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Blended learning development for vocational education

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Abstract. In general, face-to-face learning seems to have become part of the learning system, regardless of its weakness and strengths. Some of the disadvantages of face-to-face traditional learning can be covered with the advantages of distance learning systems, and vice versa. The integration of face-to-face traditional learning system with distance learning is called blended learning. For this matter, Moodle LMS can be used as a tool for support distance learning. Research method used is base design research. The developed blended learning has validated by 2 experts (material and media validator). As a result, (the validation of media experts 82.05 and validation of material experts 80).

1. Introduction

Blended learning is generally defined by many instructors as a combination of different modes or delivery media with an emphasis on media technology. Singh and Reed define mixed learning as a "learning program in which more than one mode of delivery is being used in order to optimize learning outcomes and program costs [1]. Graham et al. states that" mixed learning means a combination of various learning media (lead instructor, web-based courseware, simulations, job aids, webinars and documents) into a total training program [2]. "According to Dziuban et al.," Blended learning should be viewed as a pedagogical approach that combines the effectiveness and opportunities of class socialization -class with the possibility of technologically enhanced active learning from the online environment [3]. "Julian and Boone report that" integrated learning solutions provide a comprehensive learning experience using a variety of methods (eg instructor-led training, CD-ROM, or e-Learning) [4]. Koohang states that "Blended learning is defined as a mix of traditional face-to-face instruction and e-learning"[5].

1.1. Vocational education

Vocational education is a combination of theory and practice in a balanced manner with an orientation to the readiness of its graduates. The advantages of vocational education include learners can directly develop their skills tailored to the needs of the field, or field of tasks that will be faced. One of the courses on vocational education is corrosion and metal coating.

Corrosion and metal coating courses consist of theoretical and practical courses, including courses that are difficult to learn because they contain many theories related to the movement of electrons, this is in accordance with the results of some answers to the questions asked to students who have taken the course of corrosion and metal coating. The conclusion of some of the answers generally states: "less realistic (less application) so less the experience and understanding of the material".

To overcome the problems faced in the corrosion and metal coating course, will be applied blended learning that combines learning face to face and e-learning. Through e-learning, learning materials can

be accessed anytime and from anywhere. In addition, the material presented can be enriched with various learning resources including multimedia and can be updated by the teacher.

1.2. E-Learning

Jaya Kumar C. Koran defines e-learning as an arbitrary teaching and learning that uses electronic circuits (LAN, WAN, or internet) to convey learning content, interaction, or guidance [6]. While Dong defines e-learning as an asynchronous learning activity through a computer electronic device that obtains learning materials to suit their needs [7]. Rosenberg stresses that e-learning refers to the use of Internet technology to deliver a range of solutions that can increase knowledge and skills [8]. Onno W. Purbo explains that the term "e" or electronic abbreviation in e-learning is used as a term for all the technology used to support teaching efforts via internet electronic technology [9]. Or e-learning is defined as follows: e-Learning is a generic term for all technologically supported learning as an array of teaching and learning tools as phone bridging, audio and videotapes, teleconferencing, satellite transmissions, and the more recognized web-based training or computer aided instruction also commonly referred to as online courses [10].

1.3. Factors to consider before utilizing e-learning

Educational experts and the internet suggest a few things to note before one chooses the internet for learning activities, including:

1.3.1. Needs Analysis. If this analysis has been carried out and the answer is requiring or require e-learning, then the next step is to make a feasibility study whose assessment component is:

- Is technically feasible (technically feasible). For example, if the Internet network can be installed, whether the supporting infrastructure, such as telephone, electricity, computers, available, whether there are technical personnel who can operate it is available. This research target is student and the operational is using laptop / pc and also mobile phone.
- Is it economically profitable (economically profitable); for example, whether by e-learning activities performed profitable or whether return on investment (ROI) is greater than one. (The advantages of e-learning in terms of economical students / users do not need to go to campus to follow lectures directly because it can be accessed via pc / laptop and mobile phone.)
- Is it socially acceptable that socially acceptable use of e-learning is socially acceptable? Use of e-learning will be made as easy as possible in operational to be received more easily by users [11].

1.3.2. Instructional design. In determining this instructional design, consideration should be given to aspects:

- Course content and learning unit analysis, such as subject content, coverage, relevant topics and semester credit units.
- Learner analysis, such as student education background, age, sex, employment status, etc.
- Learning context analysis, such as what the desired learning competition should be discussed in depth in this section.
- Instructional analysis, such as what learning materials are grouped according to importance, arranges tasks from easy to difficult, etc.
- State instructional objectives. This instructional objective can be structured on the basis of the results of the instructional analysis.
- Construct criterion test items. The preparation of this test can be based on the established instructional objectives.
- Select instructional strategy. Instructional strategies can be established based on existing facilities [11-12]

1.3.3. Development stage. Development of e-learning can be done by following the development of ICT facilities are available, because sometimes ICT facilities are not equipped at the same time. Similarly, the prototype of instructional materials and instructional design that will be used continue to be developed and evaluated continuously.

1.3.4. Implementation. The complete prototype can be moved to a computer (LAN) using a specific format such as HTML format. Test against prototype should be continuously done. In this stage there are often many obstacles, such as how to use the management course tool well, whether the material actually meets the standard of self-supporting materials.

1.3.5. Evaluation. Before the program begins, it is better to try by taking some samples of people asked for help to participate in evaluating.

2. Methods

This research use approach of DBR (Design-Based Research). DBR is defined as "a series of approaches, with the intent of producing new theories, artifacts, and practices that account for and potentially impact learning and teaching in naturalistic settings [13][14]."

By adopting and modifying from the research design provided by Reeves, 2006, this research is divided into 4 stages, i.e. identification and problem analysis, prototype development program, pilot testing and implementation of program prototype, and reflection to get the expected design principles [in 15]. and overcome various problems that arise. For more details can be seen in Figure 1

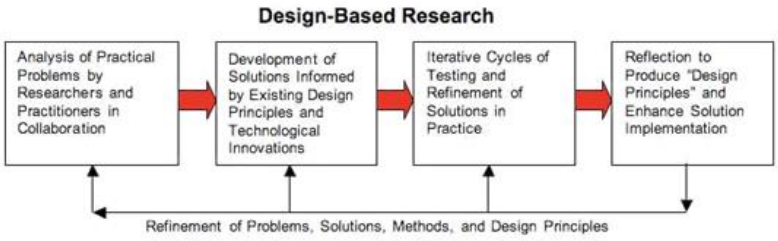

Figure 1. Design-based research.

At the stage of need assessment activities undertaken is to establish the basic problems encountered in learning corrosion and metal coating. At the prototype development stage begin to determine the concept of media to be created, select appropriate materials, and begin to design the learning media. The prototype development results are tested in two classes: Produksi Perancangan class and Otomotif class. The test results are further reflected to get the expected design. Participants in this study are Mechanical Engineering Education Students FPTK Universitas Pendidikan Indonesia 2016, that follow the corrosion and metal coating course, media experts, and material experts.

3. Result and discussion

Problem Identification and Analysis (Need Assessment: Based on the results of interview analysis to the students who have contracted the corrosion and metal coating courses, the results obtained that the teaching of corrosion and metal coating is monotonous, difficult to understand and boring.

Development of Program Prototype Based on Need Assessment: Determining the concept of learning media to be created, Choosing the appropriate material, Designing Blended Learning based on Moodle.

Trial and Implementation of Prototype Program Development: Learning media trials follow the design of learning that has been designed.

Reflection: After conducting the test, reflection is done to get the expected design principles, and to overcome the various problems that arise during the implementation.

Product design results:

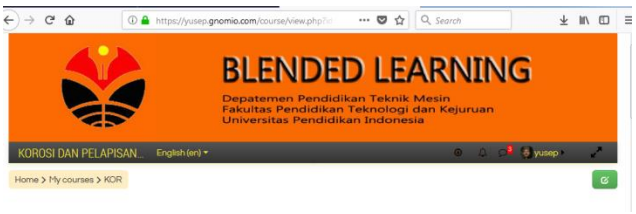

Figure 2. Product design result.

The product used in this blended learning development is Moodle LMS. The material developed consists of the introduction and the contents (fig. 2). Blended learning products are found on the website yusep.gnomio.com. On the website there are several parts of the menu in which there are functions of each, including: home, site page, courses. The home menu is an initial display that contains about blended learning that will be used. On the menu page contains participants, calendars, notes and pages that can be used to expand the network. The main menu on this blended learning website is the courses that contain the material to be learned. To access this blended learning, students who will use it must be registered as a user. In this development the user is developed into 3 i.e. user as user, user as admin and user as lecturer. User users are students who follow corrosion and coating courses, who can only access materials, work on questions, and frequently asked questions in the forums provided. User admin functions as a manager of learning blended in appearance, repair etc. And user lecturers who manage in the website such as managing the material and value. In blended learning there are 2 main parts, namely resources and activities. Resource contains learning resources in various formats, while activities contain activities that can be done by students. Language in blended learning is Indonesian and English. Students can choose the language of instruction in blended learning that is used

3.1. Validation of media experts

Table 1. Validation result of media expert.

No	Aspect	Score
1	Maintainable (can be maintained / managed easily)	2
2	Usability (easy to use and simple in operation)	2
3	Compatibility (learning media can be installed / run on various existing hardware with or without downloading material)	3
4	Complete media documentation	3
5	Reusable (can be reused)	3
6	Communicative	2
7	Creative in the following ideas	2
8	Simple and enticing	2
9	Interactivation	2
10	Giving motivation to learn	3
11	Audio (narration, back sound, and sound effect)	3
12	Visual (layout design, typography, color)	3
13	Moving media (animation)	2
	Σ score obtained	32

$$P = \frac{\text{Score of measurement data}}{\text{Ideal score}} \times 100\%; P = \frac{32}{39} \times 100\%; \; P = 82{,}05$$

From these calculations, the results of the validation of experts get the value of 82.05 percentage. In table 1 the value of 82.05 is categorized as very good, this means that the resulting blended learning development is feasible for use in corrosion and metal coating course.

3.2. Validation of material experts

Table 2. Experts material validation results.

No	Aspect	Score
1	Clarity of learning objectives (formula, realistic)	3
2	Relevance of learning objectives by curriculum	3
3	Material suitability of learning objectives	3
4	Contextuality and actuality	2
5	Completeness and quality of blended learning	2
6	Material depth	2
7	Easy to understand	2
8	Systematic, coherent, and logical flow clearly	3
9	Clarity of description, discussion and example	2
10	Influences in process skills 2	2
	Σ scores obtained	24

Calculation of validation results of material experts

$$P = \frac{\text{Score of measurement data}}{\text{Ideal score}} \text{ x } 100\%; P = \frac{24}{30} \text{ x } 100\%; \; P = 80$$

From the calculation then the result of the validation of experts get the percentage value 80. In table 2 the value of 80 included in the category very good. This means that the material on the resulting blended learning is feasible for use in corrosion and metal coating course.

3.3. Test trial result of respondents

Table 3. Recapitulation of trial results respondent.

No	Statement	Score
1	This Web is easy to operate	3,13
2	The interactions in the web are clear and understandable	3,02
3	This web has ease in navigation	3,04
4	This web address is easy to access	3,04
5	The web has an attractive display	2,98
6	The arrangement of information layout on the web is exactly	3,09
7	Users can easily find the information they are looking for	2,91
8	Web components that appear on the web are in accordance with the needs	2,96
9	The presentation of information in this web meets the needs of user information	2,96
10	The Web provides fairly clear information	3,02
11	The Web provides reliable information	3,07
12	Presentation of information in this web is always up to date	3,02
13	The information presented is relevant to my field of study	3,11
14	Text in this web can be read clearly	3,24
15	Images in this web can be seen clearly	3,17
16	This Web presents information with detail	2,87
17	Information in this web is presented with the appropriate format	3,07
18	Overall use of this web component does not have an error	2,70
19	Files that can be downloaded from the web are safe from viruses	3,02
20	Each file uploaded for the delivery of personal data is kept confidential	3,04
21	This web display draws my interest and attention to access it again	3,02
22	This web provides communication facilities between members and web admins	3,11
23	This web provides feedback facility	3,02
24	This web guarantees a high level of confidence in the information presented	3,04
25	The web always provides service updates based on user feedback	2,93
	Σ score obtained	75,59

Calculation of test results

$$P = \frac{\text{Score of measurement data}}{\text{Ideal score}} \times 100\%; P = \frac{75,59}{100} \times 100\%; P = 75,59$$

From the calculation, the result of the test gets the value of 75.59 percentage. In table. 3 the value of 75.59 is included in the category good. This means that the resulting blended learning is feasible for use in corrosion and metal coating course.

4. Conclusion

The results of testing on mechanical engineering students included in the category of good. This means that blended learning is developed to facilitate students in lectures. Blended learning developed can be operated easily and menu structure is easy to understand. Blended learning products can be used as a prototype in the corrosion and metal coating course.

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