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Developing Mind Mapping Model With Multimedia Evaluation Based for Research Methodology Module

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Abstract - This study aims to develop teaching materials in the form of module for the Research Methodology course. The module material developed is associated with surrounding facts and problems as a basis for students to raise research themes. Explanation of the material was developed in the "mind mapping" model, namely an interrelated explanation between each word, definition, parts, functions, and benefits. The developed model used is the first three steps of the ADDIE model, namely Analysis, Design, and Development. The study was conducted at STKIP Taman Siswa Bima with study program respondents and 4 experts as validators, each of the 4 experts are linguist, design, and media expert. The results of the study are based on 3 things: needs analysis, blueprint design, and expert validation. The results of the needs analysis indicate that it is very important to develop modules for each course, especially research methodology as a source of learning for students. The blueprint for module material that was developed consists of 6 submodules which include assignments for students in each submodule as an evaluation. In the evaluation and assignment section, the module utilizes the multimedia applications, such as Google Form and Quizizz.com. Based on the experts' assessment, the module developed has met the valid criteria and is in accordance with the needs of the course.

Keywords – mind mapping, research methodology module, multimedia evaluation

I. INTRODUCTION

Among the characteristics of good and effective teaching and learning are those actively involve students, attract interest and attention, arouse motivation to learn and perform demonstrations in the classroom during the learning process. In order to achieve these characteristics, teaching and learning must be supported by teaching staff, devices, and teaching materials, as well as supporting facilities. One of the most important elements is the availability of tools and teaching materials which are in accordance with the material presented. The existence of teaching materials can involve students directly on the material and instructions in it. In the Guidelines for Writing Textbooks [1], it is stated that everything that educators directly provide to students and everything expected to be mastered by students in order to achieve a certain competency in education must be included in the content of education.

The facts indicate that there are still many lecturers who do not have a complete learning tool. Learning tools are still limited to the Semester Learning Plan and Student Task Design. This is certainly influence the effectiveness of learning in the classroom. For example, in the department of mathematics education, learning modules are not available especially in research methodology subjects. The way lecturers handling the course only rely on textbooks in teaching. As a result, the learning model is less varied and less attractive. In fact, teaching materials are a set of learning tools or tools that contain learning materials, methods, boundaries, and ways to evaluate systematically and attractively designed in order to achieve the expected goals, namely achieving competencies or sub-competencies with all its complexity [2].

Therefore, lecturers should prepare teaching materials, for example, modules, according to the course and related to the surrounding problems. There are at least four conditions that are required for the teaching material to be said good, i.e.: 1) the scope of the material or content is in accordance with the curriculum, 2) the presentation of the material meets the principles of learning, 3) language and readability level is good, and 4) the format of the book or graphic is interesting [3].

The research methodology course is aimed at preparing students to be able to make research proposals independently, properly, and correctly. Through these courses, students are also invited to think scientifically and logically in understanding the facts and problems found around them. Furthermore, the graduates are expected to have the ability to write scientific papers. For these ends, teaching materials that train students to write the facts must be provided. In this case, the module of Mind Mapping model is considered suitable and in accordance with the needs of lectures.

The Mind Mapping Module contains several sub-modules that are followed by the student assignment sheet. The module material is adapted to the learning model that can help students to be active and independent in developing thinking skills in solving problems through data searching in order to obtain rational and authentic solutions [4]. Modules are developed in a package with an attractive appearance that aims to invite students to maximize the work of the brain in linking things, one to

another or commonly called Mind Map. By designing mind maps we have utilized two hemispheres of the brain, the right brain and the left brain [5]. The left brain is used at thinking about logic, numbers, analysis, and sequences, while the right brain is used in terms of rhythm, space awareness, imagination, color, and dimensions [6]. In addition, Mind mapping is a technique of utilizing the whole brain by using visual images and other graphic infrastructure to form a deeper impression [7].

In order for this module to be exactly as needed, the development is based not only on the initial conditions in the study program such as the curriculum, the availability of teaching materials, and student characteristics, but also is adjusted to the development of IT technology based on multimedia evaluation. Multimedia evaluation used is Google Form and Quizziz. There are two stages in the evaluation of multimedia learning, namely formative evaluation and summative evaluation. Formative evaluation is oriented to the level of feasibility of the media developed while summative evaluation is oriented to the effectiveness level of the media in use which is in accordance with the aims and objectives of learning [8]. The Google Form application is used for summative tests, while the Quizziz application is for formative tests. Google Form is a useful tool for planning events, sending surveys, giving students or others quizzes, or gathering information in an efficient way. Whereas quizziz can be done in class or as homework. Quizziz immediately makes a live ranking among the participants in the class. In addition, quizziz can display learning material through quizzes and games and it is made in such a way as to increase students' exploration power, the active role, and participation of students with their classmates in competitive learning [9]. There is a positive effect on students in using quiz media, in which the students' interest and their test scores increase [10].

With this module, it is expected that students who take research methodology course will have the ability to think logically and utilize the work of the right and left brains in understanding problems and facts, and also will have the capability to think through scientific and systematic analysis steps about the things that must be done before making conclusions about an issue.

II. Research Method

This research is a development research that uses ADDIE model (Analysis, Design, Development, Implementation, Evaluation). In this study, the steps that have been taken limited to 3 steps, namely Analysis, Design, and Development. Analysis is an activity to gather information about module development needs. Head of Departments of Mathematics Education and 3 senior lecturers who taught research methodology subjects became the subject of the research. Design refers to the design of the cover of the blueprint, material, and overall contents. Development is modules validation by experts (validators) dealing with the contents and appearance of the modules developed. There are 4 validators: material experts, design experts, linguists, and media experts.

This research was conducted for 4 months, from January to April 2019 at the STKIP Taman Siswa Bima. This research is focused on research methodology courses in the Department of Mathematics Education.

The Data were collected through interviews, FGD (Focus Group Discussion) with lecturers, the distribution of validation questionnaires to experts and documentation. The instruments used were interview sheets, validation questionnaires, and documentation tools. Expert validation scores are given on a scale of 1-5 in which 1 = irrelevant, 2 = less relevant/less good, 3 = quite relevant/good enough, 4 = relevant/good and 5 = very relevant/very good. The expert validation scores were analyzed by the following formula [11]:

$$P = \frac{f}{N} x100$$

P = Validation Value
f = Obtained Score
N= Maximum Score

Furthermore, to know its validity, the validity value that has been obtained was categorized based on the validity criteria table. The following table of validity criteria was used. If the results of the validation by the four experts are in the minimum category of "relevant", then the module developed is categorized to be valid and usable.

TABLE I. Validity Criteria of Teaching Materials

No	Validity Value (P)	Criteria
1	81-100	Very Relevant/Very Good
2	61-80	Relevant/Good
3	41-60	Quite Relevant/Good Enough
4	21-40	Less Relevant/Less Good
5	0-20	Irrelevant

III. Results and Discussion

In general, the results of this research cover 3 things namely the results of Needs Analysis, Blueprint Design, and Expert Validation.

A. Need Analysis

The data of need analysis were obtained through unstructured interviews with the Head of Mathematics Education Department regarding inputs, process, and output of learning implementation in the research methodology courses for the past two years.

In terms of input, lecturers who teach a research methodology course have never taught by using modules. They only use Semester Learning Design and Student Task Design. In addition, they also used textbooks in teaching. This is because of the lack of teaching materials in the form of modules made by lecturers. In the practice, the research methodology lectures still took place conventionally and were less varied. Lecturers still adopted

teaching patterns that follow instructions in textbooks without considering the needs and character of the students. The students were only given theoretical assignments about the material, and very little assignments were given in the form of practical field surveys, data collecting, or real problems around them. Students were never accustomed to plunge directly into the field in observing things that could have been appointed as material for their research in order to complete the final project (thesis). As a result, the quality of students' competence after they attended the research methodology course was not in accordance with their final grades. This can be seen from the inability of some students to design research titles, formulation of research problems, research objectives, and other matters related to research activities. Thus, as a consequence of this fact, some students were late to complete their final projects.

B. Design (Blueprint Module)

Based on the results of the needs analysis, the researcher noted the important points as the basis for designing the Module blueprint. Before writing the blueprint, the researchers conducted a Focus Group Discussion (FGD) with the head of mathematics education department and lecturers who taught research methodology courses. The results show that some lecturers suggested to adjust the course material to the objectives and mission of the study program, and every assignment given must be related to the problems that exist around daily life so that students are able to learn directly in understanding the problem or to interpret the facts that occur. In addition, in the FGD activities, the lecturers greatly appreciated the development of this Module so that this Module can be used in teaching the research methodology.

The results of the FGD were used as additional references in designing the module blueprint. In order for the module to be adapted to the needs and circumstances of students, the module was designed in the form of mind mapping that explains the material in the form of maps and relates them to various related matters. The sample of blueprint of the module designed by the researcher can be seen in Figure 1 and Figure 2 :

Figure 1. Cover of PBL Module based on Mind Mapping

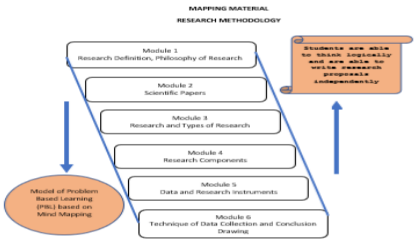

Figure 2. Module of Mapping Material

This Module contains 6 sub-modules, namely sub-module 1 to 6. Each sub-module is accompanied by student assignments which are individual or in group work. The assignments for each submodule are packed in the google form and quizizz.com application. At the end of the module, the researcher attached a guideline for writing qualitative, quantitative, and research development types.

Figure 3. Assignment Module by Using Google form

Figure 4. Test Design using Quizizz

Figure 5. Quizizz Test Implementation

C. Development (Expert Validation)

At the development stage, researchers submit modules to experts in order to solicit opinions and considerations about the validity of the Module. There are 4 experts, namely material expert, design expert, linguist, and media expert. Material expert validation sheets include: relevance (M1), accuracy (M2), content comprehensiveness (M3), basic concept material (M4), and student-centered material presentation (M5). Furthermore, the design expert validation sheet includes: general display (D1), special display (D2), and module presentation (D3). The linguist validation sheet includes: language use (B1), language accuracy (B2), and consistency (B3). The validation sheet of media experts includes: text (MD1), images (MD2), screen design (MD3), navigation (MD4), accessibility (MD5), response (MD6), documentation (MD7) and efficiency (MD8).

This validation stage was carried out through 2 stages. As in the phase I, the module has not reached the expected average score or was not valid, it was revised according to the direction of the experts. The validation scores obtained can be seen in Table 2:

TABLE II. THE RESULTS OF EXPERTS VALIDATION OF MODULES

Stage	The Percentage of Expert Validation Value								% Mean	Criteria
	Material (M)		Design (D)		Language (B)		Media (M)			
	%	Criteria	%	Kriteria	%	Kriteria	%	Kriteria		
I	54	Quite Relevant	55	Quite Relevant	73	Relevant	68,33	Relevant	62,67	Relevant
II	79,8	Relevant	80	Very Relevant	90	Very Relevant	82,50	Very Relevant	83,075	Very Relevant
Mean	66,90	Relevant	67,50	Relevant	81,67	Very Relevant	75,42	Relevant	72,87	Relevant

Table 2 indicates that the results of module validation by the four experts have increased from stage I to stage II. The highest increase in the percentage of validation was seen in material experts, followed by design, language, and media experts. The improvement in validation scores from various experts in the stage II was caused by the revision of the modules which was based on the directions and notes provided by experts in stage I. The notes included expanding the material displayed, adding student assignments, explaining lines, arrows and colors in various images and real examples should be provided in each sub-module and be in accordance with the sub-module title.

IV. CONCLUSION

It can be concluded that the mind mapping model with multimedia evaluation based for the module of the research methodology course has met the valid categories given by the four experts namely material experts, design experts, linguists, and media experts. The module developed was in the valid category.

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