

DEVELOPMENT OF A MATHEMATICS MODULE BASED ON A CONTEXTUAL APPROACH TO ENHANCE NUMERACY LITERACY**PENGEMBANGAN MODUL MATEMATIKA BERBASIS PENDEKATAN KONTEKSTUAL UNTUK MENINGKATKAN KEMAMPUAN LITERASI NUMERASI****Rima Fitriyani¹, Happy Lumbantobing², Jonner Nainggolan³**

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Corresponding Author*ABSTRACT**

The primary objective of this research is to develop a mathematics module utilizing a contextual approach to enhance the numeracy literacy skills of eighth-grade students at MTs Negeri Kota Jayapura, specifically focusing on relations and functions. Employing the Research and Development (R&D) method with the ADDIE model, the study progressed through analysis, design, development, implementation, and evaluation stages. The findings indicate that the developed module achieved a "very valid" rating (97.2%) and was deemed "very practical" by practitioners (85.2%) as well as students during small groups (87.6%) and field trials (85.6%). In terms of effectiveness, the classical learning mastery of students using the module reached 93%, significantly surpassing the 19% mastery rate of those who did not. Statistical analyses, including paired and independent t-tests, revealed significant differences in numeracy literacy skills (Sig. <0.05). Furthermore, the N-Gain test confirmed that the improvement in the experimental group was high (0.77), whereas the control group remained low (0.23). Conclusively, this module is proven to be feasible, practical, and effective for improving numeracy literacy.

Keywords : contextual approach, mathematics module, numeracy literacy**ABSTRAK**

Penelitian ini difokuskan pada pengembangan modul matematika dengan pendekatan kontekstual sebagai upaya penguatan literasi numerasi peserta didik kelas VIII MTs Negeri Kota Jayapura, khususnya pada materi relasi dan fungsi. Dengan menerapkan metode Research and Development (R&D) model ADDIE, penelitian ini melewati tahapan analisis, desain, pengembangan, implementasi, hingga evaluasi. Temuan studi menunjukkan bahwa produk modul memenuhi kriteria "sangat valid" (97,2%) dan "sangat praktis" baik menurut penilaian praktisi (85,2%) maupun respon peserta didik pada uji coba skala kecil (87,6%) dan uji coba lapangan (85,6%). Efektivitas modul terbukti dari ketuntasan belajar klasikal yang mencapai 93%, unggul signifikan dibandingkan pembelajaran tanpa modul yang hanya 19%. Analisis statistik melalui uji-t (berpasangan dan independen) mengkonfirmasi adanya perbedaan signifikan pada kemampuan literasi numerasi (Sig. < 0,05). Hal ini diperkuat oleh hasil uji N-Gain, di mana kelompok pengguna modul mengalami peningkatan kategori tinggi (0,77), sedangkan kelompok non-pengguna berada pada kategori rendah (0,23). Kesimpulannya, modul ini dinyatakan layak, praktis, dan efektif untuk digunakan.

Kata kunci: literasi numerasi, modul matematika, pendekatan kontekstual**1. INTRODUCTION**

The 21st century demands educational reforms focused on enhancing student abilities in accordance with the nature of the times and the environment (Putri & Akhwani, 2023). Ki Hajar Dewantara explained that the essence of education is to guide students to realize their potential in alignment with the demands of their environment and the era. The "nature of the environment" (kodrat alam) emphasizes the local, social, and cultural aspects of students as the unique character of each region. Meanwhile, in interpreting the "nature of the times"

(kodrat zaman), contemporary education must emphasize the development of 21st-century skills. Indonesia's literacy performance in the PISA survey has consistently remained below international standards since 2000. The PISA survey, conducted every three years, is an ongoing initiative aimed at providing essential data for formulating educational policies and improving the quality of the education system. The 2022 PISA results indicated a global decline in learning outcomes, which is believed to be a consequence of the pandemic. Interestingly, although Indonesia's international ranking improved in PISA 2022, the literacy assessment results of Indonesian students have not shown significant improvement compared to the previous period. Specifically, Indonesia's 2022 PISA results showed a decline in scores compared to 2018. The mathematics score dropped by 13 points, from 379 to 366, even though Indonesia's ranking rose by 5 positions. Similarly, the reading literacy score declined by 12 points (from 371 to 359), yet Indonesia's ranking improved by 5 positions compared to the previous assessment. The science literacy score also decreased by 13 points (from 396 to 383), while Indonesia's ranking rose by 6 positions. These scores remain far below the international average, where the average scores for reading, mathematics, and science literacy are 476, 472, and 485, respectively (OECD, 2023). As an effort to improve the quality of education, the Ministry of Education and Culture (Kemendikbud) began conducting the National Assessment annually starting in 2021. This assessment serves as a replacement for the abolished National Examination (UN) and is known as the National Assessment (AN). The AN functions to measure students' literacy competence at the educational unit level, comprising three instruments: the Minimum Competency Assessment (AKM), the character survey, and the learning environment survey. Specifically for madrasahs or educational institutions under the Ministry of Religious Affairs, there is also a literacy assessment known as the Indonesian Madrasah Competency Assessment (AKMI). AKMI focuses its literacy assessment on four aspects: reading, numeracy, science, and socio-cultural literacy.

Referring to the 2023 Education Report (Rapor Pendidikan), the numeracy literacy profile at MTs Negeri Kota Jayapura is categorized as moderate, with 55.56% of students achieving the minimum competency threshold. Specifically, National Assessment (AN) data shows an improvement in achievement across all content domains (numbers, algebra, geometry, and data and uncertainty), with increases ranging from 1% to 12%. However, in the cognitive aspect, application competency (L2) defined as the ability to apply knowledge in diverse situations actually experienced a decline of 2.07% (Education Report, 2023). This condition has subsequently become a critical concern for the school to implement improvements in the learning process. Furthermore, the 2024 Indonesian Madrasah Competency Assessment (AKMI) results reported that the school's numeracy literacy is at Competency Level (Capaian Kompetensi or CK) 5, or "proficient," within the range of CK3 to CK7. This achievement indicates that the school is at a moderate level and can establish literacy as a habit to elevate the competency level to "skilled." The AKMI Report also included several recommendations for improvement, including: the use of more applicative learning approaches to develop numeracy literacy, the utilization of teaching materials that encourage the strengthening of numeracy literacy across all subjects (not limited to mathematics), and the implementation of numeracy literacy-based learning that challenges students to apply it in more complex real-world contexts (AKMI Report, 2024). However, data from mathematics teachers at MTs Negeri Kota Jayapura reveals that the strengthening of numeracy literacy in the learning process has not yet been implemented optimally. Content in textbooks, which tends to be textual, is identified as one of the reasons for students' lack of familiarity with literacy. Additionally, the availability of references for teachers to design numeracy literacy-based learning remains minimal. The mathematics teaching materials currently used originate from books published by the government and private sectors. Teachers remain hesitant to develop specific teaching materials focused on strengthening literacy-based learning.

As a primary modality in 21st-century life, there are six fundamental aspects of literacy that need to be mastered: reading and writing, numeracy, scientific, digital, financial, and cultural and civic literacy (K. Limiansih et al., 2024). This study will specifically examine

numeracy literacy, one of these six types, due to its close relation to the application of mathematical concepts in daily life. In the current modern era, the development of literacy proficiency has become an imperative. Bagasta et al. (cited in K. Limiansih et al., 2024) emphasize that in the 21st century, human resources need to master four main competencies: literacy, creative thinking, effective communication skills, and high productivity. Going beyond mere reading and writing activities, the concept of literacy has transformed into a set of abilities integrating critical thinking and information utilization. There are several types of literacy, including reading literacy, which refers to an individual's capacity to not only understand the content of a text but also to analyze, evaluate, and apply the information obtained from the text in daily life (Pusmenjar, 2020b). Numeracy literacy is understood as the ability to apply mathematical concepts in real-world situations. This involves the use of numbers, symbols, and mathematical principles to analyze data, solve problems, and make informed decisions (D. N. Munahefi et al., 2023). Meanwhile, scientific literacy is the ability to use scientific knowledge in daily life. This competency encompasses the ability to ask questions, seek explanations, and make rational decisions based on scientific evidence (K. Limiansih et al., 2024).

PISA 2022 data indicates that there has been no improvement in the literacy scores of Indonesian students, encompassing reading, mathematics, and science proficiencies. Nofiana & Julianto (cited in V. Amelia et al., 2023) state that this low level of literacy ability causes students to be slow in addressing and resolving the various problems they encounter. Furthermore, Yusmar & Fadilah (cited in V. Amelia et al., 2023) argue that this condition renders students less adaptive to changes in their surroundings, causes difficulties in applying knowledge to real-world contexts, presents challenges in problem-solving, and leads to slowness in decision-making. Literacy is not a subject, but rather a crucial skill or competency that must be mastered by every student. There are three essential components in numeracy literacy: content, cognitive processes, and context (Pusmenjar, 2020b). The content component encompasses the scope of mathematical material (numbers, geometry and measurement, algebra, and data and uncertainty). Furthermore, the cognitive component focuses on the required thinking stages, including understanding, application, and reasoning to solve problems. Meanwhile, the context component relates to relevant problem situations, whether personal, socio-cultural, or scientific in nature. These three components (content, cognitive level, and context) are subsequently integrated into the learning process. The comprehensive development of numeracy literacy skills cannot be fully achieved solely through mathematics instruction. Students often encounter difficulties in applying the mathematical knowledge they have acquired outside the context of the subject itself. This is primarily caused by the lack of reinforcement of literacy aspects in daily learning activities, resulting in students being less accustomed to or familiar with literacy practices. Furthermore, conventional learning methods, which tend to focus on delivering mathematical concepts in isolation from real-world contexts, often fail to effectively arouse student interest and attention. The use of predominantly textual instructional materials is also a factor hindering the habituation of literacy within the school environment. To enhance numeracy literacy, relevant learning strategies are required, one of which is the Contextual Teaching and Learning (CTL) approach. According to Yani et al. (2021), the effectiveness of Contextual Teaching and Learning (CTL) lies in its ability to bridge subject matter with real-life realities. This connection to concrete situations facilitates students in internalizing mathematical concepts and procedures, which in turn strengthens their numeracy skills. Dhani and Rahayu (cited in D.F. Pakar et al., 2024) reinforce this advantage by highlighting that Contextual Teaching and Learning (CTL) is capable of creating a more meaningful and productive learning experience. Through this approach, students are encouraged to discover concepts independently (rather than merely memorizing), to explore boldly, and to practice collaboration in problem-solving. Therefore, the integration of literacy through a contextual

approach is crucial to implement, spanning from the planning and implementation stages to the assessment of learning.

In efforts to strengthen literacy, innovation in the form of learning resources is necessary to enhance the quality of learning. The intended learning resource is a module structured systematically, clearly, and concisely; it should be user-friendly, aligned with the curriculum, and supportive of literacy habituation within the school. According to Kosasih (2021), a module is defined as a complete and self-contained learning package comprising a sequence of learning activities designed to achieve specific and measurable instructional objectives. The advantages of modules compared to textbooks are quite diverse. Among these advantages are a structure that better supports independent or teacher-guided learning, the ability to cover a single topic or subject matter with greater focus and depth, the provision of evaluation and feedback mechanisms, ease of adaptation and greater flexibility, a higher level of interactivity, and a more attractive design layout. Referring to this background, this study focuses on the development of a mathematics module using a contextual approach that is tested for its validity, practicality, and effectiveness to strengthen the numeracy literacy of Grade VIII students at MTs Negeri Kota Jayapura. The selection of the relations and functions material, which is part of the algebra domain, is based on the fact that this topic is frequently taught abstractly with minimal connection to the reality of students' lives. Consequently, the problem statement of this research addresses how to develop a mathematics module based on a contextual approach to improve numeracy literacy skills on the topic of relations and functions in Grade VIII at MTs Negeri Kota Jayapura. This research aims to produce a module product that meets the criteria of validity, practicality, and effectiveness.

2. LITERATURE REVIEW

2.1. Definition of Module

According to E. Kosasih (2021), a module is a complete and self-contained unit containing a series of learning activities designed to achieve specific and clear learning objectives. Furthermore, a module is also understood as instructional material presented completely and systematically, containing a set of planned and designed learning experiences to assist students in mastering specific learning goals. T. N. Sipayung and S. D. Simanjuntak (2017) define a module as self-instructional material that is systematically structured, encompassing content coverage, delivery methods, and learning evaluation. This instructional material is designed in such a way that it enables students to learn independently through a series of learning activities, either with or without the direct presence of a teacher. Prastowo (cited in T. N. Sipayung & S. D. Simanjuntak, 2017) states that the use of modules has several objectives, including: (1) to facilitate students in learning independently with minimal teacher intervention; (2) to create a teacher role that is neither dominant nor authoritarian in the learning process; (3) to foster an attitude of honesty in students; (4) to accommodate students' varying levels and paces of learning; and (5) to provide opportunities for students to self-assess their level of mastery of the material studied.

2.2. Teaching Material Standards

The Government of Indonesia has established national standards for teaching materials through Government Regulation Number 19 of 2005. The National Education Standards Agency (BSNP) explains that there are four main aspects determining the feasibility of teaching materials: content feasibility, presentation feasibility, linguistic feasibility, and graphical feasibility. The assessment of the feasibility of these teaching materials is based on specific indicators for each aspect, including:

1. Content Feasibility Aspect Reviewed in terms of the scope, accuracy, and currency of the material, as well as the ability to incorporate productivity insights and stimulate curiosity.
2. Presentation Feasibility Aspect Assessed based on presentation techniques and methods, material presentation support, and learning presentation strategies.

3. Linguistic Feasibility Aspect encompasses suitability with the reader's (student's) development, communicative nature, dialogic and interactive qualities, straightforwardness, coherence of thought flow, conformity with Indonesian language rules, and consistency of terms and symbols.
4. Graphical (Design) Feasibility Aspect Encompasses module size (suitability of physical size with content), cover section (layout, typography, illustration), and content section (layout and typography).

2.3. Contextual Teaching and Learning

A learning approach refers to the way an individual understands how the teaching and learning process takes place. The foundation of a learning approach stems from learning theories that subsequently inspire the utilization of specific methods. The contextual approach, or known as Contextual Teaching and Learning (CTL), is a learning method that connects the knowledge possessed by students with real experiences in their lives to construct meaningful understanding (Mashudi & F. Azzahro, 2020). Contextual learning assists teachers in bridging subject matter with real-world situations. Furthermore, this approach encourages students to take responsibility for their own learning activities and facilitates them in connecting knowledge with its application across various life contexts. According to Kokom Komalasari, contextual learning is instruction that links subject matter with the reality of students' lives, encompassing their roles as family members, school citizens, community members, and citizens. The objective is to ensure that the material learned in school holds significance and substantial value for students (Mashudi & F. Azzahro, 2020).

2.4. Numeracy Literacy

Numeracy, also referred to as numeracy literacy, is the proficiency in analyzing number-based data. According to the National Literacy Movement (Gerakan Literasi Nasional, 2017), numeracy involves crucial knowledge and skills, namely: (a) using numbers, numerals, and symbols related to basic mathematics to solve practical problems in various contexts; and (b) analyzing and interpreting information presented through various representations (such as tables, graphs, and charts) to formulate hypotheses and make decisions. This definition indicates that numeracy is far more than mere calculation skills; rather, it is a key element for understanding the significance of mathematics in the contemporary world. In summary, numeracy is an individual's ability to apply numbers, symbols, and basic mathematical concepts to resolve problems encountered in daily life.

3. METHODS

This research adopts the Research and Development (R&D) method utilizing the ADDIE model framework (Analyze, Design, Development, Implementation, Evaluation). One of the advantages of the ADDIE development model lies in its ability to facilitate continuous evaluation and revision activities at each stage, contributing to the production of a valid and reliable product. According to Hadi & Agustina (2016), the ADDIE model is also characterized by its straightforward procedure, although its implementation remains structured and systematic. The research subjects involved Grade VIII students at MTs Negeri Kota Jayapura in the 2024/2025 academic year.

The research subjects were selected using a purposive sampling technique for testing purposes, comprising a small-group trial (6 students) and a field trial (50 students across two classes). The research procedure encompasses the five stages of ADDIE:

1. Analyze

This stage includes needs analysis (learning outcome documents, instructional documents), curriculum analysis (learning objectives, learning outcomes), concept analysis (subject matter, concept maps, socio-cultural conditions), student analysis (non-cognitive and cognitive initial assessments), and literature review (books, teaching materials, learning methods).

2. Design

This stage involves determining learning objectives and essential material (relations and functions), establishing criteria for the achievement of learning objectives (using score intervals), selecting learning methods (including group discussion, inquiry, presentation, project tasks, and problem-solving), determining assessments (initial, formative, summative), selecting tools (hardware and software), and designing the module structure (preliminary, content, and closing sections).

3. Development

This stage covers drafting the module (using Microsoft Word and Canva), compiling assessment instruments (expert and practitioner validation sheets, student questionnaires, numeracy literacy tests), and product validation by experts (two mathematics lecturers, one mathematics teacher) and practitioners (two mathematics teachers). Validation refers to the four aspects of BSNP teaching material feasibility (content, presentation, language, and design).

4. Implementation

The validated module was tested in a small-group trial (6 students) and a field trial using a Counter-Balanced Design in two classes (VIII E and VIII F). Each class received treatment alternately during the experiment. Tests (pre-test and post-test) and questionnaires were administered at this stage.

5. Evaluation

This stage includes formative evaluation (module improvement at each stage) and summative evaluation (determining the module's effect on numeracy literacy). Data analysis employed mixed methods: qualitative (validator suggestions and criticisms) and quantitative (validation assessment scores and test results). Quantitative analysis assessed the validity and practicality of the module (using percentages and a Likert scale), as well as test data analysis (individual and classical mastery, paired t-test, independent t-test, and N-Gain test).

4. RESULTS AND DISCUSSIONS

4.1. Results

The development of a mathematics module based on a contextual approach through the ADDIE stages produced a module ready for implementation.

1. Analysis Stage

The results of the National Assessment (AN) and the Indonesian Madrasah Competency Assessment (AKMI) indicated low numeracy literacy among students at MTs Negeri Kota Jayapura, accompanied by a lack of support from teaching materials. In response to this, a comprehensive analysis (curriculum, concept, student, and literature) was conducted to serve as the foundation for designing the module on relations and functions, aiming to optimize numeracy literacy skills.

2. Design Stage

The learning objectives for the relations and functions material, mastery criteria, contextual learning methods (group discussion, inquiry, presentation, project tasks, and problem-solving), assessment types, tools, and module design comprising preliminary, content, and closing sections with the integration of seven contextual approach components were established.

3. Development Stage

A module draft was produced and subsequently validated by experts and practitioners.

The results of the module validation by experts and practitioners are presented below.

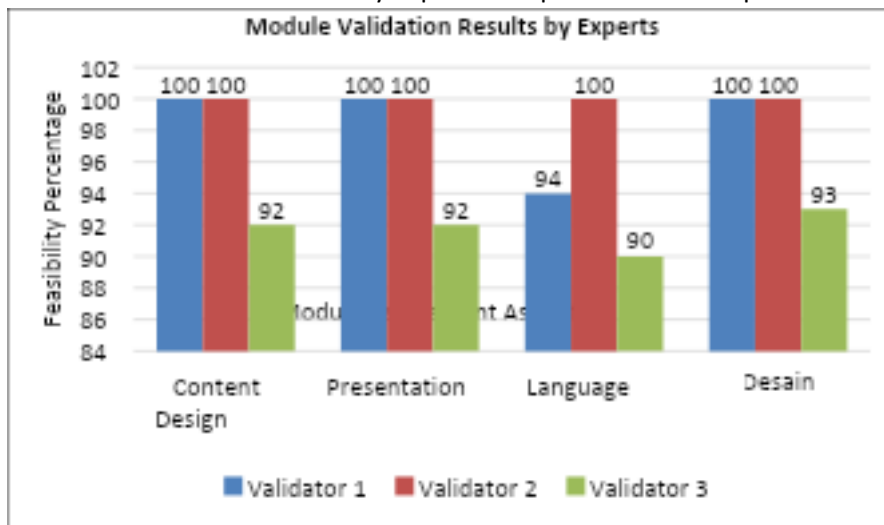


Figure 1. Module Validation Results by Experts

The average percentage results of the module assessment by the validators for each assessment aspect, along with their interpretations, are presented in the following table.

Table 1. Results of Module Validation Analysis by Experts

| No. | Feasibility Aspect | Percentage | Interpretation |
|---------------------------|--------------------------|--------------|-------------------|
| 1. | Content | 97,4% | Very Valid |
| 2. | Presentation of Material | 97,4% | Very Valid |
| 3. | Language | 94,7% | Very Valid |
| 4. | Design | 97,5% | Very Valid |
| Average Percentage | | 97,2% | Very Valid |

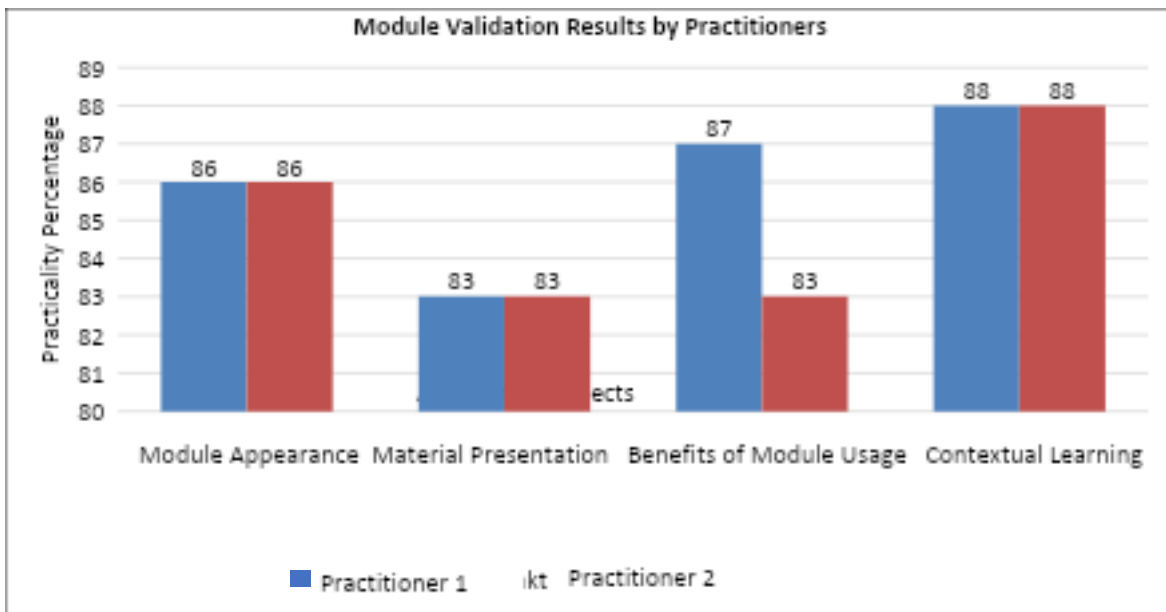


Figure 2. Module Validation Results by Practitioners

The average percentage results of the module assessment by practitioners for each assessment aspect, along with their interpretations, are presented in the following table.

Table 2. Analysis Results of Practitioner Validation

| No. | Assessment Aspect | Percentage | Interpretation |
|---------------------------|--|--------------|-----------------------|
| 1. | Module Appearance Aspect | 85,7% | Very Practical |
| 2. | Material Presentation Aspect in Module | 83,3% | Practical |
| 3. | Benefits of Module Usage Aspect | 85,0% | Very Practical |
| 4. | Learning with Contextual Approach Aspect | 87,5% | Very Practical |
| Average Percentage | | 85,2% | Very Practical |

Based on the expert validators' assessment, the module achieved an average validity percentage of 97.2%, categorized as 'very valid.' The detailed breakdown for each aspect also demonstrated a 'very valid' category (content 97.4%, presentation 97.4%, language 94.7%, and design 97.5%). Suggestions for improvement from the experts included the refinement of diction and sentence structure, the notation of mathematical symbols, material concepts, explanations of images/tables/infographics, and formatting. Meanwhile, the practicality assessment by practitioners yielded an average percentage of 85.2%, categorized as 'very practical.'

1. Implementation Stage

a. Small-Group Trial Based on the limited trial involving 6 students, the module was proven to meet the criteria of "very practical." The detailed results of the practicality assessment derived from the student response questionnaires are presented in the following data.

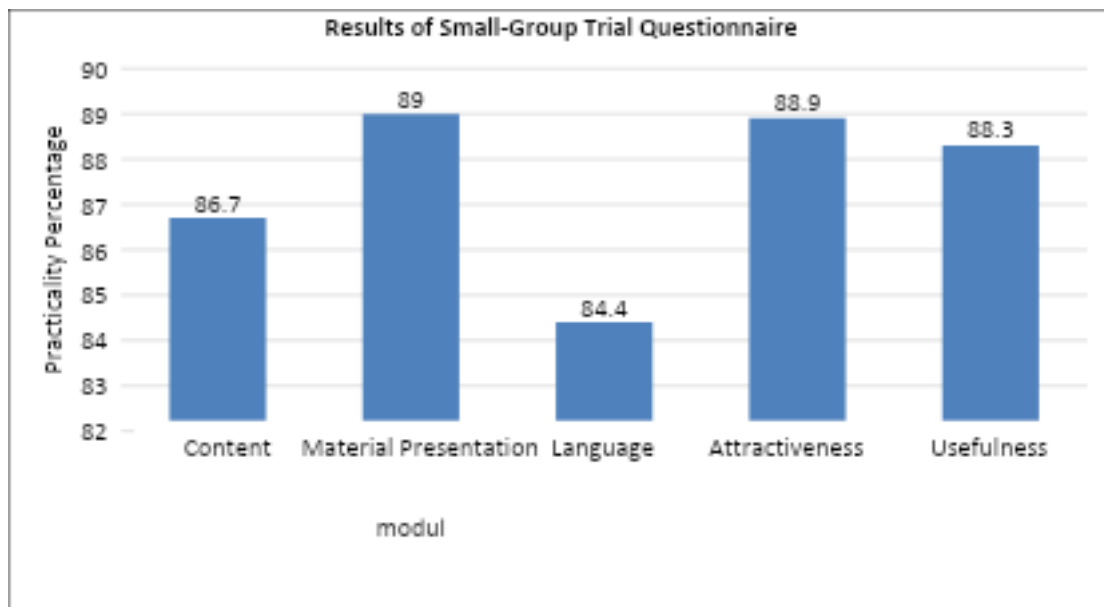


Figure 3. Results of Small-Group Trial Questionnaire

The following table presents the detailed interpretation of the module practicality assessment for each aspect based on the results of the small-group trial.

Table 3. Analysis Results of Small-Group Trial Questionnaire

| No. | Assessment Aspect | Percentage | Interpretation |
|-----|-------------------|------------|----------------|
| 1. | Content Aspect | 86,7% | Very Practical |

| | | | |
|---------------------------|------------------------------|--------------|-----------------------|
| 2. | Material Presentation Aspect | 89,0% | Very Practical |
| 3. | Language Aspect | 84,4% | Very Practical |
| 4. | Attractiveness Aspect | 88,9% | Very Practical |
| 5. | Usefulness Aspect | 88,3% | Very Practical |
| Average Percentage | | 87,6% | Very Practical |

The module was proven to have a 'very practical' level of practicality (87.6%) based on the small-group trial questionnaire. The highest score was obtained in the material presentation aspect at 89.0%, followed by the attractiveness aspect (88.9%), usefulness (88.3%), content (86.7%), and language (84.4%). All these aspects fall into the 'very practical' category. In addition to the practicality data, the test results regarding individual mastery, classical mastery, and the paired t-test are presented below.

Table 4. Classical Learning Mastery of Small-Group Trial

| No. | Test Type | Percentage of Classical Learning Mastery |
|---|--|--|
| 1. | Test 1 (Topic: Concept of Sets and Relations) | 83,3% |
| 2. | Test 2 (Topic: Concept of Functions) | 83,3% |
| 3. | Test 3 (Topic: One-to-One Correspondence) | 83,3% |
| 4. | Test 4 (Topic: Representing Relations and Functions) | 83,3% |
| 5. | Test 5 (Topic: Function Formulas, Linear Functions, and Nonlinear Functions) | 83,3% |
| 6. | Test 6 (Topic: Application of Relations and Functions) | 83,3% |
| Average Percentage of Classical Learning Mastery | | 83,3% |
| Category | | Excellent |

| | | Paired Differences | | 95% Confidence Interval of the Difference | | t | df | Sig. (2-tailed) | |
|--------|--------------|--------------------|----------------|---|---------|---------|--------|-----------------|-------|
| | | Mean | Std. Deviation | Std. Error Mean | Lower | | | | Upper |
| Pair 1 | pre1 - post1 | -33,000 | 17,146 | 7,000 | -50,994 | -15,006 | -4,714 | 5 | ,005 |
| Pair 2 | pre2 - post2 | -39,500 | 13,605 | 5,554 | -53,778 | -25,222 | -7,112 | 5 | <,001 |
| Pair 3 | pre3 - post3 | -36,833 | 13,014 | 5,313 | -50,491 | -23,176 | -6,933 | 5 | <,001 |
| Pair 4 | pre4 - post4 | -28,500 | 18,939 | 7,732 | -48,376 | -8,624 | -3,686 | 5 | ,014 |
| Pair 5 | pre5 - post5 | -40,167 | 11,720 | 4,785 | -52,466 | -27,867 | -8,395 | 5 | <,001 |
| Pair 6 | pre6 - post6 | -31,333 | 14,320 | 5,846 | -46,361 | -16,305 | -5,360 | 5 | ,003 |

Figure 4. Paired T-Test of Small-Group Trial

The classical learning mastery level reached 83.3%, falling into the 'excellent' category. Statistical analysis using the paired t-test also confirmed a significant difference in numeracy literacy skills before and after the utilization of the module (Sig. < 0.05).

b. Field Trial

This stage involved 50 students divided into two classes. The data regarding the student response questionnaire results on module practicality are presented below.

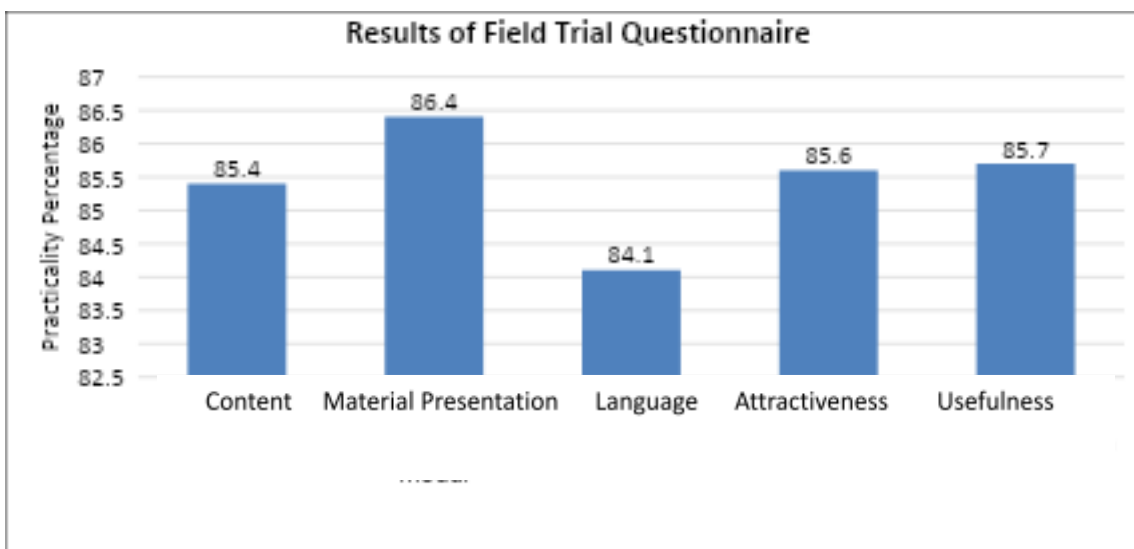


Figure 5. Results of Field Trial Questionnaire

The interpretation of the module practicality assessment for each aspect during the field trial is presented in the following table.

Table 5. Analysis Results of Field Trial Questionnaire

| No. | Assessment Aspect | Percentage | Interpretation |
|---------------------------|--|--------------|-----------------------|
| 1. | Content Aspect | 85,4% | Very Practical |
| 2. | Material Presentation Aspect in Module | 86,4% | Very Practical |
| 3. | Language Aspect | 84,1% | Very Practical |
| 4. | Attractiveness Aspect | 85,6% | Very Practical |
| 5. | Usefulness Aspect | 85,7% | Very Practical |
| Average Percentage | | 85,6% | Very Practical |

Based on the student assessment during the field trial, the module was declared 'very practical' (85.6%). All supporting aspects also fell within the 'very practical' level, namely: presentation (86.4%), usefulness (85.7%), attractiveness (85.6%), content (85.4%), and language (84.1%). The student test results, encompassing mastery (individual and classical) as well as the t-test results (paired and independent), are presented below.

Table 6. Classification of Classical Learning Mastery

| No. | Test Type | Percentage of Classical Learning Mastery (Module) | Percentage of Classical Learning Mastery (Without Module) |
|---|--|---|---|
| 1 | Test 1 (Topic: Concept of Sets and Relations) | 88% | 4% |
| 2 | Test 2 (Topic: Concept of Functions) | 80% | 4% |
| 3 | Test 3 (Topic: One-to-One Correspondence) | 96% | 24% |
| 4 | Test 4 (Topic: Representing Relations and Functions) | 96% | 32% |
| 5 | Test 5 (Topic: Function Formulas, Linear Functions, and Nonlinear Functions) | 100% | 24% |
| 6 | Test 6 (Topic: Application of Relations and Functions) | 100% | 24% |
| Average Percentage of Classical Learning Mastery | | 93% | 19% |
| Category | | Excellent | Very Poor |

Paired Samples Test

Paired Differences

| | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | t | df | Sig. (2-tailed) |
|--------|----------------|---------|----------------|-----------------|---|---------|---------|----|-----------------|
| | | | | | Lower | Upper | | | |
| Pair 1 | pre1A - post1A | -38,120 | 12,101 | 2,420 | -43,115 | -33,125 | -15,750 | 24 | <,001 |
| Pair 2 | pre2B - post2B | -37,320 | 19,098 | 3,820 | -45,203 | -29,437 | -9,771 | 24 | <,001 |
| Pair 3 | pre3A - post3A | -44,160 | 13,933 | 2,787 | -49,911 | -38,409 | -15,847 | 24 | <,001 |
| Pair 4 | pre4B - post4B | -38,640 | 16,070 | 3,214 | -45,273 | -32,007 | -12,023 | 24 | <,001 |
| Pair 5 | pre5A - post5A | -38,640 | 8,920 | 1,784 | -42,322 | -34,958 | -21,658 | 24 | <,001 |
| Pair 6 | pre6B - post6B | -46,280 | 14,519 | 2,904 | -52,273 | -40,287 | -15,938 | 24 | <,001 |

Figure 6. Paired T-Test of Field Trial

Independent Samples Test

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|-------|-----------------------------|---|-------|------------------------------|--------|-----------------|-----------------|-----------------------|---|---------|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| | | | | | | | | | Lower | Upper |
| post1 | Equal variances assumed | 21,264 | <,001 | -8,217 | 48 | <,001 | -25,160 | 3,062 | -31,316 | -19,004 |
| | Equal variances not assumed | | | -8,217 | 33,099 | <,001 | -25,160 | 3,062 | -31,389 | -18,931 |
| post2 | Equal variances assumed | 4,103 | ,048 | -8,060 | 48 | <,001 | -23,160 | 2,873 | -28,937 | -17,383 |
| | Equal variances not assumed | | | -8,060 | 44,107 | <,001 | -23,160 | 2,873 | -28,950 | -17,370 |
| post3 | Equal variances assumed | 10,806 | ,002 | -10,233 | 48 | <,001 | -28,880 | 2,822 | -34,555 | -23,205 |
| | Equal variances not assumed | | | -10,233 | 38,544 | <,001 | -28,880 | 2,822 | -34,591 | -23,169 |
| post4 | Equal variances assumed | 2,293 | ,136 | -8,354 | 48 | <,001 | -23,840 | 2,854 | -29,578 | -18,102 |
| | Equal variances not assumed | | | -8,354 | 45,373 | <,001 | -23,840 | 2,854 | -29,587 | -18,093 |
| post5 | Equal variances assumed | 13,468 | <,001 | -9,145 | 48 | <,001 | -27,840 | 3,044 | -33,961 | -21,719 |
| | Equal variances not assumed | | | -9,145 | 34,419 | <,001 | -27,840 | 3,044 | -34,024 | -21,656 |
| post6 | Equal variances assumed | 8,894 | ,004 | -8,249 | 48 | <,001 | -26,080 | 3,162 | -32,437 | -19,723 |
| | Equal variances not assumed | | | -8,249 | 36,378 | <,001 | -26,080 | 3,162 | -32,490 | -19,670 |

Figure 7. Independent T-Test of Field Trial

Table 7. Analysis of N-Gain Test Results for the Group Using the Module

| No. | Test - n | N-Gain Score |
|-----------------------------|----------|--------------|
| 1 | Test 1 | 0,77 |
| 2 | Test 2 | 0,72 |
| 3 | Test 3 | 0,80 |
| 4 | Test 4 | 0,74 |
| 5 | Test 5 | 0,78 |
| 6 | Test 6 | 0,79 |
| Average N-Gain Score | | 0,77 |
| Category | | High |

Table 8. Analysis of N-Gain Test Results for the Group Without the Module

| No. | Test - n | N-Gain Score |
|-----------------------------|----------|--------------|
| 1 | Test 1 | 0,28 |
| 2 | Test 2 | 0,18 |
| 3 | Test 3 | 0,18 |
| 4 | Test 4 | 0,21 |
| 5 | Test 5 | 0,22 |
| 6 | Test 6 | 0,31 |
| Average N-Gain Score | | 0,23 |

| Category | Low |
|----------|-----|
|----------|-----|

There was a significant disparity in results between the two groups. The group using the module achieved a classical learning mastery of 93% ('excellent' category), significantly outperforming the group without the module, which only reached 19% ('very poor' category). Statistical analysis using paired and independent t-tests (Sig. < 0.05) confirmed a significant difference in numeracy literacy skills, both in the comparison of test results and between the groups. The effectiveness of the module was further reinforced by the N-Gain score of the module group, which fell into the 'high' category (0.77), in stark contrast to the non-module group, which fell into the 'low' category (0.23). In addition to being effective, the module was also proven practical based on student response questionnaires during the field trial, achieving a score of 85.6% ('very practical').

4.2. Discussion

The research findings confirm that the developed mathematics module based on a contextual approach has met the teaching material quality standards (valid, practical, and effective) as established by the BSNP, verified through expert validation. The high validity score (97.2%) reflects the internal consistency of the module components as well as their alignment with curriculum demands. In terms of practicality, the module was assessed as easy to implement in the field, evidenced by the positive responses from practitioners (85.2%) and students (85.6%). The product's effectiveness was also significantly demonstrated, indicated by a classical learning mastery achievement of 93% in the user group. These results reinforce the findings of previous studies regarding the efficacy of the contextual approach in strengthening numeracy literacy, where students are trained to construct understanding by linking material with the realities of daily life.

5. CONCLUSION

This study concludes that the development of a mathematics module on relations and functions material using the ADDIE model with a contextual approach has successfully met the criteria of validity, practicality, and effectiveness. Based on expert assessment, the module achieved a very high validity level (97.2%), while practitioner and student assessments demonstrated an excellent level of practicality (>85%). The module's effectiveness in enhancing numeracy literacy was evidenced by the classical mastery achievement in the small-group trial (83.3%) and the field trial (93%), both categorized as excellent. Furthermore, statistical tests confirmed a significant improvement, wherein the N-Gain score of the group using the module reached 0.77 (high), significantly outperforming the group without the module, which scored only 0.23 (low).

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