Development Of Web-Based Database Learning Media

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Abstract—The database is a primary lesson for the students of Vocational High School majoring in Software Engineering. The subject has an allocation time are 4 hours per week. Based on observations at one of State Vocational High School in Malang, the material database presented by teachers using power point and job sheet with limited material. A lot of competencies which must learned by students so the teacher have a trouble when present all material. From these problems, need to make a media of learning that can be used by students as a learning tool in the classroom or outside the classroom. The purpose of media development are to produce web-based database learning media and to test the feasibility of media. The method that used in the development is Sugiyono development model. The phases of development are the potential and problems, data collection, product design, design validation, revised design, product testing, product revision, field testing, product revision, and mass production. The product of media include a material description, simulation, and evaluation. The results of the feasibility test of media experts validation obtained a percentage of 98%, materials expert validation obtained a percentage of 92.65%, individual testing is 84.33%, a small group testing is 88.87%, and field testing is 87.33%. The average percentage of the overall feasibility media is 90.24%. Based on the feasibility criteria, the learning media which have been develepod can be said very feasible and can be used without revision

Keywords— learning media; database; web

I. INTRODUCTION

The development of Information and Communication Technology (ICT) has brought a tremendous change for the advancement of education. The existence of information technology, Internet network, and accelerating the flow of information is the basis of a paradigm shift, particularly in education and knowledge in the information age.

According to [1], developments in information technology can improve performance and enable a wide range of activities can be carried out quickly, precisely and accurately, so that ultimately will improve productivity. Developments in information technology have an impact on the emergence of various types of activities based on technology, such as e-government, e-commerce, e-education, e-medicine, e-laboratory, and others, all of whom were based electronics.

The trend of education in Indonesia in the future include: development of open education with distance learning mode, sharing resource among institutions of education/training, and using of interactive information technology devices , such as CD-ROM multimedia in education which replacing television and multimedia [1].

Database is one of the primary subjects for students of class XI at Vocational High School majoring in Software Engineering. The competencies of this course are to give knowledge to the students about the structure of the hierarchical database, entity relationships diagram, databases normalization techniques, functional dependencies, application DBMS, Structured Query Language (SQL), object databases, object to process data, query on DBMS, input and output data, and the integration of the object in a simple DBMS.

Based on observations at SMK Negeri 5 Malang, the school have applied curriculum 2013 in database learning but still use conventional learning. Database material are presented by teachers using standard learning media, such as power point or without a medium of learning and also give job sheet to students with limited material. The cause of learning, a lot of students are not motivated and not interested in learning database.

According to [2], the web-based learning media has several advantages such as: does not require a classroom, not limited by time as well as face to face regular, can choose a topic or materials according to the needs, the accuracy and current learning materials and the learning can be done interactively..

II. METHOD

The development model used in this research is the Sugiyono development model, the plot is shown in Figure 1. The phases of development include are potential and problems, data collection, product design, design validation, the revised design, product testing, product revision, field testing , product revision, and mass production.
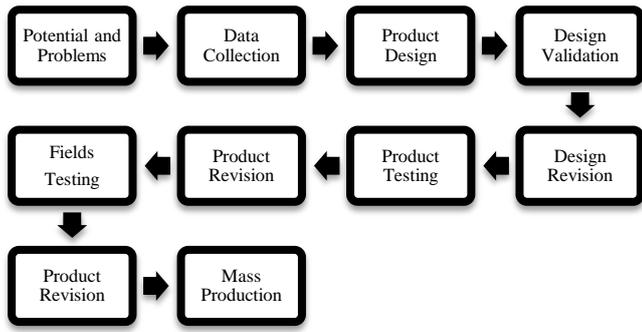
Fig. 1. The Phases of Sugiyono Development Model [3]

The first phase is the observation and interviews to SMK Negeri 5 Malang. It done by interviewing to teacher database lesson about curriculum, facilities, learning process, and learning resources used in learning database. Based on observations and interviews, obtained facts that the school is still using conventional learning. The teacher teach the lesson by using standard media like power point and writing at board, then give job sheet to students with limited material. These conditions cause the students are not motivated and not interested in database learning.

The next phase is the collection of data aimed at product planning materials. The data include form of instructional objectives and lesson materials to be developed. Instructional objectives consist of core competence and basic competence in database subject syllabus that use Curriculum 2013. The form of the material is done by consulting with teachers database.

This product design phase aims to produce product design that will be developed. The model which used to develop this media is mastery learning model which have approach to learning that requires students to master completely around the core competence and basic competences of specific subjects. Product design in this research illustrated with storyboards each section of the page with descriptions of learning media. Storyboard is the initial framework of the design of media that will be developed.

Design validation phase is the process to assess product design in the form of learning media design has been prepared by making a storyboard. Validation of product design is done by media experts and material expert to see and evaluate a deficiency of learning media. Media experts in this research is a lecturer from Informatics Engineering Education who has expertise in the field of learning media. Material experts in this research is a lecturer from Informatics Engineering Education who lecture database course and a teacher from vocational high school who teach the database lesson. If there are deficiency in the product design after design validation by media experts and expert material, then the media be revised to improve the design until validation design could be accepted by media experts and material expert.

The testing phase through three stages, namely the individual testing, small group testing, and field testing. In the individual testing done by selecting three students who have obtained the database material and represent the characteristics of the target with the ability of users which is above average, average and below-average. In the small group testing, selected 15 students who have obtained database material and represent the population target. The field testing is the final stage of testing. The situation of testing is the actual class that consists around 30 students who have obtained database material.

Data analysis is the stage of searching and compiling data systematically. The goal of data analysis is to give meaning to the data collected from the results of the validation and testing of the product. Data obtained from the subjects tested percentages are calculated using the following formula.

$$V = \frac{TSEV}{S - max} \times 100$$

Where V is the validity, TSEV is the total score of empirical validator, and S-max is the expected maximum score.

The criteria used to assess the feasibility of using the criterion of validity according to Akbar and Sriwijaya as shown in Table 1.

TABLE I.   VALIDITY CRITERIA

Percentage	Validity	Description
75,01% - 100 %	very valid	can be used without revision
50,01% - 75,00%	quite valid	can be used with little revision
25,01% - 50,00%	Invalid	cannot be used
00,00% - 25,00%	very invalid	forbidden use

Source [4].

Product revision is done, if there is a deficiency that is encountered when testing the product, the product is revised and updated based on deficiencies found.

After the successful testing of learning media, then the next product in the form of learning media are implemented in real conditions for a broad scope. Next product revision is done when the real conditions there is a deficiency.

The production in large number is done if the media that have been tested are feasible for mass production.

III. RESULT AND DISCUSSION

The learning media created using the programming language PHP and Database Management System (DBMS) MySQL. Media uses Laravel framework version 4.2 as a basis for developing software. Installing the website is done manually by placing the entire website folder on the server using the learning cPanel.

On the home page, the user can open the page of competence, a concept map pages, help pages, and the login page as shown in Figure 2. The page also shows the features

provided, user testimonials, and form a support for students. On the footer section contains logo of learning media, navigation, and information of developers.

Fig. 2. Home of Database Learning Media

The concept maps page describe relationship among the topics on the database subject. Users can display material on each topic by clicking on the topic name as shown in Figure 3
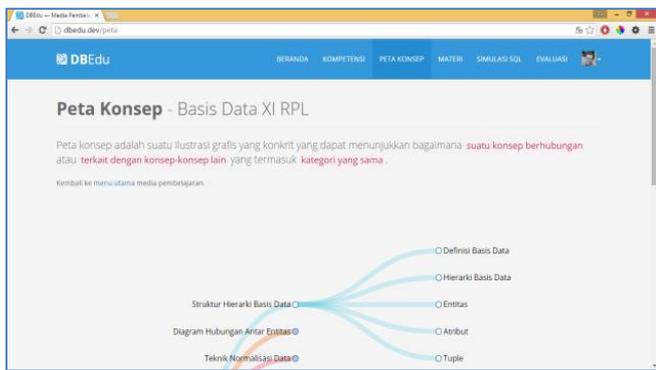

Fig. 3. Concept Map Page of Database Learning Media

The material page contains topics that is provided by a learning media. There are eleven topics that can be studied by students. Each topic has a brief information about the materials to be studied and the progress of students learning achievement as shown in Figure 4.

Fig. 4. Material Page of Database Learning Media

The evaluation page contains questions that can be done by students as shown in Figure 5. These issues cover all the topics contained in learning media.
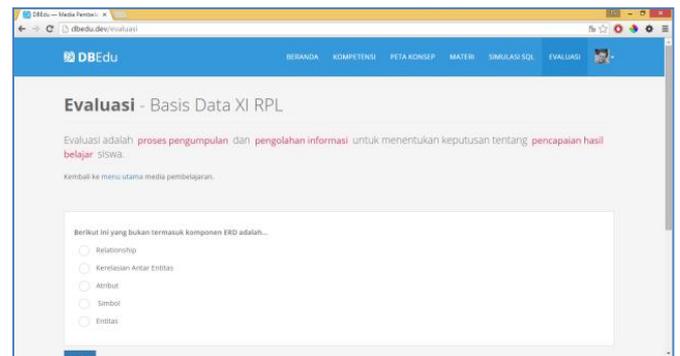

Fig. 5. Evaluation Page of Database Learning Media

The Result of product validation are shown in Table 2 below.

TABLE II.   THE RESULT OF PRODUCT VALIDATION

Validator	Percentage	Criteria
Media Expert	98%	very valid
Material Expert	92,65%	very valid

Validation of media experts held on February 20, 2015. The data were taken in the form of quantitative data on various aspects of software engineering and visual communication aspects. Suggestions obtained during validation of media experts as a basis to make revisions before the media tested to students.

The percentage of media feasibility is 98%, which indicates that the media is very feasible to be used. Media expert gives some suggestions to revise the statement of 2nd, 10th, and 11th. On 2nd statement, media experts provide information for efficient media must pass through the dissemination of products. Whereas in the 10th and 11th statement, media experts advise to better describe the specifications of the hardware and operating system used.

The validation of material experts was held on 17-18 February, 2015. The data were taken in the form of quantitative

data on various aspects of learning design. Suggestions and criticisms which were acquired during the validation of material experts as a basis to make revisions before the media tested to students.

The percentage of material feasibility is 92.65%, which indicates that the media is very feasible to be used. Material experts give several suggestions to revise the material presented, such as: feedback should be given for less competence, history of student achievement evaluation value needs to be displayed, the material is displayed per page based on the topic, and there is an option to enable the evaluation.

Table 3 below shows data of product testing.

TABLE III.   PRODUCT TESTING

Testing	Percentage	Criteria
Individual	84,33%	very valid
Small group	88,87%	very valid
Fields	87,33%	very valid

Individual testing was held on February 21, 2015. The percentage of the overall feasibility of the media is 84.33%, which indicates that the media is very feasible to be used. The advice given by respondents include: the language used in the material still difficult to be understood by students and feedback made more creative.

Small group testing was held on February 26, 2015. The percentage of the overall feasibility of the media is 88.87%, which indicates that the media is very feasible to be used. The advice given by respondents include: slideshow on the main page should be changed, the website difficult to access when the low internet speed, the media should display menu to see the grade of students, and students difficulties when using media without the help of teachers.

Field testing was held on February 28, 2015. The percentage of the overall feasibility of the media is 87.33%, which indicates that the media is very feasible to be used. The advice given by respondents include: added menu searching to search material easily and added features forget passwords for students.

IV. CONCLUSION

The web-based database learning media which developed has eleven subjects include: the structure of the hierarchical database, entity relationships diagram, databases normalization techniques, functional dependencies, application DBMS, Structured Query Language (SQL), object databases, object to process data, query on DBMS, input and output data, and the integration of the object in a simple DBMS

The development model which used to develop of database learning media is Sugiyono development model. This model consists of the potential and problems, data collection, product design, design validation, revised design, product testing, product revision, field testing, product revision, and mass production. Data collection techniques using a questionnaire with Likert scale. Data from validation and testing are processed using descriptive analysis formula. The results of the analysis determined the feasibility of media.

The results of the feasibility test of media experts validation obtained a percentage of 98%, materials expert validation obtained a percentage of 92.65%, individual testing is 84.33%, a small group testing is 88.87%, and field testing is 87.33%. The average percentage of the overall feasibility media is 90.24%. Based on the feasibility criteria, the learning media which have been develepod can be said very feasible and can be used without revision.

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