Statistical Analysis in System Evaluation of iLearning Media With McCall's Quality Model

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Abstract. Evaluation of the system regarding user participation and satisfaction will affect the success of the system implementation, where user participation can improve information system performance. In practice of evaluation, there must be a survey through statistical analysis of the system so that in its application can be known system deficiencies and user satisfaction in using information system services. The application of the business intelligence concept in this iLearning class is very felt in the decision support process and it can be felt directly by students without any further guidance from educators. This research aims to determine the results of the evaluation of the system implementation that has been running in order to know the validity and reliability test. The method used in this research is the statistical analysis approach with McCall's quality model. The data retrieval process by distributing questionnaires to the class which is used as a sampling of the total population of classes in SMK Al Fattah. This research aims to find out empirical data about the implementation of the iLearning Media system at the vocational high school level with the approach of McCall's quality model.

1. Introduction
The process of implementing an information system requires a variety of supporting factors, such as user support to provide direction and advice about the appearance of an information system application and find out how many users participate in using the system. For designing an intelligent application, it takes a simple and attractive display for visitors and can support decisions for certain users so that user participation in the implementation of this system is expected to be able to support the success of the use of information technology which ultimately can generate satisfaction from the users and managers of the application.

The process of learning and teaching activities needs to be planned so the results of these activities are in accordance with the objectives for all parties. Every plan is concerned with thinking about what will be applied. Planning about teaching and learning programs and estimating the actions to be taken when implementing learning. The planning component can consist of arranging and defining elements of learning, such as goals, materials or content, methods, tools, sources and assessment [1].
The definition of evaluation is decision making based on measurement results and criteria standards. Both measurement and evaluation are two continuous activities. Evaluation can be carried out after measurement and evaluation decisions are made based on measurement results. Decision making is done by comparing measurement results with established criteria. Therefore, there are two activities in evaluating such as measuring and making decisions by comparing measurement results with the intended criteria. Through education programs, new assessments can be carried out after measuring the various components of the education program. Evaluation is expected to be feedback for programs that have been run and provide feedforward in the form of information needed to run the program in the future [2].

System evaluation regarding user participation and satisfaction will affect the success of the information system implementation, where user activity in the system can improve the performance and development of information systems. So that in practice there must be a study with survey methods through statistical analysis so that in its application can be known system deficiencies and user satisfaction in using information system services.

iLearning media is an application system that provides distance learning activities by utilizing Information Communication and Technology (ICT) so the learning process becomes more fun because it has four concepts such as learning, playing, praying and working. ALFiL Class is an acronym for AL Fattah iLearning Class which is the result of collaboration between STMIK Raharja and SMK Al Fattah to be able to utilize information communication and technology in the vocational high school environment especially those related to computer and network engineering theory [3], and this is part of community service carried out through research channels. The application of the business intelligence concept in this class is really felt so that the decision support process can be felt directly by students, so that with this intelligent system there is no need for further guidance by educators.

Previous research has been done on the design and implementation of information systems with the concept of business intelligence. The research has proven extraordinary impacts and benefits for
students and teachers [4]. The system that has been used in the process of learning activities is expected to encourage educational institutions to feel the benefits of its use, both in terms of the quality of education and teaching so that it can become a promotional venue for schools to get many prospective students. Therefore, as a material evaluation system and to obtain empirical data and proven truth, there must be a validity test to measure the results of the system implementation with an analytical approach from McCall’s quality model. So that the problems that arise regarding the feasibility of implementing this system can be proven empirically.

2. Methods

Several processes in data collection methods were used in this study, mainly focused on the process of distributing questionnaires. The data is collected based on observations to the school that can support the collection of information to analyze system evaluation. The respondent was given questions about the benefits of system implementation in vocational high schools. Questionnaire contains a number of questions or statements that must be answered by the user or respondent aims to find complete information about the evaluation of the system implementation.

The data obtained from a number of respondents using questionnaires to students who have carried out the learning process with iLearning Media. Population is a collection or all members of the research object and meet certain criteria that have been determined in the study so that data can be concluded and known from the research. The population in this study were students at SMK Al Fattah. The sample is part of the existing population. This includes a number of members selected from the predetermined population. Data collection instruments in this study were using questionnaires. The questionnaire contains structured questions related to problems in the implementation of the iLearning Media system.

Variables are things that become objects or often also referred to as factors that play a role in the event or impact to be studied. McCall introduced his quality model in 1977. According to Pfleeger (2001), it is one of the first quality models that has been published and Figure 2 shows the quality model. Each quality factor on the left side of the image represents a quality aspect that cannot be measured directly and on the other hand are measurable properties that can be evaluated to measure quality in terms of factors. McCall proposes a subjective level scheme ranging from 0 (low) to 10 (high) [5].

![Figure 2. McCall’s Quality Model](image)

Other data collection was obtained from several literature reviews of various supporting theories both through the books and published papers or scientific articles from several international journals related to this research. Previous researches obtained from several studies conducted by researchers, such as from Sudaryono who describes the influence of iLearning Media on the quality of assessment and
learning effectiveness [6]. Then another research from Salem Alkhalaf who published the findings of the evaluation of the elearning system in the Kingdom of Saudi Arabia (KSA) [7].

In other related research obtained from Guo-Heng Luo who proposed a simulation-based learning system for international trade, combining international trade-process simulation and business letter writing [8]. Next research carried out from Maria Viorela Muntean who present the design and implementation of an Intelligent Agent based Expert System that use a set of rules to decide whether a program respects or not an integrated learning strategy from a student's perspective [9]. Other research from Ionuţ Viorel Herghiligiu who has presented a statistical analysis of the relationship between factors that influence as input, learning by sharing as a process, and results [10].

3. Results and Discussion

The questionnaire that has been designed in this survey research uses the Likert scale type. Likert scale is used to measure perceptions, attitudes and opinions of someone or group about social events or impacts. In each research, the social impact is usually specifically determined by the researcher, hereinafter referred to as the research variable. The variables to be measured will be translated into dimensions and make them sub-variables and then become indicators that can be measured. Furthermore, from measurable indicators can be used as a starting point for designing instrument items in the form of statements or questions, so that these items can be shared with respondents to be able to be filled in according to existing items [11]. The answer choices for this Likert scale can be explained in table 1 below.

| Answer statement | Weight |
|------------------|--------|
| Strongly agree   | 5      |
| Agree            | 4      |
| Neutral          | 3      |
| Disagree         | 2      |
| Strongly Disagree| 1      |

In this case the variable taken for the research instrument is system evaluation. In McCall's, the evaluation process for system quality has 11 main factors, but only six factors are used as dimensions in this study such as correctness, efficiency, integrity, usability, reusability and interoperability. The remaining five other characteristics are reliability, maintainability, testability, flexibility and portability are not the focus of this research.

| Dimension | Indicator        | Question number |
|-----------|------------------|-----------------|
| Correctness | Traceability  | 6, 25           |
|           | Completeness    | 1, 21, 24       |
|           | Consistency     | 7, 18, 40       |
| Efficiency | Execution efficiency | 13, 28         |
|           | Storage efficiency | 14, 22,        |
|           | Access control  | 5, 30, 35       |
| Integrity  | Access audit    | 29              |
|           | Operability     | 2, 8, 15, 23, 26|
| Usability  | Training        | 10, 19, 20, 31, 32, 33, 36, 37 |
|           | Communicativeness | 16             |
Reusability | Generality | 4, 38
Interoperability | Communications | 3, 9, 11, 12, 17, 27, 34, 39

To get maximum results, then this study uses the validity and reliability test of the research instrument. Validity test was applied by utilizing the correlation coefficient (1) and the equation used in testing reliability was the Flanagan equation (2).

\[
r = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{\sqrt{n(\Sigma x^2) - (\Sigma x)^2} [n(\Sigma y^2) - (\Sigma y)^2]} \tag{1}
\]

\[
r_{11} = 2 \left[1 - \frac{V_1 + V_2}{V_t}\right] \tag{2}
\]

Based on the results of data distribution from the respondent's answers, it can be decided that the overall validity of the instrument has valid and reliable values. Furthermore, to rank the system evaluation variables can be seen from the comparison between the actual score with the ideal score. The actual score is obtained from the calculation of all respondents' opinions according to the classification of weight given. While the ideal score is obtained through the acquisition of the highest value prediction multiplied by the number of questionnaires then multiplied by the number of respondents. Therefore, the results of the calculation of 40 questions given to 56 respondents are as follows,

\[
\text{The actual score} = \frac{\text{The actual score}}{\text{The ideal score}} \times 100\% = \frac{5255.5}{5600} \times 100\% = 93.85\%
\]

then the result is 93.85%, this score is in very good criteria. So it can be stated that the implications of the evaluation of the iLearning Media system produce valid and feasible data to be continued and developed according to user needs, so that the business intelligence concept can make it easier for teachers to see students' performance in carrying out tasks, knowing students' development, and making it as a basis policy in making decisions to provide assessment to students.

4. Conclusion

The results of the system evaluation indicate that the testing conducted on iLearning Media is declared valid and reliable so that it can be continued in learning and teaching activities. The concept of business intelligence attached to the system shows that students' enthusiasm in learning activities is very high and the process of communication between teachers and students or vice versa makes the learning process more effective. These results can be proven empirically through valid and reliable questionnaire data with the approach of McCall's quality model. This can prove that the application of the iLearning Media system in SMK AL Fattah is very effective both in terms of correctness, efficiency, integrity, usability, reusability and interoperability.

Other research can also be developed by implementing other business intelligence concepts such as data mining which can be used to predict the probability of student activity either with classification or clustering so that it can be used for forecasting purposes [12]. Then the results of this implementation can be developed into a larger business intelligence model in a school environment such as a data warehouse, by combining all existing databases in schools that can be used as the main foundation for supporting management decisions in managing the school or foundation.

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