Development of Numeration-Based Curriculum Merdeka Learning Module for Students of Madrasah Tsanawiyah in North Aceh

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Abstract: Developing numeracy-based teaching modules within the Merdeka Curriculum framework at MTsN aims to improve students' mathematics skills independently and contextually. This module is designed to support more flexible learning according to student's needs and interests while preparing them to face academic and daily life challenges. The numeracy approach in this module involves integrating mathematical concepts into various subjects and real situations. So that students can apply their numerical skills effectively in multiple contexts. In addition, this module is also equipped with various innovative learning strategies, including project-based learning, the use of technology, and formative assessment. Through the development of this numeracy-based teaching module, it is hoped that students can develop critical thinking, problem-solving, and decision-making skills, which are very much needed in the current era of globalization and digitalization. Implementing this module is also expected to support teachers in teaching relevant and engaging materials and improve the quality of education at the MTsN level. The objectives of this study were to determine the feasibility of the teaching module instrument and the practicality and effectiveness of the teaching module. The development model used in this research is the ADDIE Model (Analysis, Design, Development, Implementation, Evaluation).

Keywords: Development; numeracy-based; ADDIE; Curriculum Merdeka

1. Introduction

Education in Indonesia is undergoing a significant transformation through the implementation of the Independent Curriculum, which was initiated as part of the government's efforts to improve the quality of education and prepare a competent young generation to face global challenges. The Merdeka Curriculum allows schools and teachers to design learning that suits students' needs, emphasizing more flexible, student-centered, and project-based learning (Ministry of Education and Culture, 2020). In this context, developing numeracy-based teaching modules is becoming increasingly important, especially in improving MTsN. Numeracy, which includes students' ability to understand, interpret, and apply mathematical concepts in everyday

life, is an essential skill greatly needed in various aspects of life, including work and higher education [2]. However, various studies have shown that students' numeracy skills in Indonesia still need to be improved. PISA (Programme for International Student Assessment) data indicates that Indonesian students' numeracy skills are below the international average [3].

The numeracy-based teaching module developed within the Curriculum Merdeka framework can solve this challenge. This module is designed to improve students' mathematical understanding and help them apply numeracy skills in broader contexts, including in other subjects and real-life situations. This interdisciplinary approach can help students understand the relevance of numeracy in everyday life and increase their motivation to learn mathematics [4]. Using learning modules specifically developed to support the Independent Curriculum allows for a head start in teaching methods. Teachers can adapt materials to students' needs, use more interactive learning methods, and engage students in projects that challenge their analytical and problem-solving skills [5]. This approach aligns with the Independent Curriculum's objectives, which aim to create a more dynamic and contextual learning environment [6]. Thus, this research aims to develop a numeracy-based learning module that can be integrated into the Merdeka Curriculum at the Madrasah Tsanawiyah level, which is expected to improve the quality of numeracy learning and support overall student competency development..

2. Materials and Methods

The development model used in this study is the ADDIE Model, which stands for Analysis, Design, Development, Implementation, and Evaluation.

2.1 Research Model and Design

The research design using the ADDIE model can be seen in the following table:

Table 1. Steps of Research Development Model.

	Stages of the Development Research Model	Information
1.	Analysis	The first step includes needs analysis, literature study, and study of the required literature. After that, the steps are continued, which include (1) formulating research objectives; (2) estimating funds, workforce, and time; (3) formulating researcher qualifications and forms of participation in research
2	Design	This step includes (1) determining the product design to be developed, (2) producing initial products for numeracy-based teaching modules, and (3) determining the stages of implementing field trials. (4) assessment from language experts, instruments, and materials on the initial product of the module numeracy-based teaching.
3	Development	These steps include (1) Conducting a limited trial of the integrated mathematics literacy test instrument for the Pancasila student profile on MTsN students on a small scale and (2) Making improvements based on the limited trial. The initial product will be refined after a limited field trial. More is done with a qualitative approach at this stage of refining the initial product

4.	Implementation	This step includes (1) carrying out large-scale tests on the products developed, (2) carrying out research by giving tests to students to see the effective results, and (3) Giving questionnaires to students to see the practicality of the teaching modules that have been developed field trial. More is done with a qualitative approach at this stage of refining the initial product.
5.	Evaluation	This step is data processing to meet the research objectives. This final stage is also the second improvement after a broader field test than the first. Product refinement from the results of this broader field test will further strengthen the product being developed.

2.2. Data Analysis Techniques

After the required data has been collected, it is analyzed for validity, practicality, and effectiveness.

a.   Validity Analysis

The developed teaching module was tested for validity by providing validation sheets to experts, including media and material experts, to clarify the learning media's validity level. The researcher used a Likert scale. Validity weight:

Table 2. Validity Assessment Weight

Category	Score
Very Good	4
Good	3
Poor	2
Very Poor	1

Source: [17]

The following validity level criteria:

Table 3. Validity Level Criteria

No	Validity Value (%)	Validity Criteria
1	85-100	Very valid, or can be used without revision
2	70-85	Valid, or can be used but needs minor revision
3	50-70	Less valid, not recommended for use because it needs major revision
4	0-50	Not valid or should not be used

Modified from: [18]

b.   Practical Data Analysis

The developed learning media was tested for practicality by providing a questionnaire sheet for student and teacher responses. To clarify the level of practicality of the learning media, the researcher used a Likert scale.

Table 4. Practicality Level Criteria

Category	Score

Very Good	4
Good	3
Not Good	2
Very Poor	1

Source: [17]

The following Practicality Level Criteria:

Table 5. Level of Practicality

No	Practicality Value (%)	Level of Practicality
1	85-100	Very practical, or can be used without revision
2	70-85	Practical, or can be used but needs minor revision
3	50-70	It is less practical and not recommended for use because it needs major revision
4	0-50	Not practical, or should not be used

Modified from: [18]

c.   Data Effectiveness Analysis

The effectiveness of the developed teaching module can be seen from the data on measuring student learning outcomes. An open module is to be effective if students have met the KKM.

Table 6. Effectiveness Level Criteria

No	Effective value (%)	Level of Effectiveness
1	81-100	Very effective or can be used without revision
2	61-80	Effective or can be used but needs minor revision
3	41-60	Less effective, not recommended
4	21-40	Ineffective, or should not be used
5	0-20	Very ineffective, or should not be used

Modified from: [18]

3. Results and Discussion

The results of the development of open modules were conducted using the ADDIE model. The following are the stages of developing a numeracy-based independent curriculum teaching module for North Aceh Madrasah Tsanawiyah students.

a. Analysis Stage

The initial stage in this development is the analysis stage. This analysis stage aims to identify problems experienced by students in the learning process. Curriculum Analysis is conducted to determine how the learning system is implemented at MTs Negeri 2 Aceh Utara. The researcher's interview with the mathematics teacher at MTs Negeri 2 Aceh Utara showed that MTs Negeri 2 Aceh Utara had implemented an independent curriculum for class VII. The implementation of an independent curriculum is implemented in government accordance with government regulations

b. Design

This stage prepares references in the form of modules that are sources and questions for student worksheets, namely the independent curriculum teaching module. The selection of materials at this stage is carried out to be relevant to learning achievements, which is also the material for junior high schools. This stage produces the initial product of a numeracy-based teaching module. This stage also uses test instruments to measure student abilities to be validated by media and material expert validation.
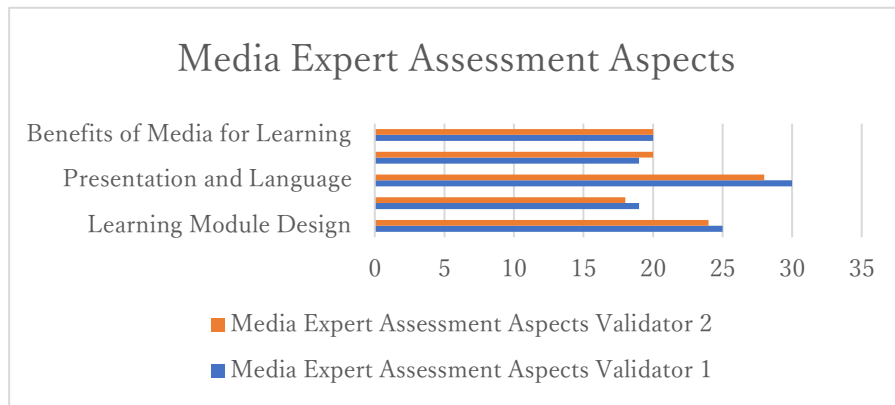
Picture 1. Media Expert Assessment Aspects

The percentage of the validity assessment of the teaching module from Media Expert 1 is 93.91% with a very valid category, and Media Expert 2 is 95.65% with a very valid category. Thus, the validity of the media developed, namely the independent curriculum teaching module, is a very valid category.

An assessment will be carried out on the validity of the material, namely the content of the material, presentation, and communication, as follows:
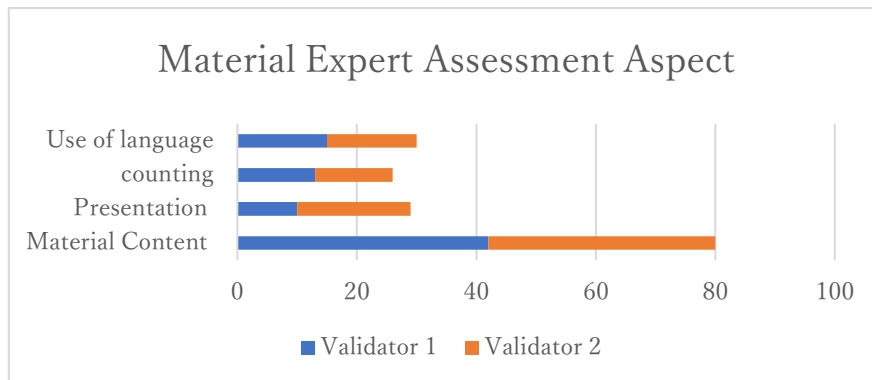

Picture 2. Material Expert Assessment Aspects

It can be seen that the validity percentage of this teaching module is very valid with a validator 1 value of 94.74% and validator 2 of 89.47%. So, it's been concluded that this teaching module was developed and tested on students.

c.   Development

This initial product stage includes conducting limited trial activities of the mathematical numeracy test instrument. Make improvements based on limited trials. The initial product's perfection will be achieved after gradual field trials. The results of small group trials are as follows:
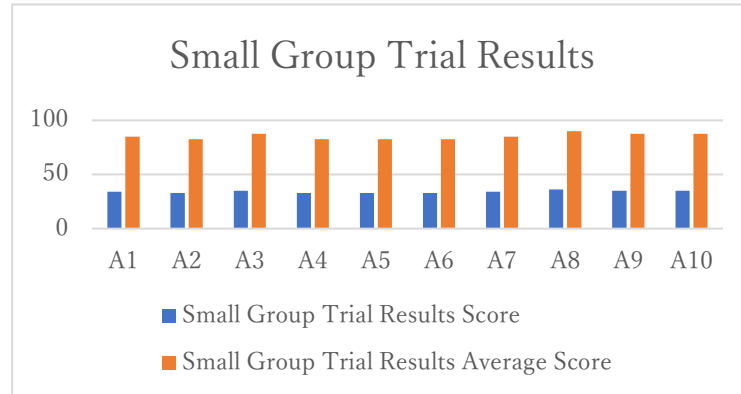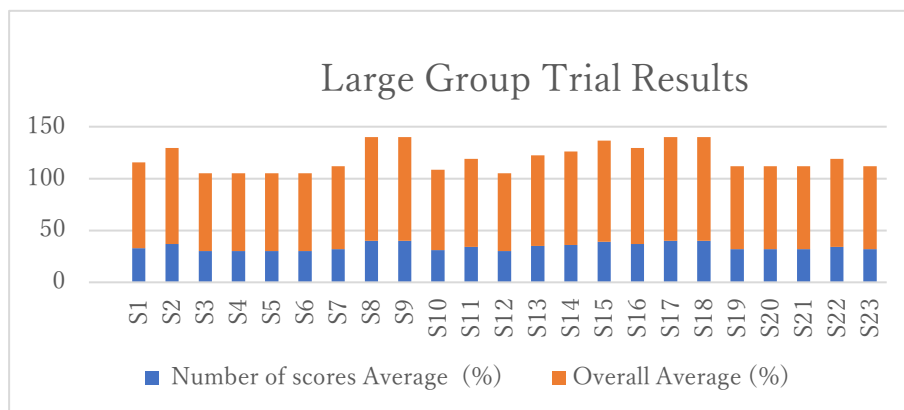


Picture 3. Small Group Trial Results

The results of the small group trial, with an average of 85.25%, are very valid. It shows that the developed Curriculum Merdeka teaching module can continue to be tested on large groups.

d.   Implementation

The next stage is implementation; at this stage, the implementation of the independent curriculum teaching module on Algebra material is carried out in a large group trial. The large group trial is conducted to obtain student responses to the continuity of learning to see the practicality of the developed teaching module. Apart from practicality, this stage data will also be obtained regarding the effectiveness of independent curriculum teaching modules on the Algebra material being produced. The large group trial was carried out in class VII/A with 23 students.

Picture 4. Large Group Trial Results
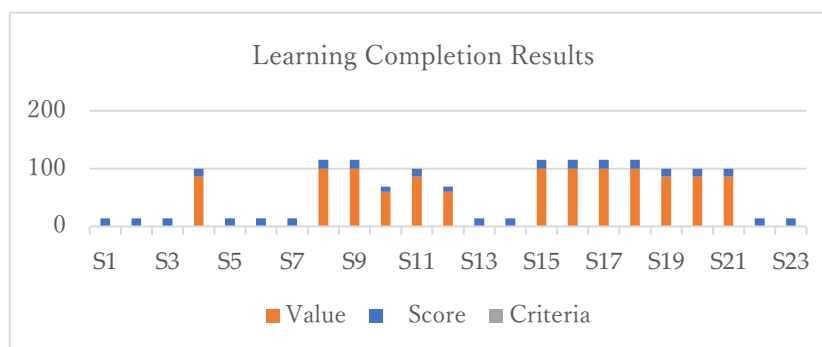
Picture 5. Learning Completion Results

The test results for the large group assessment of the independent climate teaching module based on numeracy on algebra material obtained a percentage of 91.30% with very effective criteria.

e.   Evaluation

The final stage in this development is evaluation. The evaluation stage is carried out to determine the validity, practicality, and effectiveness of the independent curriculum teaching module based on numeracy in algebra material. The validity of the independent curriculum teaching module based on numeracy on algebra material can be seen from media experts and material experts, as well as the results of small group student assessments with valid assessment results. The practicality of the independent curriculum teaching module based on numeracy on algebra material can be seen in students' responses to learning with efficient results. Meanwhile, the effectiveness of the independent curriculum teaching module based on numeracy on algebra material can be seen from the students' classical completion at the implementation stage, which has very effective results. The results of the validity, practicality, and effectiveness obtained can be stated as the independent curriculum teaching module based on numeracy on algebra material that has been developed and produces a final product that can be used during the learning process in class on the data structure material for class VII.

4. Conclusions

In the implementation stage of the research activity of the Development of the Independent Curriculum Teaching Module Based on Numeracy for Students of Madrasah Tsanawiyah Aceh Utara, the research data that has been obtained will then be processed and analyzed. The data analysis that will be carried out is the analysis of data from large group trials to measure the effectiveness and practicality of the media that has been developed—processing effectiveness of data from the material contained. Data is obtained from student evaluations by answering questions in the form of essays regarding the material contained in the module. The teaching module has been tested for validity and produces a very practical and effective one.

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