Usability Testing of Laboratory Website using a Participatory Design Approach

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Abstract. Website is one of supporting facilities that used by universities as communication and marketing media. The Industrial Modeling and Simulation Laboratory website is one of the academic websites at the Islamic University of Indonesia. There are still problems found on the website such as not uniform display content, less attractive appearance, complex navigation and too many link layouts. It was indicated that the website has not been easy and effective to be used so that an evaluation and usability testing needs to be carried out to improve the function of the website. The research method used was participatory design, performance measurement and usability scale (SUS) system questionnaire. The purpose of this study was to determine the results of evaluation based on participatory design and the level of usability on the proposed website. The evaluation process identifies problems and suggestions for improvement through 2 iteration stages to produce a proposal design. In the process of usability testing the proposed website shows that the proposal for a new laboratory website has an effectiveness level of 78%, an efficiency level of 76% and a satisfaction level of 74% with excellent categories.

Keywords: Academic Website, Usability, Participatory Design, Performance Measurement, System Usability Scale (SUS).

1. Introduction

One of the most widely used website domains today is for academic purposes [1]. Information on a website itself depends on the profile of the visitor, the destination of the visitor, information expected by the visitor, the level of knowledge, expertise or interest of the visitor [2]. Improving the quality of website-based services is an effort that must be done continuously to convince users to continue to trust the services provided [3]. Industrial Modeling and Simulation Laboratories is one of the laboratories in the Industrial Engineering Universitas Islam Indonesia that used as information media, especially for students and academic interests so that it must provide good usability. This is because generally the usability level owned by most applications is still low so that it is difficult to be used and learned [4] whereas if the usability value of a website is good, it will increase convenience for users. On the contrary, if the value is bad it will make the users inconvenient and an evaluation of the website needs to be carried out [5]. The objective of evaluation on a human and computer interaction system is its design and implementation [6]. Research on the evaluation form of an online community using paper prototyping, as a fast participatory design technique that includes community members in collaborative online community design, so that members will use the system that has been created because it is
designed based on user feedback [7] Research related to website usability is also conducted by [8] which aims to find out the quality of information systems from websites with usability testing using the Post-study System Usability Questionnaire (PSSUQ) package.

There are several problems on the laboratory website such as display of website content/information that is not uniform, display that is not attractive, complex navigation and too many link layouts. It was indicated that the website has not been easy and effective to be used so that an evaluation and usability testing needs to be carried out to improve the function of the website. The research method used is participatory design, performance measurement and usability scale (SUS) system questionnaire. The purpose of this study was to determine the results of evaluation based on participatory design and the level of usability on the proposed website.

2. Research Method

2.1 Research Object
The object of research in this study is the Industrial Modelling and Simulation Laboratory in Department of Industrial Engineering, Universitas Islam Indonesia.

2.2 Research Subject
In this study there are 3 methods used systematically. Participatory design method is used to evaluate and develop the existing website. Performance measurement method and System Usability Scale (SUS) questionnaire is used for usability testing on the proposed website. Each respondent who is a subject of different research is the same as stated by Nielsen [9].

2.3 Research Instrument
a. Participatory design was carried out with the help of prototyping papers that were tested to the parties involved or stakeholders from the laboratory.
b. Performance measurement was carried out in 2 stages, first, the pilot test of 2 respondents and playing test on 10 respondents with a total of 5 assignments.
c. The Usability Scale System (SUS) questionnaire was conducted online on 30 respondents who met the characteristics of the study.

3. Result and Discussion

3.1 Field Studies
Field studies are an effort to collect and then organize and analyze data about the problems that are the focus of the research [9]. Usability problems found on the website that as many as 18.18% of users complain about the layout of the links and information that has been inflicted. In addition, 24.25% of users stated that the display between pages and content of page content is not uniform, and 12.12% states that general information that should be displayed on the website is not found. Another problem is 15.15% complained about the complex navigation system and 30.30% of users responded that the display of the website was now not attract attention and curiosity.

3.2 Website Development
The participatory design process involves the developer, the person in charge and the user in discussing the problems in the initial website design (Figure 1).
Figure 1. Existing Design

Data collected from the first stage participatory design process was used as a reference as the first iteration process as shown in Table 3. After the proposal design was made, the second stage of participatory design was followed by the second iteration which can be seen in Table 4, from this stage to the proposed design laboratory website (Figure 2).
3.3 Effectiveness
Effectiveness is measured based on how successful the respondent is in completing the task. Respondents were given 5 task scenarios to access the proposed website. From 10 respondents, only 3 respondents successfully completed the entire task scenario. The highest success rate achieved by one respondent was 100%, while the lowest was 60%. The average level of effectiveness of 10 respondents in completing the task is 78%, this shows that the effectiveness level of the proposed website was quite effective.

3.4 Efficiency
Efficiency is the time that users spend in completing task scenarios and efficiency indicators, i.e., the time that users need to complete one time (time completion rate) [10]. In the results of the tests that have been carried out showed that the average value of the respondents' efficiency in completing the task was 76% where the lowest percentage was 48% and the highest percentage of efficiency was 100%.

3.5 Satisfaction
The level of satisfaction is obtained from the results of the System Usability Scale (SUS) questionnaire by looking at the score generated [11]. Based on the results of the SUS questionnaire score, the proposed website was categorized as excellent because the average SUS score generated was 74 which was among the acceptable adjective rankings. It is indicated that the proposed website was classified as good quality and quite satisfying.
4. Conclusion
Based on the results of the research that has been done it can be concluded that:
1. The initial website design evaluation process is carried out with 2 stages of design iterations to produce new designs that are based on stakeholders' needs and satisfaction.
2. The development process identifies 6 problems and suggests improvements in the first iteration stage. Then in the second iteration process there are 3 problems along with suggestions for improvement and 2 suggestions for feature enhancements on the proposed website.
3. Usability testing results indicate the level of the proposed website's characteristic size is above 70%, so that it can be said that the user is able to achieve certain goals effectively, efficiently, and obtain satisfaction from the proposed website.

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