5]:

1. External and internal models.
2. The quality model in use.

Here is an explanation of each factor and sub-factors contained in the model of quality ISO 9126.

1. Functional

   This factor relates to how far a software can meet the needs of users.

   a. Suitability

      Suitability relates to the level of ability and feasibility of a software to provide functionality for specific needs.

   b. Accuracy

      Accuracy relates to the ability of a software to be able to give the correct result and in accordance with the function being run.

c. Interoperability
Interoperability describes the ability of a software to be able to interact with other systems or with certain systems.

d. Security
Security related to security which is owned by a software. Security is able to be granting access rights to users.

e. Functionality Compliance
Functionality compliance describes the compatibility between existing functionality in a software with standard rules that apply to other similar software.

2. Reliability
Reliability associated with the reliability or how well the level of service a soft perankat when used under certain conditions.

a. maturity
Maturity relates to the feasibility of a software to handle failures or errors contained therein.

b. Fault Tolerance
Fault tolerance is a sub-factor of reliability describing how far a software can provide fault tolerance for errors that occur when used in certain conditions.

c. recoverability
Sub-factor is related to the ability of the software to be able to rebuild and restore performance data either directly or indirectly.

d. Reliability Compliance
Reliability compliance relating to compatibility between the level of service provided by the software with standard rules used on any software that has the same type.

3. Usability
Usability berhubungna with how well the software can be understood, learned and used.

a. understandability
Sub-factor is related to how much a software can be understood by users of both conceptually logical and implementation of the use of such software.

b. learnability
Learnability describes a software can be learned well by users.

c. operability
Operability related to how much the software can be operated by users.

d. attractiveness
Sub-factor describes how a software to attract attention for its users.

e. Usability Compliance
Sub-factors related to the usability of software compatibility between the standards used by other similar software.

4. Efficiency
Efficiency factor related to the efficiency of how the resources are used by a software.

a.Time Behaviour
Time behavior related to the time required by a software to perform a specific function or purpose.

b. Resource Utilization
This illustrates the sub-factor of the amount of resources used by the software to perform a particular function or purpose.

c. Efficiency Compliance
Efficiency compliance relating to compatibility between the resources used by a standard software with the use of resources on other similar software.

5. Maintainability
Maintainability describes a software maintenance, how well the software can be maintained.

a. Analyzability
Analyzability related to how much a software can be analyzed, it is necessary for the analysis of deficiencies or causes of failures in order to know which part needs to be modified.

b. Changeability
Changeability relates to how well the software can be changed, the effort required for the modification, elimination of errors or changes in the environment.

c. Stability
Sub-factors related to the stability of a software that allows to deduce the risk of unexpected effects caused by the modification.

d. Testability
Testability illustrates how software can be tested, it is to conclude about the effort required to validate the software and test coverage.

e. Maintainability Compliance
This is related to the suitability of the maintenance performed on the software by standardizing contained in the maintenance of other similar software.

6. Portability
Portability describes the ability of a software to be able to move from an environment or system to another.

a. Adaptability
Sub-factor is related to how much a software can adapt to changes in the environment or a different system.

b. Installability

Installability describes how well the software can be used in an environment or system.

c. Co-existence

Co-existence relates to how the software can co-exist with other software products or in an environment or a similar system to learn about dependencies, behavior, or side effects.

d. Replaceability

Replaceability relates to how a software can replace other software if there is dependency on other software when the software is used.

e. Portability Compliance

Portability compliance relating to the correspondence between changes can be done by a software with standardized portability found in other similar software.



Figure1. Quality In Use ISO 9126 Models

1. Effectiveness
   Effectiveness relates to the ability to achieve accuracy and completeness user through the software.
2. Productivity
   Productivity software is an attempt to avoid excess use of resources to achieve the goals of the user.
3. Safety
   Safety is the software's ability to be able to reduce the failure rate to other users.
4. Satisfaction
   Satisfaction is the level of user satisfaction in using a software.

1.6 Metrik ISO 9126

Implementation of the software metrics berkaiatan closely with effort and cost estimation software project activities. ISO 9126 is a representation of the quality characteristics and sub characteristics during testing and operational phases. ISO 9126 provides external metrics that have many characteristics that include functionality, reliability, usability, efficiency, maintabilitas, portability. Each of these characteristics has a sub-characteristics that clarify the meaning of these characteristics. Characteristics efficiencies have sub characteristic time behavior, resource utilization, fulfillment of the efficiency with which a sub characteristics to be measured in this study. Here is a table metric metric in ISO 9126 [7]. ISO metric chosen because this model is one of the international standards in the assessment of software quality factor and this model has a separate evaluation criteria and external and internal quality, so this model is suitable for use in e-training [3]. Examples:

Table 1 Examples Metric ISO 9126

Name Metric	Measurement	Interaction The Measured	Value Type Size
Functional adequacy	X = 1-A/B A = the number of functions included in the evaluation issue B = Number of functions in evaluation	0 <= X <= 1 The closer to 1.0 the better	X= Count/Count A= Count B= Count
Functional implementation completeness	X = 1-A/B A = the number of lost functions detected in evaluation B = The number of functions described dalamspesifikasi needs	0 <= X <= 1 The closer to 1.0 the better	X= Count/Count A= Count B= Count
Functional implementation coverage	X = 1-A/B A = he amount of which is implemented by true or lost functions in the evaluation B = the number of the functions described in the specification needs	0 <= X <= 1 The closer to 1.0 the better	X= Count/Count A= Count B= Count

1.7 Method of *Weighted Summation*

Weighted summation method is a method that can be used to solve problems involving finite set [8]. Here are the steps to perform weighted summation method:

1. Define alternatives (factors) that are compared with each other.
2. Selection and define the criteria
3. Assessment scores for each factor

4. Standardize scores for criteria
5. Weighting criteria for determining priority
6. The total score for each factor by multiplying a score criteria with weights of criteria.

The total score for each factor can be calculated with the following equation WSM:

$$\text{Score (a)} = \sum_{w=1}^{n} a_i w_1 \quad (a=1,2,\ldots) \ldots \textbf{Equation (2.1)}$$

1.8 Weighting Quality

Weighting scale using the scale contained in metric ISO 9126 with a range of 0 - Low 0:33, 0:34 - nice 0.66, and 0.67 - 1 very nice.

2. ONTENTS RESEARCH

2.1 Characteristics Analysis Application Software E-training

Each software has different characteristics depending on the purpose of the construction of the device itself. The characteristics contained in the application software of this e-training are [14]:

1. Upload Duties

   At the time the participants get the task of the facilitator, the participants can collect the task by uploading a task, such as digital content, essay, project tasks, reports, and others. At the time of uploading tasks need to be considered in terms of performance such as the type of file that can be uploaded and the failure rate experienced by the software when used.

2. Exercise Training

   In this case given the facility of learning on topics I containing info about the first topic, reading material, a task independently, and video conferencing. Learning topics II contains information topics, policy matters, topics of discussion, interaction with the facilitator, the task of learning journal, and post test.

3. Download material

   The facilitator provides the materials for the training process and participants can download the materials. With these materials, participants are expected to understand the contents of the material provided.

4. Forum

   The menu is made so that participants with the other participant or participants with facilitators could conduct a discussion on a topic. However, the discussion is not done in real-time. Each participant is incorporated into this discussion will receive a copy of the posting in their email.

5. Video Conference

   Video conferencing facilities are used to interact directly with the facilitators and other participants. Also on the menu is also a facility to chat among participants.

Analysis of quality factors that exist in every model of quality needs to be done to determine where the actual characteristics could be used to develop application software this e-training.

Table 2 External and Internal Factors metrics on ISO 9126

Quality Factor	Sub-Factor	Specification
Functonality	*Suitability*	The ability of the software to provide a set of functions that correspond to specific tasks and goals of the user.
	Accuracy	Software's ability to provide correct results as needed.
	Security	The ability of the software to prevent unauthorized access, the face of the intruder (hacker) or authorization in the modification data.
	Interoperability	The ability of the software to interact with one or more particular system.
	Complience	Software's ability to meet the standards and requirements according to regulations.
Reliability	*Maturity*	The ability of the software to avoid failure as a result of an error in the software.
	Fault Tolerance	The software's ability to maintain its performance software.

Quality Factor	Sub-Factor	Specification
	Recoverability	The software's ability to re-establish the level of performance in the event of failure of the system, including data and network connections.
Usability	*Understandibility*	The software's ability to comprehend ease.
	Learnability	The ability of the software to be learned for the user while operating.
	Operability	Software's ability to ease to operate.
	Attractiveness	Software's ability to attract users.
Efficiency	*Time Behavior*	The ability of the software dalammemberik an response and processing times appropriate when performing its functions.
	Resource Behavior	The software's ability to use its resources
Maintainability	*Analyzability*	Software's ability to diagnose deficiencies or causes of failures.
	Changeability	The ability of the software to certain modified.
	Stability	The ability of the software to minimize unexpected effects from modifications of the software.
	Testability	The ability of the software to be modified and validated other software.
Portability	*Adaptability*	The ability of the software to be adapted to different environments.
	Instability	The ability of the software to be installed in a different environment.
	Coexistence	The software's ability to coexist with other software in the environment by sharing resources.
	Replaceability	The ability of the software replacement for other software.

2. Establishment of criteria Question

Establishment of criteria for software quality factor is intended to determine whether the application software e-training to meet the needs of the users. This criterion relates to the quality of application software e-training P4TK IPA Bandung. Establishment of criteria is done by making a questionnaire. Making the questionnaire is based on the quality factor is used based on the characteristics of application software e-training. As seen in the table below there are only a few factors and sub-factors related to the characteristics of software applications including functional e-training, Reliability, Usability, and Efficiency. Of sub factors didapatlah several criteria questions relating to the characteristics of application software e-training.

Table 3 Criteria Question Exercise Training

Quality Factor	Sub-factor Quality	Criteria Question
Functionality	*Suitability*	The ability of the software to provide a set of functions that correspond to specific tasks and goals of the user.
	Security	The ability of the software to prevent unauthorized access, the face of the intruder (hacker) or authorization in the modification data.
Reliability	*Fault Tolarence*	The software's ability to maintain its performance.
	Recoverability	The ability of the software back to the beginning if an error occurs.
Usability	*Understandibility*	The software's ability to comprehend ease.
	Learnability	The software's ability to learn ease.
	Operability	Software's ability to ease to operate.
Efficiency	*Time Behavior*	The software's ability to respond and an appropriate processing time when performing its functions.

3. HASIL PENELITIAN

Based on data from respondents regarding the characteristics of the software, then formed a quality metric using the WSM in the equation (2.1). Calculation starts from the sub factor of the quality of the results of sub-factors then formed into a quality factor, then the results can be calculated factor characteristics, then the results of the characteristics didapatlah results of quality e-training itself. Then dioalah return based on characteristics of the application of e-training are held P4TK IPA Bandung.

Then the final results obtained are as follows shown in Table 4.

Tablel 4 Software Quality Metrics Application E-training P4TK IPA Bandung

No. Software	Characteristics Criteria	Criteria Respondents	W	count	Factor A	Quality E-training
1	*Upload* Tugas	1.277	0.2	0.2554	1	Sangat Bagus
2	Latihan Diklat	1.3478	0.2	0.269		
3	*Download* Materi	1.17	0.2	0.234		
4	Forum	1.56	0.2	0.312		
5	*Video Conference*	0.961	0.2	0.192		

Based on the data presented in Table 4 it can be concluded that the quality is based on the application of e-training on the characteristics that are used. Weighting of the results can be seen that the application of e-training P4TK IPA Bandung has a very good quality.

4. CLOSURE

4.1 Conclusions

Based on research that has been done, it can take several conclusions, namely:

1. In this study, it can be seen the quality of e-training to serve as a reference for the development of e-training application further.
2. In this study didapatlah result that the quality of e-training has a very good quality.

4.2 Suggestions

Based on the results obtained during the study, basically there are many shortcomings in this penlitian. Therefore, there are some suggestions in the future to improve the results of the research that has been carried out include:

1. To assess the quality of the same software are advised to choose other characteristics are still concerned with the software.
2. To assess the quality of software should not be seen in terms of software, but also can use the assessment of the acceptance factor.

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