The Design of Information System for Physics Learning Media Laboratory

U R Fitri¹, I Sugihartono² S Maulana³, and R Aprilia⁴

¹Physics Education Media Laboratory, Faculty of Mathematics and Science, Universitas Negeri Jakarta
²Physics Study Program, Faculty of Mathematics and Science, Universitas Negeri Jakarta
³Master of Physics Education Study Program, Faculty of Mathematics and Science, Universitas Negeri Jakarta
⁴Physics Education Study Program, Faculty of Mathematics and Science, Universitas Negeri Jakarta

*Email: upik.rahma.fitri@gmail.com

Abstract. This study aims to develop information systems for physics learning media laboratory and facilitate students in obtaining academic information, especially physics education laboratory. The research method used is research and development with ADDIE model. The developed web-based information system then will be tested by students from the academic community/academic program of physics education and from outside people to use the online data system. Users who have used a web-based information system are required to fill out the online questionnaire available on the web page. The results obtained from 30 physics education program students are 92.0% with very good criteria and same criteria is obtained from 20 outside users or other institutions with value 91.0%. According to the result obtained from the test indicator, it can be concluded that the web-based information system that has been made meets the eligibility requirements to be used as laboratory services to meet the needs of physics education students.

1. Introduction
Information is something that is needed in an organization or agency. This is evident from a survey conducted in a preliminary study that all students surveyed used computers/laptops/handphones that had connections to the internet to find and obtain information.

In an organization, both those involved in services, commerce, or educational institutions will not be separated from information and data management. Good data processing will make it easier for many parties to find the information needed so that it can help the decision-making process. Because of the significant role of information in an organization, a tool that can store a lot of information is needed quickly, precisely and can be reused.

Development and innovation in the field of information are now so advanced that it has an impact on the ease of doing a job. One tool that can be used is website-based information. With website-based information, the need for information can be accessed anytime, anywhere and by anyone. The need to access information that is easy involves the acquisition of devices to support those needs. Many users
have used communication products or devices that provide high specifications. The use of devices or products with high specifications causes the use of high information systems. This is because everyone has an internet reach so that website-based information can make it easier. From the previous study, website-based information gives several benefits in terms of better integration and flexibility, enhanced collaboration, higher data quality, knowledge-based analysis and more informed decision making [1].

From the results of the needs analysis that has been carried out to 30 respondents, it is seen that the use of electronic products or devices that can access the internet has been used so that the demand for information quickly and massively increases. Adjustment to needs must be applied in the organizational context of education.

Website-based information is not only used in an organization, but also from the education sector. One of them is a laboratory. A laboratory is a place where experiments and investigations are carried out [2]. In a limited research laboratory is a closed room where experiments and investigations are carried out supported by the existence of tools and materials used for practical activities [3]. Website-based information is very competitive in terms of efficiency [4].

Making a website-based information system for media and learning laboratories at Universitas Negeri Jakarta is expected to accommodate the needs of users to facilitate information retrieval and provide convenience in research and development activities.

2. Method
This research method used Research and Development with ADDIE model which includes five stages, they are Analysis, Design, Development, Implementation, and Evaluation. Research and development of ADDIE models are often used in research and teaching materials [5]. At the analysis stage, the identification of needs, the determination of objectives and identification of physics lectures in a course that uses a physics learning media laboratory are carried out. At the design stage, the method is determined, the link between lecture concepts with laboratory management, making blueprint instruments, conducting field studies, and making proposals. At the development stage, research products begin to be developed by creating themes, concepts, materials and contents, as well as making layouts. At the implementation stage, the product that has been developed is then tested on users in small group and large group. The final stage is evaluation, which is evaluating the final product that has been implemented to several users in terms of information availability and level of satisfaction.

3. Results and Discussion
This study developed a research product in the form of an information system for the Physics Learning Media Laboratory. The product that has been developed has several sections, including a starting page, an information page, a contact person for the Physics Learning Media Laboratory, Physics teaching aid page, Physics learning book page, and others (see Figure 1).
The product that has been developed is then validated by several panellists who are experts in the information system and in the media field. Each questionnaire had 20 items where each indicator has a scale from 1 to 5 where 1 is for very disagree, 2 is for disagree, 3 is for average, 4 is for agree, and 5 for very agree. Before it, the questionnaire will be tested to get the information about validation and reliability for each indicator. The results showed that each indicator from each questionnaire was declared valid, where each indicator have value more than 0.444 ($r_{table} = 0.444$), while all questionnaire were declared reliable too with the value Cronbach’s Alpha for information system questionnaire and media questionnaire are 0.782 and 0.911 (reliable when Cronbach’s Alpha more than 0.600). The results of the validation will be showed in Table 1.

Table 1. Criteria the Results of Validation.

| No | Value   | Criteria    | Feasibility       |
|----|---------|-------------|-------------------|
| 1  | 0% - 20%| Very Poor   | Very Inadequate   |
| 2  | 20% - 40%| Poor        | Inadequate        |
| 3  | 40% - 60%| Average     | Decent Enough     |
| 4  | 60% - 80%| Good        | Decent            |
| 5  | 80% - 100%| Very Good  | Very Decent       |

The results of the validation of the products that have been developed are shown in Figure 2.

![Figure 2. Validation Results.](image)

Based on the results of the validation that has been done, research products that have been developed have a value of 77.36% in the field of information systems with good criteria. This confirms that the product that has been developed is feasible to use with good criteria when viewed in terms of information systems. The research products that have been developed have a value of 88.89% in the media field with very good criteria. This confirms that the product that has been developed is feasible to use with very good criteria when viewed in terms of media.
Products that have been declared feasible are then implemented by several respondents. The trials carried out are divided into two stages, namely small group trials and large group trials. The trial was conducted in the form of giving questionnaires which had 10 indicators to several respondents regarding the quality of the information system of the Physics Learning Media Laboratory that had been developed. Each indicator has scaled from 1 to 5 where 1 is for very disagree, 2 is for disagree, 3 is for average, 4 is for agree, and 5 for very agree. The results showed that each indicator was declared valid, where each indicator have value more than 0.632 ($r_{table} = 0.632$), while all questionnaire were declared reliable too with the value Cronbach’s Alpha is 0.808.

A small group trial was conducted by asking 10 respondents for help in filling out the questionnaire. The results of small group trials show in Table 2.

| No | Indicator                                                                 | Total Respondents | Total Values | Average |
|----|---------------------------------------------------------------------------|-------------------|--------------|---------|
| 1  | The web contains downloadable documents making it easier for users to write research letters/loans/registration of laboratory assistants | 10                | 47           | 94%     |
| 2  | Web-based information systems are easy to use the web contains all information related to the laboratory (practicum, research and administration) | 10                | 40           | 80%     |
| 3  | The web informs every activity that will be carried out | 10                | 45           | 90%     |
| 4  | the web informs activities that have been carried out (can be photos/videos) | 10                | 44           | 88%     |
| 5  | The web contains a catalogue of products available in the learning media laboratory | 10                | 45           | 90%     |
| 6  | The web contains an explanation for each product making it easier for users to understand information | 10                | 40           | 80%     |
| 7  | Is the development of a web-based information system helping users in carrying out related activities? | 10                | 40           | 80%     |
| 8  | web use can streamline user time | 10                | 50           | 100%    |
| 9  | web use can help research activities and improve academic systems based online | 10                | 49           | 98%     |

The average score that was obtained from small group trials has a value of 88.2%. The results of small group trials show that the research products that have been developed are feasible and accepted by respondents with very good criteria.

After conducting a small group trial, the products that have been developed are then tested on large groups. Large group trials were conducted by asking 20 respondents for help in filling out the questionnaire. The results of large group trials show in Table 3.

| No | Indicator                                                                 | Total Respondents | Total Values | Average |
|----|---------------------------------------------------------------------------|-------------------|--------------|---------|
| 1  | The web contains downloadable documents making it easier for users to write research letters/loans/registration of laboratory assistants | 10                | 47           | 94%     |
| 2  | Web-based information systems are easy to use the web contains all information related to the laboratory (practicum, research and administration) | 10                | 40           | 80%     |
| 3  | The web informs every activity that will be carried out | 10                | 45           | 90%     |
| 4  | the web informs activities that have been carried out (can be photos/videos) | 10                | 44           | 88%     |
| 5  | The web contains a catalogue of products available in the learning media laboratory | 10                | 45           | 90%     |
| 6  | The web contains an explanation for each product making it easier for users to understand information | 10                | 40           | 80%     |
| 7  | Is the development of a web-based information system helping users in carrying out related activities? | 10                | 40           | 80%     |
| 8  | web use can streamline user time | 10                | 50           | 100%    |
| 9  | web use can help research activities and improve academic systems based online | 10                | 49           | 98%     |

The average score that was obtained from small group trials has a value of 91.3%. The results of large group trials show that the research products that have been developed are feasible and accepted by respondents with very good criteria.

Based on the questionnaire retrieval data from the small group and large group trials, the role of the information system in the field of education is growing rapidly. Based on the results of testing a web-based information system that is made has met the appropriate requirements to be used as a laboratory service to meet the needs of physics education students.

With information systems in the world of education, it can be interpreted the existence of laboratory learning with electronics. So, users can find out information remotely, and devices like this have been widely applied to schools and universities [6]. This agrees with some previous studies that explain the
laboratory information system to help monitors in managing their laboratories [7] [8]. Information systems have significant benefits, interactivity, and ease of use [9].

### Table 3. Large Group Trial.

| No | Indicator                                                                 | Total Respondents | Total Values | Average |
|----|---------------------------------------------------------------------------|-------------------|--------------|---------|
| 1  | The web contains downloadable documents making it easier for users to     | 20                | 94           | 94%     |
|    | write research letters/loans/registration of laboratory assistants       |                   |              |         |
| 2  | Web-based information systems are easy to use the web contains all      | 20                | 88           | 88%     |
|    | information related to the laboratory (practicum, research and           |                   |              |         |
|    | administration)                                                         |                   |              |         |
| 3  | the web informs every activity that will be carried out                  | 20                | 97           | 97%     |
| 4  | the web informs activities that have been carried out (can be           | 20                | 87           | 87%     |
|    | photos/videos)                                                           |                   |              |         |
| 5  | The web contains a catalogue of products available in the learning      | 20                | 89           | 89%     |
|    | media laboratory                                                          |                   |              |         |
| 6  | the web contains an explanation for each product making it easier for   | 20                | 95           | 95%     |
|    | users to understand information                                          |                   |              |         |
| 7  | Is the development of a web-based information system helping users in   | 20                | 96           | 96%     |
|    | carrying out related activities?                                         |                   |              |         |
| 8  | web use can streamline user time                                         | 20                | 96           | 96%     |
| 9  | web use can help research activities and improve academic systems       | 20                | 90           | 90%     |
| 10 | based online                                                              |                   |              |         |

With the concept of a laboratory information system, it means that it has used the internet world which can only be expressed easily. The word easy here can already represent fatigue in the internet world. One example of the international world is a web-based laboratory information system.

In the small group and large group questionnaire questions, it can be seen that students can easily access information quickly about their need for a learning media laboratory in the form of equipment availability, organization of practice schedules, and recruitment of laboratory assistants. This agrees with a previous study. Laboratory information management system for all users and administrators to run the information system and laboratory easily, openly, and widely. Agree with that, laboratory information systems can improve laboratory operations and improve users need [10] and can explain the real-time laboratory condition [11]. Information design has a literal interpretation, under which there is a real information designer who can commit to the choice of the best information structure [12] wherewith system information, systems can be built with verifiable control of timing channels and other information channels [13] for optimization and various uncertainty quantification tasks [14]. The web-based information system will give a good performance in terms of device resources consumption, easiness of implementation and latency of communication [15] and allowing to exchange information, trigger actions and control other components autonomously [16].

### 4. Conclusion

Based on the discussion that has been explained, it can be concluded the web-based information system that has been developed meets the eligibility requirements to be used as laboratory services to meet the needs of physics education students.

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