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Development of Economic Mathematics Learning Materials Based on Problem Based Learning

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***Abstract*—The purpose of this study was to produce teaching materials for economics based on Problem Based Learning in an effective and interest-oriented Economic Education Study Program based on an enhanced contextual and ICT-based economic education program curriculum. This study uses the Borg and Gall model as well as the procedures include: identifying problems and potential, collecting data and designing products, design validation by experts, design revisions. The results of the study show that the economic mathematics teaching materials developed have good criteria. Design experts judge that the teaching materials for economic mathematics courses based on Problem Based Learning are appropriate. Material experts assess economic mathematics teaching materials based on Problem Based Learning is very good / very suitable to be used as a guidebook for students. This teaching material helps students to remind students of their understanding in the economics mathematics course. In general, based on the results of data analysis, both expert validation results indicate that the quality of economic mathematics teaching materials is good / appropriate, so that the development of teaching materials is of direct benefit for the formation of professional students' competencies and also for the Economic Education study program of Jambi University to ensure learning quality.**

Keywords—teaching materials; problem based learning

I. INTRODUCTION

Economic Mathematics Course as a subject for the subject to take further courses such as Microeconomic Theory courses, Macroeconomic Theory, state finance, environmental economics, accounting and so on. This course is part of economics as a tool to solve economic problems quantitatively with a mathematical approach. The approach used is to explain or analyze the relationship of economic variables. Today economics is often considered a mathematical subject [1].

The implementation of learning in the Economic Education study program curriculum still faces several problems. Identified problems include; (1) learning activities still use conventional systems where lecturer activities are more dominant; (2) learning tools not based on contextual and ICT, (3) the lack of attractive, and effective audio visual media products (software); (4) the presentation of learning has not fully utilized Computer Assisted Learning; the estuary is (5) the low learning outcomes and the slow pace of graduation for most students in the last three years.

The student learning outcomes of Economic Mathematics course for Economic Education Study Program even semester 2015/2016 of 84 students who contracted economic mathematics courses were as follows: 14 students who received E scores (16.67%), D scores were 17 students (20.23 %), c value is 25 students (29.76%), B value is 18 students (21.43%) and A is 10 students (11.91%). In the study of economic mathematics in general students are still accustomed to passive learning, not supported by adequate learning tools, and have difficulty in understanding the concept of [2].

Relatad to these problems, because students only 20% of the number of students contracting economic mathematics courses have compulsory books. The one-way learning pattern that is centered on the teacher emphasizes more on giving the experience that is possessed by the teacher, the strategy is very rigid and formal. As a result, the creativity of students will not grow as expected even tend to be passive [3].

The above learning problem solving efforts are by choosing innovative and creative learning models. The model that can be used is the Problem Based Learning model which is the most significant innovative learning, develops lifelong skills with an open mindset, reflective, critical, and can increase the activeness of students [4]. Learning with PBL models is designed to develop all the potential that students have, both cognitive, psychomotor, affective / character abilities so as to increase student interest and motivation [5].

The development of economic mathematics teaching materials using the PBL model was effective in increasing higher order student skills up to 84.2%, and received a positive response from students to 85.4% [6]. Development of teaching materials using the PBL model proved effective in increasing student learning outcomes by 32.30 percent [7]. The development of teaching materials using the PBL method proved practical as a teaching material both based on the assessment of students and teachers, and is an effective teaching material because it can improve student learning outcomes [8].

Based on the background of the problems that have been described, the authors are interested in developing problem based learning teaching materials for economics mathematics courses, through the development research that the author will do with the title "Development of Problem Based Learning

Teaching Materials for Mathematical Mathematics in Economics"

II. METHOD

This research is a research on developing Research and development (R & D) teaching materials. This development research procedure uses the modified Borg and Gall research, namely (1) identifying problems and potential, (2) collecting data and designing products, (3) design validation by experts, (4) design revisions, (5) trials products, (6) product revision 1, (7) product revision 2, (8) usage test, and (9) product results [9].

III. RESULT AND DISCUSSION

A. Study of Need Assessment Results

The results of the analysis of the development needs carried out for the 2017-2018 semester 2 students of the academic year as many as 84 students are shown in the following table 1.

TABLE I. RESULTS OF NEED ASSESSMENT

Rated aspect	Question number	Category (%)		Information
		0	*1*	
Ownership of reference books	1, 2	85	15	0 = does not have
Ease of understanding material	3,4,5,6,7, 8	62	38	0 = difficult
Attractive courses	9,10,11	65	35	0 = not interesting
Learning process	12,13,14. 15	45	55	0 = unpleasant

From the Need Assessment questionnaire, it is known that in general students do not have a recommended reference book, so they are not motivated to have a reference book, because mathematics courses are considered very difficult, so understanding the subject matter is very low, this is indicated by the final semester results 38% of students expressed D grades and E. Another major problem based on the needs analysis questionnaire is when in the lesson there is a bill to students in the form of assignments both in class and at home to complete the task in the form of working on the given questions pointing to the still low performance of students in completing the task. This is in accordance with the questionnaire of needs analysis that students are still in trouble even though they have been given time to do the task.

Based on the results of the observation, the researcher considers the learning model to overcome the problem. The effort that can be done is by developing teaching materials as reference material, consideration and pilot for students to be able to understand the material of economic mathematics learning in the future.

B. Feasibility of Development

The development of teaching materials includes descriptions of subject matter, learning activities and learning objectives, evaluation, and assessment instruments that have been completed and reviewed by the validator. The validator consists of a validator of material experts, a validator of design experts in order to get the accuracy of the product being developed.

Based on the validation results of the validator and after being calculated based on the validation criteria by the researcher, the following results are obtained.

TABLE II. VALIDATION RESULTS BASED ON THE VALIDATOR'S ASSESSMENT

Validator	Results	Criteria
Design Expert	81,23	Valid
Material expert	86,27	Very Valid
Average	83,75	Very Valid
Description	Worth the trial in the field	

According to the development design experts assess, the instructional material developed has a good and harmonious writing system contained in the products of economic mathematics teaching materials developed that are coherent so that teaching material products are believed to be able to help the achievement of learning objectives. Besides that, this teaching material is arranged in accordance with the procedural approach, so that students can learn and understand easily.

Although it has been recommended that instructional materials be printed books for use in field trials. The material expert also provides improvement suggestions and comments as follows:

- The formulation of learning objectives requires the appearance of behavior in developing aspects of knowledge, attitudes, and psychomotor behavior.
- Writing on mathematical formulas is given a box so that it looks more clear, neat and attractive. The revisions made are mathematical formulas that have been given a box.

Overall the validator provides comments related to the subject matter developed which needs to be added to show examples of economic aspects in everyday life, so that building a more concrete understanding. Learning material can be said as a program prepared by the lecturer to develop knowledge, skills and positive attitudes towards learning derived from the curriculum [10]. The validator states that the instructional material developed is feasible to be tested in the field without revision.

Teaching materials design experts provide suggestions and comments related to the overall design of learning the appearance of teaching materials in a good category which means that the instructional material developed has met the criteria for developing good teaching materials. Everything that supports learning is called a learning resource that can help students learn and master skills [5]. Teaching materials are very important elements in a learning, without the presence of must-teach material, the learning objectives will be achieved, besides that teaching materials are the main and very important in learning activities.

IV. CONCLUSION

Based on the results of data analysis and discussion of the process and results of the development of teaching materials based on Problem Based Learning in economic mathematics material in the semester of the Economic Education Study Program of Jambi University, the following conclusions can be drawn: The development process of teaching materials based on Problem Based Learning is only (1) Need Assessment stage, student questionnaires are distributed and classroom observations (2) the instructional design stage is based on Problem Based Learning and stage (3) development by validation test 2 experts who get results averaging 83.75 with very valid criteria then revising teaching materials based on suggestions and comments from the material expert validator and design expert validator.

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