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DEVELOPMENT OF A MATHEMATICS LEARNING MODULE WITH THE MISSOURI MATHEMATICS PROJECT (MMP) MODEL ON THE TOPIC OF ALGEBRAIC FUNCTION LIMITS FOR GRADE XI MA AL-JUNAIDIYAH, DISTRICT MANDAILING NATAL

PENGEMBANGAN MODUL PEMBELAJARAN MATEMATIKA DENGAN MODEL *MISSOURI MATHEMATICS PROJECT* (MMP) PADA POKOK BAHASAN LIMIT FUNGSI ALJABAR KELAS XI MA AL-JUNAIDIYAH KABUPATEN MANDAILING NATAL

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Abstract

This research is driven by the limited use of mathematics learning tools such as teaching modules in schools. At MA Al-Junaidiyah in Mandailing Natal Regency, learning still largely relies on textbooks based on the 2006 curriculum, resulting in low student achievement in mathematics, particularly in the topic of algebraic function limits. This study aims to determine the validity, practicality, and effectiveness of a Mathematics Learning Module developed using the Missouri Mathematics Project (MMP) Model for the topic of Algebraic Function Limits for Grade XI students at MA Al-Junaidiyah. The research follows the Research and Development (R&D) methodology with the ADDIE development model comprising five stages: Analysis, Design, Development, Implementation, and Evaluation. Module validation involved experts in content, media, and language. The trial was conducted with 23 students of class XI-2. Two validators were assigned for each area. Results showed that the module achieved an overall validity score of 84.29%, categorized as valid. Its practicality reached 89.75%, categorized as practical. Student learning effectiveness reached 47%, showing the module is effective in improving learning outcomes. Therefore, the module is deemed feasible, engaging, and beneficial for enhancing student achievement.

Keywords : Limit of Algebraic Functions, *Missouri Mathematics Project* (MMP), Module

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Abstrak

Penelitian ini dilatar belakangi oleh kurangnya penggunaan perangkat pembelajaran matematika seperti modul ajar di sekolah tersebut, di MA Al-Junaidiyah Kabupaten Mandailing Natal lebih sering menggunakan buku berbasis kurikulum 2006, serta rendahnya hasil belajar matematika peserta didik khususnya pada materi limit fungsi aljabar. Penelitian ini bertujuan untuk mengetahui validitas, praktikalitas dan efektivitas Pengembangan Modul Pembelajaran Matematika dengan Model *Missouri Mathematics Project* (MMP) Pada Pokok Bahasan Limit Fungsi Aljabar Kelas XI MA Al-Junaidiyah Kabupaten Mandailing Natal. Penelitian ini merupakan *research and development* (R&D). Model pengembangan yang digunakan di penelitian ini adalah ADDIE yang melalui lima tahap di antaranya, *Analisys* (analisis), *design* (perancangan), *development* (pengembangan), *implemention* (penerapan), dan *evaluation* (evaluasi). Validasi modul terdiri dari validasi ahli materi, validasi media, dan validasi ahli Bahasa. Di uji coba di kelas XI-2, subjek uji coba dilakukan di MA Al-Junaidiyah Kabupaten Mandailing Natal yang berjumlah 23 peserta didik. Ahli materi, ahli media, dan ahli bahasa masing-masing terdiri dari 2 validator. Hasil dari penelitian ini yaitu modul yang dikembangkan memenuhi kriteria kelayakan dari hasil persentase keseluruhan validasi sebesar 84,29% berada dikategori valid. kepraktisan dari seluruh aspek ditunjukkan dengan nilai 89,75% berada dikategori Praktis. Kemudian nilai efektivitas dari seluruh nilai hasil belajar peserta didik ditunjukkan dengan nilai 47% nilai ini didapat dari nilai rata-rata keseluruhan hasil belajar peserta didik dikategorikan efektif. Dengan demikian dapat dinyatan bahwa modul sudah layak, menarik dan mampu meningkatkan hasil belajar peserta didik.

Kata Kunci: Limit Fungsi Aljabar, *Missouri Mathematics Project* (MMP), Modul

1. INTRODUCTION

Education is an essential activity and will always be inherent in human life.[1] Tilaar said that education is not only to improve academic intelligence abilities, but also the entire spectrum of human intelligence, both physical and spiritual.[2] According to the statement above, this implies that education is an effort to develop human character and abilities through the learning process. Therefore, development and improvement in education are needed to change the quality of Indonesian society for the better.

Mathematics is one of the important sciences to learn in this modern era.[3] The importance of mathematics makes this subject mandatory to be studied at every level of school, even up to college.[4] Given the large role of mathematics in everyday life, it is certainly concerning to see that students' mathematical abilities are still relatively low, causing their

[1] H. A. R. Tilaar, *Kekuasaan dan pendidikan: manajemen pendidikan nasional dalam pusaran kekuasaan* (Jakarta: Rineka Cipta, 2009), hal. 50.

[2] Muhammad Krisnawan, *Filsafat Pendidikan; The Choice Is Yours* (Jogjakarta: Valia Pustaka, 2016), hal. 95.

[3] Nurul Aufa, Cut Morina Zubainur, dan Said Munzir, "Pengembangan Perangkat Pembelajaran Model Missouri Mathematics Project (MMP) Berbantuan Software Geogebra Untuk Meningkatkan Pemahaman Konsep Siswa," Dalam *Jurnal Inovasi Penelitian*, Volume 1, No. 11, Maret 2021, hlm. 2.

[4] Novi Marliani, "Peningkatan Kemampuan Berpikir Kreatif Matematis Siswa melalui Model Pembelajaran Missouri Mathematics Project (MMP)," Dalam *Formatif: Jurnal Ilmiah Pendidikan MIPA* Volume 5, No. 1, Agustus 2015, hlm. 18.

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learning achievements to not reach the completed standards that have been applied.[5] The success of students in learning, in addition to their interest in learning towards teachers in teaching, is a learning tool made by subject teachers themselves.[6] According to Government Regulations, teachers must have professional competence in developing lesson materials.[7] One type of learning tool in the form of teaching materials is a module.

There are three definitions of a module, namely: 1) a unit of material that is specifically designed so that it can be studied by students independently; 2) is a complete learning program, systematically arranged, referring to clear and measurable learning objectives; and 3) contains learning objectives, materials and activities to achieve objectives and evaluation of the achievement of learning objectives pembelajaran.[8] Dharma explains that writing a module has the following objectives: 1) to clarify and simplify the presentation of messages so that they are not too verbal; 2) to overcome limitations of time, space, and sensory abilities, both for students and teachers/instructors; 3) can be used appropriately and in a variety of ways, such as to increase motivation and enthusiasm for learning; develop the ability to interact directly with the environment and other learning resources that allow students to learn independently according to their abilities and interests. Dharma Thus, the use of modules is an important basic thing in implementing learning, choosing the right module will help teachers and students in their efforts to achieve maximum learning objectives.[9]

Based on the results of observations conducted at the Al-Junaidiyah Madrasah Aliyah in Puncak Sorik Marapi District, Mandailing Natal and interviews with one of the grade XI mathematics teachers at the school, there are several problems in teaching mathematics related to learning tools. These problems include, (1) The teaching materials used in mathematics learning in class are still limited, only using mathematics textbooks and LKPD, printed teaching materials in the form of modules have never been used. (2) The textbooks used in learning in class are still based on the 2006 curriculum, have not been adjusted to the latest curriculum, (3) The LKPD used is not made by the teacher so it has not been adjusted to the characteristics and learning environment of the students, (4) The appearance of the LKPD is only plain black and white so it is less interesting for students to read and use the LKPD.

Based on these problems, the researcher believes that there needs to be a solution to the existing weaknesses. So the researcher developed a mathematics learning module to solve the problem. In addition, based on the results of interviews with grade XI mathematics teachers regarding students' understanding of the function limit material, more than 50% of students did not understand the material and assignments regarding the subject of algebraic function limits given by the teacher. In addition, the researcher gave students a test to determine the level of students' understanding of the subject of algebraic function limits. From the test, it was found

[5] Ni Luh Gd Ari Diantari, I. Ketut Gading, dan I. Gusti Ngurah Japa, "Pengaruh Model Pembelajaran Missouri Mathematics Project Realistik Berbantuan LKS Terhadap Hasil Belajar Matematika," Dalam *Jurnal Ilmiah Pendidikan Dan Pembelajaran* Volume 3, No. 2, Juli 2019, hlm. 10.

[6] Ahmad Rohani, *Pengelolaan Pengajar; Sebuah Pengantar Menuju Guru Profesional* (Jakarta: Rineka Cipta, 2010), hlm. 185.

[7] Peraturan Pemerintah Nomor 19 tahun 2005 Pasal 20.

[8] Depdiknas, *Panduan Pengembangan Bahan Ajar* (Jakarta: Depdiknas, 2008), hlm. 30.

[9] Surya Darma, *Penulisan Modul* (Jakarta: Direktorat Tenaga Kependidikan Direktorat Jendral Peningkatan Mutu Pendidik dan Tenaga Kependidikan Departemen Pendidikan Nasional, 2008), 5.

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that the level of understanding of students in the school had not reached the standard of completion with an average score of 43.5. So it can be concluded that students' abilities are still at a low level.

According to the results of previous research on students abilities in the material on function limits, it was found that students did not fully understand the definitions, properties, prerequisite concepts that apply in the material on algebraic function limits and students more often abbreviate the solution process so that they make mistakes in writing and substitution.[10] According to other research findings, students still experience difficulties in applying concepts to solve function limit problems. Examples experienced include the subject's inability to remember technical names, the inability to state the meaning of terms that represent certain concepts, and difficulties in applying principles to solve function limit problems.[11]

One of the learning models that can overcome the above problems is by using the Missouri Mathematics Project (MMP) learning model. MMP is a structured learning model that can require active students and help students understand knowledge and skills in solving problems both in group discussions and through independent practice. A learning model that involves students actively during learning, students will understand the lesson better if they themselves are more active in understanding mathematical concepts, and it will be easier to work on the questions given.[12] It can be concluded that MMP is an active learning model that emphasizes working on practice questions to improve students' understanding of the material. Based on the explanation above, the researcher will conduct a study entitled Development of Mathematics Learning Modules with the Missouri Mathematics Project (MMP) Model on the Subject of Limits of Algebraic Functions for Class XI MA Al-Junaidiyah Mandailing Natal Regency.

2. RESEARCH METHOD

This research was conducted at Madrasah Aliyah Aliyah Al-Junaidiyah Kampung Lamo located in Puncak Sorik Marapi District, Mandailing Natal. This research was conducted in the odd semester of the 2024/2025 academic year on the material of algebraic function limits. The subjects of this study were 23 students of class XI of Madrasah Aliyah Al-Junaidiyah Kampung Lamo Puncak Sorik Marapi.

The type of research used is research and development (R&D). The type of development carried out using the ADDIE model consists of Analysis, Design, Development, Implementation, and Evaluation.

Analysis

[10] Achmad Salido, La Misu, and Mohamad Salam, "Analisis Kesalahan Siswa dalam Menyelesaikan Soal-soal Matematika Materi Pokok Limit Fungsi pada Siswa Kelas XI IPA 2 SMA Negeri 5 Kendari" Dalam *Jurnal Penelitian Pendidikan* Matematika, Volume 2, No. 1, Januari 2014, Hal. 12.

[11] Siti Suci Robiah, "Analisis Kesulitan Siswa Kelas XII dalam Menyelesaikan Soal Pada Materi Limit Fungsi" Dalam *Jurnal Equation* : *Teori dan Penelitian Pendidikan Matematika,*Volume 3, No.1, Maret 2020, hlm. 74.

[12] Al Krismanto, *Beberapa Teknik, Model, dan Strategi dalam Pembelajaran Matematika*, (Yogyakarta: Departemen Pendidikan Nasional Direktorat Jendral Pendidikan Dasar dan Menengah Pusat Pengembangan Penataran Guru (PPPG) Matematika, 2003), hlm. 11.

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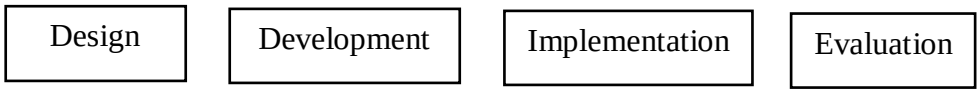

Pictures 1. Addie Development Steps

3. RESULTS AND DISCUSSION

1. Validity Level

a) Material Validation

Validation was carried out by 2 material experts lecturer at UIN Syahada Padangsidimpuan, and mathematics teacher MA Al-Junaidiyah Kabupaten Mandailing Natal. In general, the validation results data by material experts can be seen in the following table.

Table 1. Material Expert Validation Results

No.	Assessment Aspect	Score per Aspect	Total Score	Score per Aspect	Total Score
		Validator 1		Validator 2	
1.	Content/Material	25	56	26	56
2.	Presentation	22	56	25	56
Total Score		47	56	51	56
Percentage		83,92 %		91 %	
Average Percentage		87,46 %			
Category		Very Valid			

Based on the table above, the validation results of the Material in the Missouri Mathematics Project-based module by validator 1 were obtained with a percentage of 83.92% and validator 2 with a percentage of 91%, so that an average percentage of 87.46% was obtained, which is a very valid category.

b) Media Validation

Validation was carried out by 2 experts, lecturer at UIN Syahada Padangsidimpuan, and mathematics teacher MA Al-Junaidiyah Kabupaten Mandailing Natal. In general, the validation results data by media experts can be seen in the following table.

Table 2. Media Expert Validation Results

No.	Assessment Aspect	Score per Aspect	Total Score	Score per Aspect	Total Score
		Validator 1		Validator 2	
1.	Accuracy	23	52	24	52
2.	Relevance & Relatedness	22	52	25	52
Total Score		45	52	49	52

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Percentage	**86,53 %**	**94,23 %**
Average Percentage	**90,38 %**	
Category	**Very Valid**	

Based on the table above, the results of Media validation on the Missouri Mathematics Project-based module by validator 1 with a percentage of 86.53% and validator 2 with a percentage of 94.23% so that an average percentage of 90.38% is obtained which is a very valid category.

validation was carried out by lecturer at UIN Syahada Padangsidimpuan. can be seen in the following table.

No	Indicator	Score
1	Conformity of writing and font size	3
2	The learning module display is attractive	3
3	Language conformity according to the Enhanced Spelling (EYD)	3
4	The language used is communicative	3
5	The images used help understand the material.	3
6	The sentences used are clear	3
7	The sentences used are easy to understand	3
8	Clarity of instructions and directions	3
9	The terms used are easy to understand	3
10	The suitability of the image with various attractive colors so that it can convey the message	3
11	Clarity of letters and numbers	3
$\sum Score$		33
Percentage Value		75%
Category		Valid Enough

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Based on the table above, the results of the Language validation on the Missouri Mathematics Project-based module with a percentage of 75% are quite valid. Based on the data above, the validation information for the Missouri Mathematics Project-based module from the experts is obtained as follows:

Table 4. Results of LKPD Validation by Experts

No.	validator	percentag	Category
1.	Ahli Materi	87,46%	Very Valid
2.	Ahli Media	90,38%	Very Valid
3.	Ahli Bahasa	75%	Enough Valid
Percentage Value		**84,28**	**Very Valid**

Based on the table above, the average percentage of validation of the Missouri Mathematics Project-based module is 84.28% with a very valid category. Thus, the Missouri Mathematics Project-based module meets the criteria of being very valid and suitable for use in the classroom.

2. Level of practicality

The level of practicality is obtained through teacher responses to the Missouri Mathematics Project-based module, a response questionnaire consisting of 15 indicators is compiled. The results of the teacher response questionnaire analysis obtained the criteria practicality is very good with an average score of 91.67% while the student response questionnaire has an average score of 87.82%. Based on these data, a combined average of 89.75% is obtained so that it can be concluded that the Missouri Mathematics Project-based module that was developed has practicality with very good criteria.

3. Level of effectiveness

The effectiveness of the module is carried out to determine the extent of students' understanding of the material taught using the developed module.

No	Pretest	Posttest	Post-Pre	Skor Ideal	*N-gain*
1	35	59	24	65	0.37
2	18	66	48	82	0.59
3	35	42	7	65	0.11
4	35	59	24	65	0.37
5	41	66	25	59	0.42
6	29	68	39	71	0.55
7	6	42	36	94	0.38
8	12	59	47	88	0.53
9	12	59	47	88	0.53
10	12	68	56	88	0.64
11	35	94	59	65	0.91
12	41	78	37	59	0.63
13	47	65	18	53	0.34
14	12	65	53	88	0.60

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15	18	65	47	82	0.57
16	18	27	9	82	0.11
17	35	42	7	65	0.11
18	24	65	41	76	0.54
19	18	65	47	82	0.57
20	29	65	36	71	0.51
21	18	40	22	82	0.27
22	24	59	35	76	0.46
23	47	88	41	53	0.77
Mean	26,13	61,1			0,47
information					currently

From the table above, it is obtained that the N-gain score is 0.473. This score indicates an increase in learning outcomes with a moderate category. Thus, it can be concluded that the use of the Missouri Mathematics Project-based function limit module is effective in supporting and improving student learning outcomes, especially in the algebraic function limit material.

4. CONCLUSION

After the research was conducted, the conclusion that can be drawn is, The quality of the mathematics learning module on the subject of algebraic function limits for class XI MA Al-Junaidiyah Kampung Lamo based on the Missouri Mathematics Project in terms of validity according to the assessment of the expert validator team (4 lecturers and 1 teacher) is included in the category of quite valid and suitable for use with minor revisions. So that after the revision, the module is suitable for use as learning material with a percentage of material aspects, media aspects, and language aspects of 87.49%, 90.3% and 75% respectively with an average of 84.29%. The quality of the module is also determined by the practicality of a module when used in learning. Data to determine the practicality of this module was obtained from student and teacher response questionnaires. From the response questionnaire, the average score of the student response questionnaire was 3.51 and the average score of the teacher response questionnaire was 3.67. From the questionnaire scores of student and teacher responses, an average of 3.59 was obtained, so this module is included in the very good category, which means that this module is practical to use in learning. Then the quality of the module is also determined from the aspect of the effectiveness of the module developed. Effectiveness is measured which states that student learning outcomes are included in the moderate category with an average n-gain of 0.473. This means that the module is effective for use in supporting student learning with good and valid achievements.

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