Usability evaluation of assignment and monitoring information learning system of internship students based on SMS Gateway with Raspberry Pi

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Abstract. There are obstacles in the delivery of information during pre-engineering activities at the Vocational High School. There needs to be a system that makes it easy to deliver information from schools to students who carry out internship. The purpose of this study was to evaluate the usefulness of the evaluation of the usefulness of the task information learning system and the monitoring of student labor based on the SMS gateway with raspberry pi. The instrument used in usability testing is the Computer Usability Satisfaction Questionnaires: Psychometric Evaluation and Instructions for Use questionnaires developed by IBM for software usability measurement standards. The instrument for testing usability aspects with the Computer System Usability Questionnaires (CSUQ) questionnaire developed by IBM uses a Likert scale as a measurement scale. The data for the trial were 20 respondents consisting of adaptive normative subject teachers, internal engineering committee and smartschool developers. Based on the results of testing the quality of software developed on the usability aspect has a percentage of 85% or has a high quality scale and based on alpha cronbach calculations has a calculation result of 0.851 or has a "good" category. The SMS Gateway system with Raspberry Pi for Internship Assignment and Monitoring meets the usability aspect and is suitable for use.

1. Introduction
One of the competency training in vocational education is the apprenticeship system. In Australia this system is called the apprenticeship system and in Germany it is called the dual system. The dual system produces worker skills according to their fields [1]. The Vocational Education and Training (VET) education system in Germany is a good example and is applied in several European countries. In Indonesia, the dual system education environment is called Dual System Education (PSG) and currently it is often referred to as Industrial Work Practice (Internship). Internship is a joint part program between SMK (Vocational High school) and the industrial world.

During the recent decades, the dual system has become a characteristic of vocational education in Germany which has begun to be adopted by several countries because of its good management. The combination of apprenticeship with workplace-based class-based education is the difference between vocational education and general education [2]. The success and effectiveness of implementing vocational education and training programs is very much dependent on collaboration with Industry [3]. The mechanism for implementing internship at SMK Negeri 1 Sawit is a model with half the number
of classes implementing the internship and the rest carrying out learning as usual. Students who have a
turn to carry out the internship before leaving, first get debriefing by their respective expertise
program team. Internships are carried out to provide final preparation for students. The material on the
internship apprenticeship includes: (1) technical matters of internship implementation, (2) tips for the
implementation of internships so that the goals of internships can be achieved, (3) motivation so that
students can take advantage of internships to learn as well as build networks and learn career
possibilities, and (4) Best Practices and Lesson Learned. According to the opinion of the head of the
apprenticeship activity, Mr. Yuliarto, "The debriefing aims to prepare students' mental and
competency before being deployed to industry to be more ready and established". Internships are held
for 2 weeks at schools. The debriefing activity was attended by all internship participants consisting of
5 skill competencies consisting of: Computer and Network Engineering, Light Vehicle Engineering,
Auto Engineering, Industrial Chemical Engineering and Pharmacy. The debriefing materials consist
of: general internship, procedures for filling out journals and reports, discipline and work ethic and K3
(Occupational Health and Safety). According to Huda (2012), things that need to be emphasized in the
debriefing of prospective internship participants include: (1) discipline, (2) work ethic, (3)
competition, (4) thinking maturity, responsibility, (5) labor regulations, honesty, (6) K3LH (Health,
Safety and Environment), and (7) Social habits and social sanctions.

One of the functions of the SMS gateway information system is to create a centralized SMS service
that can take one action to send messages en masse. Message delivery can be done with a per-class
grouping model, majors or expertise program as well as waves that carry out internship. Initial study
conducted by researchers, students who have cell phones at SMK Negeri 1 Sawit reached 98%, but
only 50% of Android smartphones and the rest are Symbian and Java-based phones which do not
support WhatsApp access.

SMK N 1 Sawit on Saturday 3rd November 2016 launched the "Smart school". Smart school or
smart school that uses technology in the educational process, in teaching and learning activities
and the existing system in the school. Smartschool directs educational institutions to create systems that
are integrated with ICT (Information and Communication Technology) in terms of teaching and
learning practices and school management in order to prepare for the information age. Currently, the
education system of a country needs schools which by means of Information and Communication
Technology (ICT) can provide continuous learning and provide modern opportunities for individuals
to experience life in an information society in such a way that this technology is considered not only as
a means, but also as a the fundamental infrastructure is shaped by professional education [4].

"A learning method that uses ICTs to support teaching and learning process ubiquitously and
facilitates the acquisition and use of knowledge". The exponential growth of Information and
Communication Technology (ICT) has changed the education systems and contributed to the
improvement of the learning process. The exponential growth of Information and Communication
Technology (ICT) has changed the education system and contributed to the improvement of the
learning process [5]. The presence of ICT in the school system will certainly improve the quality and
access to better information. But in its own implementation, SMK N 1 Sawit is still in the
development stage of the smart school system. To support the school work program, in this case
especially the internship activities, an SMS gateway information system is needed which can provide
information services to students.

The contribution of practice is related to the various ways in which internship guidance can be
provided or not depending on the context in which they are trained. In our investigation of vocational
education in the Swiss VET dual system, observations observed workplaces where spontaneous forms
of guidance were much more frequent than others, or where vocational trainers responded easily and
willingly to assist requests [6]. In contrast, we also observed firms in which disputed forms of
guidance were the dominant interactional pattern and where workers competed for expertise and to
become a legitimate trainer. In addition, the conditions given to students may differ from one context
to another. This degree of high contextual variation is certainly an important challenge to a practice-
based model of learning as it vastly undermines overall efficiency.
The success or failure of the integration of educational technology in teaching and learning activities is influenced by various factors, namely strategic planning, a sense of belonging, existing resources and professional development. Several factors that influence individuals in responding to the use of technology are openness to technology, teacher attitudes, knowledge and skills, and teacher time and workload [7]. If one of these factors does not support or does not work well it has the potential to hinder the integration of learning. For example, the 'Smart School' program in Malaysia needs time to be implemented due to the socialization process among the bureaucracy and strategic planning of the department concerned. Information is data that is processed into a form that is more useful and more meaningful for those who receive it. The source of an information is data which is the plural form of the singular datum or data item. Data is a reality that describes events and real unity. Raspberry Pi 3 is the third generation of raspberry products that enhance the features of the second generation. Additional features include: (1) A 1.2GHz 64-bit quad-core ARMv8 CPU (2) 802.11n Wireless LAN (3) Bluetooth 4.1 (4) Bluetooth Low Energy (BLE). While the other features are the same as those of the second generation. Improvements or additions to the third generation, namely an increase in processors and connections on wireless and Bluetooth make it very easy to communicate with wifi networks.

2. Research methods

This study uses a research and development or Research and Development (R&D) model. According to Sugiyono, research and development methods are research methods used to produce certain products and test the effectiveness of these products. The purpose of this research model is to produce a specific product and test the effectiveness of the product [8]. Research and development procedures carried out by researchers use the Waterfall development model, while the stages in the Waterfall development model are: communication, planning, modeling, construction and deployment [9]. The research subjects for the usability aspect were 20 respondents consisting of adaptive normative subject teachers, the internship committee and smart school developers at SMK Negeri 1 Sawit Boyolali. Determining the sample for usability testing refers to Nielsen [10] who stated that for quantitative testing (aiming at statistical results), the user test is at least 20 respondents. While the research subject for functionality and portability aspects is the SMS gateway system with the Raspberry Pi.

2.1 Method of collecting data

Methods of data collection using interviews, observation, questionnaires and measurement software. Interviews are used to gather information at the needs analysis stage. This technique is carried out by conducting direct interviews with teachers of normative and adaptive subjects, the internship committee team and the smart school development team at SMK Negeri 1 Sawit Boyolali. The purpose of the interview is to find out: (1) user problems, (2) user needs, (3) types of media required by users, (4) software features required by users. Direct observations were made in the field regarding the process of implementing apprenticeship and assignment mechanisms by teachers. Observation of the implementation of the internship is carried out together with the committee for the implementation of the internship while the mechanism of direct assignment is with teachers of normative and adaptive subjects. The results of the analysis are used to determine the software requirements analysis being developed. The questionnaire is used to determine the response of the software developed on the usability aspect.

2.2 Research Instruments

The research instrument used to test this software consists of instruments for usability testing. The instrument used in usability testing was the Computer Usability Satisfaction Questionnaires: Psychometric Evaluation and Instructions for Use questionnaire developed by IBM for software usability measurement standards [11].
### Table 1. Usability Instrument Grid

| Subcharacteristics | Indicator                                                                                                                                 |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Understandibility  | The ability of the SMS gateway system with the Raspberry Pi is easy to understand.                                                           |
| Learnability       | The ability of the SMS gateway system with the Raspberry Pi is easy to learn.                                                                |
| Operability         | The ability of the SMS gateway system with the Raspberry Pi is easy to operate.                                                              |
| Attractiveness      | The ability of the SMS gateway system with the Raspberry Pi to attract users.                                                                 |

#### 2.3 System Testing

Data for the trial were 20 respondents consisting of adaptive normative subject teachers, internship committees and smart school developers. The research location was carried out at SMK Negeri 1 Sawit Boyolali from March 8, 2017 to March 31, 2017. Data collection was done by demonstrating the system, then respondents were asked to fill out a questionnaire.

#### 2.4 Usability Test Results

Testing the usability aspect using an instrument has been developed by IBM. The percentage score can be calculated by the formula:

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\text{Percentage of total score} = \frac{\text{total score}}{\text{maximum score}} \times 100\%
\]

Maximum score if all respondents answered Strongly Agree with a score of 5. So that the maximum score can be calculated:

Maximum score = total respondents \times \text{number of statements} \times 5 = 20 \times 19 \times 5 = 1900

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\text{Percentage of total score} = \frac{1629}{1900} \times 100\%
\]

\[
= 85\%
\]

The percentage of usability aspect test results is 85%. The test results are then converted into a qualitative scale. The results are very high and meet the usability aspect. Calculation of reliability with alpha cronbach test results for usability aspects using the CSUQ instrument from IBM with the SPSS 23 application program is shown in Figure 1 below:
The results of the usability test with Cronbach’s alpha were 0.851. Based on the Cronbach alpha conversion the usability test results are categorized as “Good”.

### 3. Discussion of Usability Test Results

Based on the results of testing the quality of the software developed on the usability aspect, it has a percentage of 85% or has a high quality scale and based on alpha cronbach calculations it has a calculation result of 0.851 or has the “good” category. The SMS Gateway System with Raspberry Pi for Internship Assignments and Monitoring meets the usability aspect and is feasible to use.

### 4. Conclusion

The development of the SMS Gateway-based Internship Student Assignment and Monitoring Information System software with the Raspberry Pi was carried out using the Kalkun CMS. The SMS Gateway-based Internship Student Assignment and Monitoring Information System with the web-based Raspberry Pi can be accessed via the local network and the internet using Gammu as the SMS Gateway machine. The system was developed to help disseminate information on assignments and
monitor students who are carrying out internship. Testing the quality level of the Information System for Assignment and Monitoring of Internship Students based on the SMS Gateway with the Raspberry Pi was carried out using ISO 9126 testing standards. The usability aspect test resulted in a percentage of 85% (high) with alpha cronbach of 0.851 (good).

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