THE DEVELOPMENT OF MATHEMATICS LEARNING MODULES USING PROJECT-BASED LEARNING MODELS ON THE MATERIAL OF SETS IN JUNIOR HIGH SCHOOL

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ABSTRACT

This study aims to find out how the development of learning modules on set material using the Project-Based Learning model for class VII SMP students. To find out how the feasibility of developing learning modules on set material by using a project-based learning model for class VII SMP students. This type of research was research and development (Research and Development) which started from the analysis, and design to the development or production stage. This study used a questionnaire instrument for the feasibility of the mathematics learning module which was compiled using a Likert scale. Data was collected using a module feasibility analysis instrument which includes content quality, coverage accuracy, project-based learning, display, and language. Based on the results of data analysis, the average module value is 3.18 with good criteria and the average percentage of module eligibility reaches 80% with appropriate criteria so that the learning module on the set material using the project-based learning model for class VII SMP students can be used as mathematics teaching materials.

Keywords:
Sets Material Learning Module; Project-Based Learning

1. INTRODUCTION

The implementation of the learning process desired by the 2013 curriculum is student-centered and minimizes the lecture method. Teachers need to foster curiosity in students and in the learning process that is applied must train students to be able to learn independently. One of these goals can be achieved if students' interest in reading is high. According to Tiemensma (2009), reading is the most important component in the 21st century in order to survive in current global era.

Based on the observations made, most of the learning process applied to mathematics subjects is still teacher-centered. The position of students in the learning process is communicant without giving feedback. Because students only act as recipients of

information, students' understanding is limited to the material presented, and does not understand the meaning and purpose of the material being studied. Teaching facilities and materials are still very limited, teachers only use whiteboards during the learning process.

Another obstacle in the learning process is the difference in student abilities. Differences in students' abilities make the simultaneous learning process difficult. Students with relatively low thinking skills compared to their classmates have difficulty processing the material presented in the lecture method. Therefore, students need to be able to study the material independently and involving in the learning process. This is because when learning mathematics, the teacher is adjusted to the condition of the students so that they can better understand the material presented, more impressed with the learning delivered, and will not easily forget what has been learned.

The development of teaching materials is important for educators so that learning becomes more effective and efficient and does not deviate from the abilities achieved. Materials are all forms that can be used by educators to assist in carrying out educational and learning activities in the classroom. Development involves the student's learning process, including a series of events aimed at influencing and enhancing the occurrence of internal learning processes or attempts to consciously create conditions to achieve support for learning objectives (Gagne, 2003).

The material developed should meet your needs. The material you need is one that can motivate students to learn independently and make student-centered learning. The various abilities of these students require material that can be studied independently according to the speed of learning. Printed materials for self-study are modules. According to Kurniawati (2013:10), this module is a resource that can be learned by students of various abilities and periods. According to the Directorate General of Quality Assurance (2008), the definition of a module for education staff is printed material that must be done by students themselves.

According to Rais in Lestari (2015), the project-based learning model (PjBL) is a learning model that includes projects in the learning process. The learning model for project-based learning is a learning model that uses projects or activities as the medium. The project-based learning model provides all students with the individual tasks they need to observe, read, and investigate.

The development of the selected module is a project-based learning model (PjBL) based module. This project-based learning model (PjBL) is a learning model that can facilitate the application of students' knowledge and skills. The Project-Based Learning (PjBL) learning model provides opportunities for students to expand their knowledge and develop their skills through problem-solving and research.

The importance of teaching students to solve problems allows students to be analytical in making decisions in their lives. If students are trained to solve problems, then students are automatically able to make decisions, so that students have the ability to collect relevant information, analyze information, and realize how important it is to re-examine the results obtained.

According to Nurik Maghfiroh, there is a study entitled "The Effect of Project-Based Learning on Scientific Process Skills for Class X SMA Negeri Sidoarjo". Based on the results of the study, it can be concluded that the average scientific process skills of the control class students increased by 8.32 compared to 22.15 in the experimental class. The effect of the independent variable on scientific process skills is determined by a number of 9.554, but the significance of 0.003 means that the learning process affects the learning achievement of

students' scientific process skills. The survey conducted by Laila Okta Fitriyani entitled "The Impact of Project-Based Learning on Scientific Process Skills for Grade 7 MT Private Matla'ul Anwar Gisting, Tanga Mass" showed a significant difference in the average post-science skills test, with a mean score of 54.46 in the control class and 70.31 in the experimental class.

This study aims to determine how the development of learning modules on set material using the Project-Based Learning model and its feasibility for class VII junior high school students.

2. RESEARCH METHOD

The subjects in this research and development expert validation are three experts consisting of two expert lecturers and one mathematics teacher as validators of the feasibility of the developed learning module. Research and development or research and Development (R&D).

This study used the ADDIE learning model which stands for analysis, design, development or production, implementation, and evaluation. However, due to the formulation and limitations of the problem, it was modified into ADD which consists of 3 stages which were Analysis, Design, and Development. The procedure is as follows: At the development stage, materials such as subject matter, pictures, and typing with the help of Microsoft Word are combined, all of which are developed into a complete module in accordance with the material and learning objectives. In this study, the data collection technique used was an expert feasibility test questionnaire. The data analysis method used to validate the mathematics learning module was obtained based on calculations using a Likert scale.

3. RESULTS AND DISCUSSION

A. Teaching Material Design

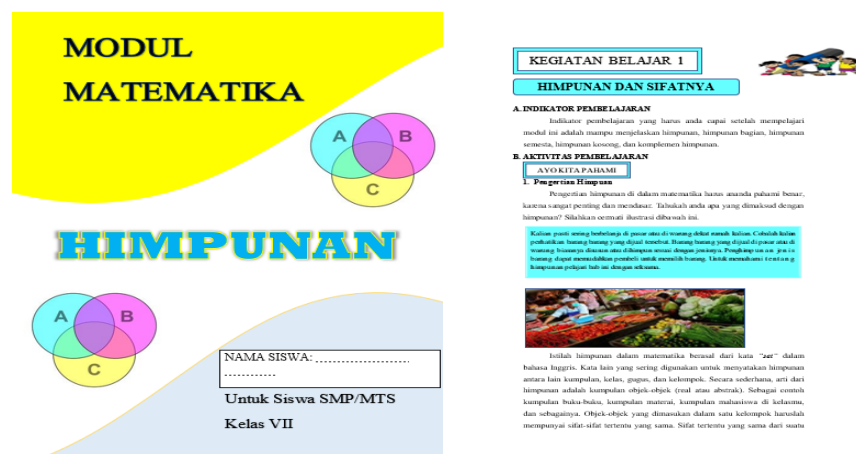The following is a design of teaching materials made by researchers:

Figure 1.

Cover Design and Summary of Teaching Materials

B. Module Feasibility Test Results

The score of the module feasibility test results from the experts are presented in the following table:

Table 1.

Overall Score of Module Feasibility Test Results

No	Aspect	Criteria	Score of		
			A1	A2	A3
1	Content Quality	1. Providing learning experience and knowledge to students.	3	4	3
		2. The information in the module provides new knowledge about mathematics.	3	3	4
		3. Conformity with learning objectives.	3	3	3
		4. The examples given are in accordance with the facts of everyday life.	4	4	4
2	Coverage Accuracy	1. Conformity with Basic Competencies and Indicators.	4	3	4
		2. Conformity with the cognitive, affective and psychomotor learners.	3	3	3
		3. Conformity with daily life.	4	3	3
3	Project Based Learning	1. Increasing students' knowledge based on their initial knowledge.	3	3	3
		2. The problems presented are in accordance with everyday life.	4	3	3
		3. Analyzing.	3	3	3
		4. Planning a solution.	3	3	4
		5. Implementing the plan.	3	3	3
		6. Summing up.	3	3	4
4	Appearance	1. Attractive writing, module design, and pictures.	3	3	3
		2. Attractive color and cover of the module.	3	3	3
5	Language	1. The language used is communicative.	3	3	3
		2. The sentences used to explain the material are easy to understand.	3	3	3
		3. The sentences used do not have a double meaning.	3	3	3

4. Conformity with Indonesian language rules.	3	3	3
5. In accordance with the level of students' thinking development.	3	3	3
Total Score of Overall Aspect (T)	64	62	65
Mean of overall aspect = T/20	3,2	3,1	3,25
Percentage of Module Feasibilty (K) = T/80 x 100%	80%	77,5 %	81,25 %
Mean K = Total K/3	80%		
Criteria	Feasible		

Based on the score in table 1 above, it can be seen that the results of the module feasibility test state that the mathematics learning module using a project-based learning model on the material of the sets is feasible to be used as teaching material. The percentage level of the feasibility test results reaches 80% which comes from the results of the assessment of experts.

To determine the feasibility of learning modules on set material using a project-based learning model for class VII SMP students, the researchers asked three experts to validate or test the feasibility of the module by providing a module feasibility analysis instrument. To find out in full the score of the module feasibility test results can be seen in the following table:

Table 2.

Score of Module Feasibility Test Results

No	Aspect	Mean	Criteria
1	Content Quality	3,42	Good
2	Coverage Accuracy	3,33	Good
3	Project Based Learning	3,17	Good
4	Appearance	3	Satisfactory
5	Language	3	Satisfactory

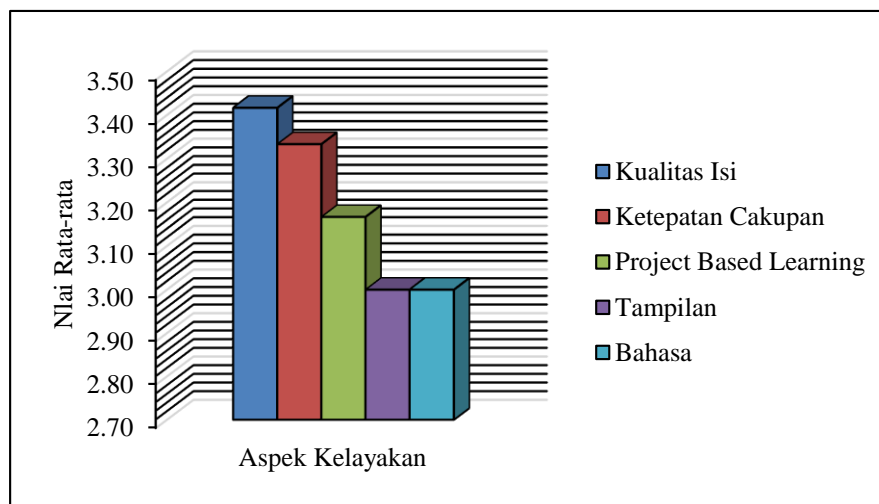For more details can be seen in the following diagram:

Figure 2.

Mean Score of Module Feasibility Test Results

Based on table 2 and figure 2 above, it can be seen the mean score and criteria for each aspect of the assessment. The mean score in all aspects of the assessment of learning modules on set material using the project-based learning model for class VII SMP students reached a value of 3.18 with good criteria. This is based on the mean score achieved in each aspect of the assessment as in the aspect of content quality reaching 3.42 with good criteria, terms of coverage accuracy reaching 3.33 with good criteria, in project-based learning aspect reaching 3.17 with good criteria, the aspect of appearance reach 3.0 with criteria satisfactory, and in the aspect of language, it reaches 3.0 with criteria satisfactory.

Then the percentage of the feasibility of learning modules on the set material using the project-based learning model for class VII SMP students reaches a value of 80% with feasible criteria. This is based on the percentage of eligibility given by each validator as validator 1 lecturer gives a feasibility percentage score of 80% with feasible criteria, validator 2 lecturer provides a feasibility percentage score of 77.5% with feasible criteria, and validator teacher provides a percentage value eligibility of 81.25% with feasible criteria.

Based on the description above, it can be concluded that the learning module on set material using a project-based learning model for class VII SMP students can be used as one of the teaching materials for mathematics in class VII SMP/MTs students.

4. CONCLUSION

Based on the results of data collection and analysis, the average module value is 3.18 with good criteria and the mean percentage of module eligibility reaches 80% with feasible criteria, so the learning module on the set material using a project-based learning model for class VII junior high school students can be used as mathematics teaching materials.

Researchers suggest that mathematics teachers use learning modules from the material provided by using a project-based learning model for 7th-grade junior high school students in class. Further development and research of mathematics learning modules need to be utilized with project-based learning models for grade 7 in various materials and subjects. To develop various activities and creativity of students who take part in the mathematics learning process, it is necessary to develop more innovative learning media in other subjects.

5. REFERENCES

Afifah, N., Batubara, I. H., & Harahap, T. H. (2021). Pengembangan Bahan Ajar Berbasis Pendekatan Investigasi Untuk Meningkatkan Kemampuan Pemecahan Masalah Matematika Mahasiswa Prodi Pendidikan Matematika. EduTech: Jurnal Ilmu Pendidikan dan Ilmu Sosial, 7(2).

Amri, Z., & Hadi, R. (2020). Pembentukan Graf Berdasarkan Benda Langit (Bintang) dengan Selisih Nilai MagnitudeTertentu di OIF UMSU. Al-Marshad: Jurnal Astronomi Islam dan Ilmu-Ilmu Berkaitan, 6(1), 24-33.

Amri, Z., Aulia, A., Syella, A., Pratamal, H., & Ramadhani, S. (2018). PELABELAN HARMONIS GANJIL PADA GRAF 2S_n [(C] _4, n). EduTech: Jurnal Ilmu Pendidikan dan Ilmu Sosial, 4(1).

Annisa, N., Akrim, A., & Manurung, A. A. (2020). Development Of Teacher's Professional Competency In Realizing Quality Of Human Resources In The Basic School. IJEMS: Indonesian Journal of Education and Mathematical Science, 1(2), 91-95.

Azis, Z., Panggabean, S., & Sumardi, H. (2021). EFEKTIVITAS REALISTIC MATHEMATICS EDUCATION TERHADAP HASIL BELAJAR MATEMATIKA SISWA SMP NEGERI 1 PAHAE JAE. Journal Mathematics Education Sigma [JMES], 2(1), 19-24.Ekayati, R. (2020). Shadowing Technique on Students' Listening Word Recognition. IJEMS: Indonesian Journal of Education and Mathematical Science, 1(2), 31-42.

Batubara, I. H. (2020). Pengaruh Model Pembelajaran Guided Discovery Learning terhadap Hasil Belajar Pengembangan Silabus Pembelajaran Matematika pada Masa Pandemic Covid 19. Jurnal Penelitian, Pendidikan dan Pengajaran: JPPP, 1(2), 13-17.

Batubara, I. H. (2020). Peningkatan Kemampuan Pemecahan Masalah Matematik Melalui Metode Penemuan Terbimbing Berbantuan Sofware Geogebra. Journal Mathematics Education Sigma [JMES], 1(1).

Batubara, I. H., & Ammy, P. M. (2018). Pengaruh Model Pembelajaran Berbasis Masalah Terhadap Hasil Belajar Mahasiswa. Biblio Couns: Jurnal Kajian Konseling dan Pendidikan, 1(2), 43-53.

Ekayati, R. (2020). Shadowing Technique on Students' Listening Word Recognition. IJEMS: Indonesian Journal of Education and Mathematical Science, 1(2), 31-42.

Hasnah, Y. (2017). TEACHERS AS ROLE MODELS IN NURTURING STUDENTS'CHARACTER. KUMPULAN JURNAL DOSEN UNIVERSITAS MUHAMMADIYAH SUMATERA UTARA, (3).

Lubis, B. N. A., & Sagala, R. W. (2020). The Comparative of Indonesian and Western Culture in Live Action: A Study of Cross-Culture. English Teaching and Linguistics Journal, 1(2), 56-59.

Ginting, P., Hasnah, Y., & Hasibuan, S. H. (2021). Pkm Pelatihan Tindakan Kelas (Ptk) Berbasis Student Centered Learning (Scl) Bagi Guru Smp Di Kecamatan Medan Deli. JURNAL PRODIKMAS Hasil Pengabdian Kepada Masyarakat, 4(1), 58-72.

Ginting, P. (2021). Pengaruh Penerapan Strategi Group to Group Exchange Berbantu Media Microblogging Edmodo terhadap Prestasi Belajar Mahasiswa pada Mata Kuliah English Syntax. KUMPULAN JURNAL DOSEN UNIVERSITAS MUHAMMADIYAH SUMATERA UTARA, 1(1).

Ginting, P., Hasnah, Y., & Hasibuan, S. H. (2021). Pkm Pelatihan Tindakan Kelas (Ptk) Berbasis Student Centered Learning (Scl) Bagi Guru Smp Di Kecamatan Medan Deli. JURNAL PRODIKMAS Hasil Pengabdian Kepada Masyarakat, 4(1), 58-72.

Manurung, A. A., & Gulo, F. F. (2021). Application of Problem Based Learning Model on Pythagorean Theorem Material to Improve Student Learning Outcomes for Class VIII SMP Negeri 2 Mandrehe. IJEMS: Indonesian Journal of Education and Mathematical Science, 2(2).

Maisyarah, M., Afriyanti, D., & Manurung, A. A. (2021). PENERAPAN MODEL PACE DALAM MENINGKATKAN HASIL BELAJAR MATEMATIKA SISWA SMP NURUL ASANAH. Jurnal Penelitian, Pendidikan dan Pengajaran: JPPP, 2(1).

Panggabean, S., Nasution, E., & Batubara, I. H. (2020). PKM Pelatihan Massive Online Open Course (Mooc) Berbasis Quizizz Bagi Guru Smp Dan Sma Satu Nusa Yayasan Abdurrahman Ayun Binjai. IHSAN: JURNAL PENGABDIAN MASYARAKAT, 2(2), 238-247.

Putri, L. A., & Panggabean, S. (2020). Efektifitas Model Pembelajaran Treffinger Dalam Meningkatkan Hasil Belajar Matematika Pada Siswa SMP Istiqlal Deli Tua. Journal Mathematics Education Sigma [JMES], 1(1).

Panggabean, S., Nasution, E., & Batubara, I. H. (2020). PKM Pelatihan Massive Online Open Course (Mooc) Berbasis Quizizz Bagi Guru Smp Dan Sma Satu Nusa Yayasan Abdurrahman Ayun Binjai. IHSAN: JURNAL PENGABDIAN MASYARAKAT, 2(2), 238-247.