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RESEARCH METHODS COURSE RESISTANCE: THE STUDY OF MATHEMATICS LEARNING MODULE DEVELOPMENT

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Abstract

This research is motivated by the low understanding of students in research methods in learning mathematics. Students who are less able to apply the research method design are indicated by a research method korfus that is not relevant to the research they are doing. This requires a breakthrough to overcome problems in research methods by designing research method modules that suit student needs. This study uses the IDI (Instructional Development Institute) development model. This research consists of three stages, namely the front-end analysis stage, the prototype stage and the assessment stage. The findings of this study indicate that the designed research method module in mathematics learning is declared valid in terms of content and construction. The use of the research method module in the practical mathematics learning process is seen from its use according to observers, students, and lecturers. The research method module in learning mathematics is also effective as seen from the results of observations and interviews with course lecturers and students. Student learning outcomes by using modules in mathematics learning increased as seen from the percentage of posttest tests.

Keywords: module, validity; practicality; effectivity

Introduction

Resistance in learning mathematics needs to be elaborated in accordance with student needs with reality so that the specified learning outcomes are achieved. This emphasizes the meaningfulness of the learning materials delivered by the lecturers to students in a comprehensive manner at the level of values obtained by students. Students are not the object of learning, but the subject of learning who must be creative and innovate in discovering and developing knowledge through research (Nicolaidouand Philippou (2003). To achieve learning mathematics that has value, a research method course module is needed. The use of modules is significant in learning proven to be better in improving scientific thinking and scientific behavior of students in science courses (Marsan et al, 2016).

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Teachers can give instructions to students who have learning difficulties in class, while other students can work independently (Bringslid, 2002). Learning materials require exclusive reasoning. To achieve learning objectives, students can analyze, speculate, and explore the problems they face while looking for solutions to the questions (Lin et al, 2017). The problem that often occurs in learning mathematics lies in the relevance of the material to conduction in reality, resulting in students not contaminated with higher order thinking (Jackson, Gibbons & Sharpe, 2017).

However, in reality, the phenomena found in lectures on the subject of research methods of learning mathematics still tend to present material in the form of rote learning without integrating the material with everyday life. This makes students less able to understand the research method learning material they are studying. The material in the research method book does not facilitate students to form their own knowledge.

To find out the problems in learning mathematics, researchers made observations on lecturers in research methods courses and PTKI students in the Southern Tapanuli region. Information was obtained that teaching materials in lectures had not been effective so far, where the teaching materials were too scientific, making students less skilled in understanding them. In addition to observations, the researcher also interviewed several students who stated that the Research Method lectures had not produced satisfactory quality, it was seen that they had difficulty in deepening the research method material.

This is in line with Dahar's research (2011) which examines the use of modules in mathematics learning. This study recommends students to study independently in order to find their own concepts. Through the use of modules, students can study independently to improve their abilities and construct their knowledge according to their respective conditions and learning styles. The same research Daryanto (2002) found that students can continue the next material if the material in the module has been mastered. Conversely, if students have not mastered the material, they are asked to repeat the teaching material.

Strictly speaking, Ashaari et al (2011) stated that research methods courses are important subjects for all study programs with various disciplines. Research methods are useful for data processing in quantitative research. The use of modules in the Research Methods course is very important and its position is very important to direct students to learn independently in developing their concepts and knowledge.

Research Methods

This research includes development research that develops a product. In this case, the product in question is a research method module in mathematics learning. Research and development methods are included in the "need to do" research category, namely research whose results are used to assist the implementation of work, so that if the work is assisted with products produced from research and development, it will be more productive, effective, and efficient (Sugiyono, 2014).

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The development of a product to be applied in learning, must prepare a learning environment that can facilitate complex learning by involving a learning environment that optimally responds to many situations, interactions within contexts, and interactions between contexts (Branch, 2009).

The procedure followed was in accordance with the steps taken by Nisiyatussani, et al (2018) which consisted of needs analysis, module design, module development, expert testing, field testing, and practice applying to small groups. This research was conducted at the mathematics education study program of IAIN Padangsidimpuan in the odd semester of the 2019/2020 academic year.

The first stage, the stage of back-facing analysis. At this stage, an analysis of the Research Methods material was carried out, conducting a review of the literature on module learning, interviews with Research Methods lecturers and colleagues, and studying the characteristics of students. The second stage, the prototype stage. This prototype stage is carried out in two stages, namely the validation stage and the practical stage (Yansen, 2019). The validation stage is carried out to lecturers who have competence in the field of research methods by conducting discussions and interviews related to the designed Research Methods module (Nizar, 2018. Then the design is given to five validators. The validation process is carried out by giving validation sheets to the five validators.

This research data was collected through various sources, namely several experts, students, observers, and the assessment of five competent validators, namely lecturers of research methods and experienced peer lecturers using observation instruments, interviews, and tests. Validity analysis was carried out by analyzing on all aspects assessed by the five validators on the module components. The analysis is presented in tabular form to determine the percentage of validity. Qualitative data were analyzed descriptively, and quantitative data were analyzed quantitatively.

Result and Discussion

Rear Face Analysis Stage Results

The research methods module was designed based on a back to back analysis consisting of an analysis of research method text books, a review of the learning modules, interviews with research methods lecturers, interviews with students, and studying the characteristics of students. The material developed in the module is the result of analysis of the syllabus and semester lesson plan for the research methods course at IAIN Padangsidimpuan. The principle of developing this module material is adjusted to the core material of research methods as a whole. Researchers also selected the most important material to be studied for effective use of time.

The research methods module material which is the focus of material development is quantitative and qualitative research material. The quantitative research materials consist of scientific thinking, research steps, characteristics and types of research, research concepts and meanings, research problems and focus, research variables, theory and hypothesis studies,

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populations and samples, research instruments and data analysis. While the qualitative research materials consist of a theoretical basis, types of qualitative research, naturalistic paradigms and characteristics of qualitative research, data collection, building data reliability, and data analysis.

The purpose of studying the characteristics of students is to determine the general ability of students about research methods. At this stage, conducted interviews with lecturers of research methods and conducted document analysis. The document in question is a list of student study results, especially the research methods course.

Module Prototype Validity Results

After obtaining criticism, suggestions, and input from the validators, they were discussed with the validators and then the prototype was revised according to the validators' suggestions. The questionnaire data from the validator's assessment were described and analyzed qualitatively and quantitatively. The validation process was carried out by three design/construct validators and two research method content validators. The design of the learning tools was revised according to comments and suggestions from the design validators and content experts. Aspects validated by the design/construct validator are aspects of module organization, writing format, use of language and illustrations/images. In general, the validation of the module organization, writing format, language use and illustrations/pictures can be seen in table below.

Table 1. Data from the Construct Validation Questionnaire

Evaluated Aspects	Validator			Jml	(%)
	I	II	III		
Cover	45	45	48	138	85.42
Content outline	48	49	49	146	90.28
Introduction	49	47	47	143	88.46
Lecture Objectives	41	44	45	130	79.37
Practice questions and answer keys	45	47	47	139	86.04
Summary	48	47	47	142	87.86
Lecture Instructions	47	46	47	140	86.65
References	47	47	47	141	87.25
Identified writing/format	46	48	48	142	86.65
Pages and exercises	46	48	49	145	87.86
Ease of use	47	46	49	142	86.65
Font compatibility	46	46	47	139	83.62
Module physical compatibility	45	46	47	137	84.22
Interesting illustration	48	46	47	141	87.25
Total				1971	

The results of the evaluation of the validators of the module organizational design, the writing format, the use of language and the illustrations/images developed are in accordance with the

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requirements for developing a good module, namely the cover is good, the writing of the outline of the material content is correct, the preliminary writing has directed the reader to the module intent, purpose the lecture is correct, the practice questions and answer keys are appropriate as an evaluation tool for the purpose of the lecture, and the summary has summarized the material and attracted the attention of the reader.

Lecture instructions can be categorized as being able to make it easier for readers to study the module, adequate reading resources as a basis for further development for readers. The results of the validators' assessment of the module organization, writing format, use of language and illustrations/pictures are correct and can be used with minor revisions. The revisions suggested by the validator are binding, and the use of operational words in writing lecture objectives.

Final Validation Results from Content Validator

After all suggestions from all validators then the module is assessed by the content validator to determine the level of validation of the content of the module. Aspects that are validated by the content validator are aspects of module organization, writing format, use of language, illustrations/pictures, and aspects of material elaboration. Aspects of material decomposition include conformity with learning objectives, conformity with learning paths, conformity with curriculum, conformity with syllabus, containing all required information. The questionnaire data from the validator's assessment of the module organization can be seen in the following table.

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Table 2. Data of Content Validation Questionnaire Results

Evaluated Aspects	Validator		Total	(%)
	I	II		
Content outline	49	49	98	90.89
Introduction	49	48	97	90.01
Lecture Objectives	47	45	92	81.80
Practice questions and answer keys	51	47	98	90.89
Summary	49	47	96	87.25
Lecture Instructions	45	46	91	81.80
References	47	48	95	88.16
Identified writing/format	47	50	97	90.01
Pages and exercises	46	51	97	90.01
Ease of use	47	48	95	88.16
Font compatibility	46	46	92	83.62
Module physical compatibility	47	45	92	85.43
Interesting illustration	47	47	94	85.43
Fit for purpose	45	46	91	83.62
Compliance with curriculum	48	49	97	90.01
Contains all the required information	46	45	91	84.53
Allows linkage between modules	46	45	91	84.53
Can motivate students to learn	48	46	94	83.62
Easy for students to understand	46	45	91	84.53
Encourage students to read other references	49	45	94	85.43
Using correct Indonesian	48	49	97	89.07
Use clear and simple sentences	47	48	95	88.16
Illustration of attractive images and colors	48	47	95	87.25
Illustration of a picture representing the message conveyed	46	49	95	89.07
Total			2265	

The results of the assessment of the content validators, the content of the developed module is in accordance with the requirements for developing a good module, namely the writing of the appropriate material content framework can lead the reader to an overview of the material in the module, the preliminary writing has directed the reader to the purpose of the module, the lecture objectives are correct, practice questions and answer keys are appropriate as evaluation tools, measure the achievement of goals, and summaries have summarized the material and attracted the attention of readers. Lecture instructions can be categorized as being able to make it easier for readers to study the module, adequate reading resources as a basis for further development for readers. All sections are well identified, complete pages and exercises, font type and size and physical size of the module, illustrations can attract students' attention in studying the module.

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Test Results on Students

Small group trials were conducted on six students of mathematics education in Padangsidimpuan with different levels of ability. The results of the trial in this small group did not get too many revisions. Revisions given by students tend to improve the writing format, namely writing sentences with incomplete letters, varying spacing between sentences, and incorrect numbering sequences.

After the module was tested in small groups, then the module was revised. Based on the results of the revision, the module was re-tested on a group of students in a limited trial. The number of test subjects was 25 students of mathematics education in Padangsidimpuan. The results of the trial provide not many revisions and are almost the same as the small group trial. For students belonging to the smart group, they gave a very good revision, namely improvements in the answer keys that deviated/miscalculated.

The practicality of learning tools used in the learning process is obtained through observations of the learning process, impressions from lecturers and students during the learning process. Observation data was obtained by filling out open observation sheets/field notes, while to get the impression of the course lecturers and students, interviews were conducted. Observations were made on the convenience of lecturers and students in using and understanding the module.

Based on the observations made by the observer in the field notes/open observation sheets, it was obtained information that the use of the Research Methods module could be said to be practical. Students and lecturers are easy to use the module. Students who find difficulties in using and understanding the module are students with low ability levels. The average difficulty they get is to complete/understand the examples and practice questions given.

Practical Results of Module Prototype

After observing the implementation of the learning process using the module, the results of observations, and interviews with lecturers and students, it can be concluded about the practicality of the learning portfolio. The observer's assessment of the practicality of learning can be shown in the following diagram.

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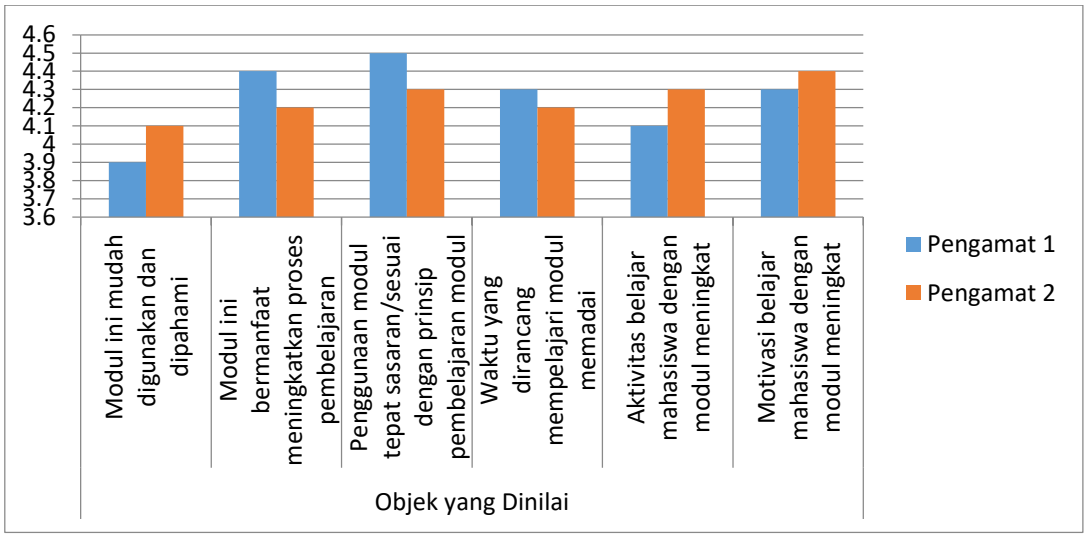

In general, the assessors are of the opinion that the overall use of the research methods module learning tools is very practical to use. However, the module still has a few revisions after a limited trial was carried out.

Results of the Effectiveness of the Research Methods Module

The assessment stage is to see the effectiveness of the module. The observed effectiveness is the implementation of the learning process with modules, the results of interviews with lecturers and students, and student learning outcomes. To see whether the implementation of the learning process using the module has been implemented in accordance with the principles of module learning, the learning process is observed by two observers. Observations were made on the learning process, class situation, interactions that occur, general student motivation, activities of lecturers and students. The results of observations on the implementation of the learning process can be seen in the following table.

Table 3. Observer Result Data

No	Observed Aspects	Meeting to									Total	Average
		1	2	3	4	5	6	7	8	9		
1	Students ask each other and discuss	5	4	4	5	4	5	5	5	4	41	4,1
2	Helping students understand the module	4	5	4	4	5	4	5	5	5	41	4,2
3	Motivating students during lectures	5	5	5	5	4	4	5	4	4	41	4,1
4	Stimulate students to give arguments	4	4	5	4	4	4	5	5	5	44	4,2
5	Stimulate students to develop independent learning	5	5	4	4	4	5	5	4	5	41	4,3

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From this table, it can be seen that during the lecture process the observer gave an average rating in the range of 3.6 to 4.5. That is, the average lecture process using the module is of good value. In conclusion, the learning process using the research methods module can create classroom situations that encourage students to ask each other, answer and express opinions, interaction between students, can motivate students in learning. In addition, learning using the research methods module can stimulate students very well in developing independence and creativity in understanding the module and solving problems.

Improving Student Learning Outcomes

The learning outcomes observed in this study were learning outcomes after using the module. To see student learning outcomes, pre-test and post-test were given to the test class. After being analyzed, it was found that student learning outcomes were higher after using the module than before using the module. The following will show a description of the results of the pretest and posttest.

Table 5. Comparison of Pretest and Posttest scores

Description	Pretest	Posttest
Mean	41,82	81,35
Standart Deviation	12,37	9,78

Based on the analysis of the descriptive research method above, it was found that the average posttest was higher than the average pretest. Then after the significance test it was found that there was a significant difference between the pretest and posttest. This shows that the developed module is effective.

Discussion

The research methods module was declared valid by the validator through the percentage of validation on several aspects observed, namely content feasibility, presentation feasibility, linguistic and contextual. This means that the content of the design in the research methods module is good and complete according to the validator. The designed research methods module has a validity value of 0.83 with a good category. This shows that the research methods module according to the validators has been declared good and can be used in the lecture process.

The results of this study are in line with the research results of Tjiptiany, et al (2016) which states that the module is feasible to use if it has been declared valid by the validator. The results of Yani's research (2012) also stated that the results of expert validation of science module learning were declared feasible to use. During the implementation of learning using the Research Methods Module design, in general the time provided was sufficient. The use of design can make it easier for students to understand lessons and solve problems related to their daily lives.

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Furthermore, based on the observation sheet used during the learning process, it showed that the planned use of the research methods module went well at each meeting. Although there are several obstacles, they do not reduce the smoothness of the learning process. Referring to the results of interviews with several students obtained good results. This can be seen from student interest in the implementation of learning activities and the instructions used in presenting the module are easy to understand, so that students can understand the research method material well.

The effectiveness of the product is identified based on the results of observations on the implementation of the learning process, the results of interviews with course lecturers, and the results of interviews with students, and student learning outcomes. Learning outcomes are test results after learning. To see student learning outcomes, pre-test was given before using the module and post-test after using the module. After being analyzed, it was found that student learning outcomes were higher after using the Research Methods module than before using the module research methods module. This shows that the research methods module developed is effective.

Conclusion

The research method module developed has met the valid criteria from the aspect of module content, module development principles, and characteristics. Aspects that are validated in this section of the module include aspects of module organization, module writing format, description of material description, use of language and illustrations or pictures. The research method module developed has met the practical criteria according to observers, lecturers, and students. This research methods module is easy to use, has an interest in learning. In general, students enjoy lectures using this module. The research methods module developed has met the criteria for effectiveness. The effectiveness observed in this lecture is the result of student learning. Student learning outcomes are higher after using the module compared to before using the module in lectures.

References

Ashaari, N. S., Judi, H. M., & Mohamed, H. (2011). “Student ’ S Attitude towards Statistics Course.” In Procedia Social and Behavioral Sciences 18(1): 287–94.

Branch, R.M. (2009). InstructionalDesign: TheADDIE Approach. NewYork: Springer.

Bringslid, O. (2002). Mathematical e-learning using interactive mathematics on the Web. European journal of engineering education, 27(3), 249-255. doi: 10.1080/03043790210141564.

Daryanto. (2002). Developing Teaching Material Modules for Teacher Preparation in Teaching. Yogyakarta: Gava Media.

Jackson, K., Gibbons, L., & Sharpe, C. (2017). Teachers’ views ofstudents’ mathematical capabilities. Teachers College Record,119(7), 1–43.

Lin, Ya Wen et al (2017). The Effect of Blended Learning in Mathematics Course. EURASIA Journal of Mathematics Science and Technology Education, 13(3) 741-770.

Marsan, Linssay A. (2016). “The Impact of an Interactive Statistics Module on Novices’ Development of

The Seybold Report
ISSN 1533-9211
DOI 10.5281/zenodo.6910901

Scientific Process Skills an Attitudes in a First-Semester Research Foundations Course." Journal of Microbiology & Biology Education 17(3) 436–43.

Nizar. (2018). "Developing PISA-Like Mathematics Problem Using The 2018 ASIAN Games Football and Table Tennis Context." Journal on Mathematics Education 9(2): 183–94.

Nicolaidou, M., & Philippou, G. (2003). Attitudes towards mathematics, self-efficacy and achievement in problem solving. In M. A Mariotti. (Eds.), European Research in Mathematics Education III (pp. 1-11). Pisa, Italy: University of Pisa. Retrieved from http://fractus.uson.mx/Papers/CERME/TG2_draft/TG2_nicolaidou_corr.pdf.

Sugiyono. (2014). Cara Mudah Menyusun: Skripsi,Tesis, dan Diserasi. Bandung: Alfabeta.

Tjiptiany, Endang Novita. (2016). Development of a Mathematics Learning Module with an Inquiry Approach to Help Class X Students in Understanding Opportunity Materials. Journal of Education: Theory, Research and Development, 1(10): 1938–42.

Yani, R. (2012). Development of Instruments and Teaching Materials to Improve Communication Skills, Reasoning and Mathematical Connections in Integral Concepts. Educational Research, 13(1): 44–52.

Yansen. (2019). "Developing PISA-Like Mathematics Problems on Uncertainty and Data Using ASIAN GAMES Football Context." Journal on Mathematics Educataion 10(1): 37–46.