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E-Module Interactive of Minimum Competency Assessment: Development and Understanding for Mathematics Teachers

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Abstract

This research was motivated by the Minimum Competency Assessment (MCA) in numeracy as a substitute for the national exam. The lack of interactive media in the form of electronic modules affects mathematics teachers' understanding of MCA Numeracy. The objectives of this study are (1) to produce and test the feasibility of an Interactive E-Module for understanding MCA Numeracy for mathematics teachers and (2) to know the influence of giving an Interactive E-module on understanding MCA Numeracy for mathematics teachers. This research method uses the development of a 4D model adopted from Thagarajan, which consists of 4 main stages: define, design, develop and disseminate. The subjects of the study are experts in the fields of education, materials, and media who aim to get validation of the feasibility and attractiveness of the products developed, and other subjects are mathematics teachers. Implementation of validation assessment activities and trials for mathematics teachers, namely at the development stage. The instruments used use assessment questionnaires and MCA numeracy comprehension ability tests. The results of the material expert validation assessment showed that it was very feasible and very attractive (95.31%), the validation assessment of educational experts was feasible and attractive (79.17%), and the assessment of media experts was very feasible and very interesting (86.67%). The E-module effectiveness test shows an interactive E-module positive influence on the understanding of MCA numeracy of mathematics teachers. This study implies that using an interactive E-module is suitable for understanding mathematics teachers about MCA numeracy.

Penelitian ini dilatarbelakangi dengan Assesment Kompetemsi Minimum (AKM) bidang numerasi sebagai pengganti ujian nasional , serta kurangnya media interaktif berupa elektronik modul yang menekenkan kepada pemahaman guru matematika tentang AKM Numerasi. Tujuan penelitian ini adalah (1) menghasilkan dan menguji kelayakan E-Modul Interaktif untuk pemahaman AKM Numerasi guru matematika, (2) Mengetahui pengaruh pemberian E-modul Interaktif terhadap pemahaman AKM Numerasi guru matematika. Metode penelitian ini menggunakan pengembangan model 4D yang diadopsi dari Thagarajan, yaitu terdiri atas 4 tahap utama yaitu: define (pendefinisian), design (perencanaan), develop (pengembangan) dan disseminate (penyebaran). Subyek penelitian adalah para ahli dalam bidang pendidikan, materi, dan media yang bertujuan untuk mendapatkan validasi kelayakan dan kemenarikan dari produk yang dikembangkan, serta subyek lainnya adalah guru-guru matematika. Kegiatan penilaian validasi serta uji coba kepada guru matematika dilakukan pada tahap develop. Instrumen yang digunakan menggunakan angket penilaian serta tes kemampuan pemahaman AKM numerasi. Hasil dari penilaian validasi ahli materi menunjukkan sangat layak dan sangat menarik (95.31%), Penilaian validasi ahli pendidikan layak dan menarik (79.17%),

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penilaian ahli media sangat layak dan sangat menarik (86.67%). uji efektifitas E-modul menunjukkan terdapat pengaruh positif E-modul interaktif terhadap pemahaman AKM numerasi guru-guru matematika. Implikasi dari penelitian ini adalah bahwa E-modul interaktif baik digunakan untuk pemahaman guru – guru matematika tentang AKM numerasi.

***Keywords**: MCA; Numeracy; Development; Electronic module; Interactive; understanding*

INTRODUCTION

Application of assessment to assess the extent to success an activity or program has been implemented by the goals set. The assessment also aims to look at the equity and sustainability of education (Wang et al., 2022). It can succeed in learning by assessing the models it will develop (Chereguini & Gea, 2021). Assessment can also see the success of high-level thinking skills in solving mathematical problems through self-assessment (Barana et al., 2022). In addition, forms of assessment, for example, open classical written examinations, can be used as a measurement method in distance education (Adigüzel, 2020). Conducted the assessment in Indonesia to see students' high-level thinking and communication abilities, including through the Minimum Competency Assessment (MCA). This assessment in 2021 has been tested and carried out, and the survey is a substitute for the national exam (Nehru, 2019), (Winata et al., 2021). Background of the implementation of the MCA Survey, namely the results of the Programme for International Student Assessment (PISA), shows that the learning outcomes of Indonesian students are always low. In 2018, the PISA score of Indonesian students was lower than the results in 2015. Several components in the PISA score, namely literacy, mathematics, and science performance (Tohir, 2019). Thus, MCA empowers literacy and numeracy, in addition to surveying the character and school environment.

One of the MCA surveys is numeracy; these competencies usually exist in mathematics because they are related to numbers, measurements, and geometry (Winata et al., 2021). Numeracy Ability means thinking using concepts, procedures, facts, and mathematical tools to solve everyday problems in various contexts relevant to individuals as citizens of Indonesia and the world (Kamendikbud, 2021). Contexts in numeracy skills, namely Personal, socio-cultural, and Science. Minimum Competency Assessment (MCA) is applied to measure students' thinking or reasoning competence when reading data and reading texts (literacy) and facing problems that require mathematical knowledge (numeracy) (Meriana & Murniarti, 2021).

In preparation for testing this numeracy ability, sharing studies or surveys have been carried out (Maulidina, 2019), (Basri et al., 2021), (Siskawati1 et al., 2020), (Winata et al., 2021). The results of the study show that teachers' numeracy ability is still low and high school students (SMA) (Winata et al., 2021) and numeracy ability of prospective mathematics teacher students are also still low (Basri et al., 2021). The condition of weak numeracy ability is very concerning, even though the Indonesian government will decide on numeracy ability as the primary survey instead of the national exam. Thus, an effort is needed to improve numeracy skills.

If appropriately pursued and produced set expectations, numeracy skills have many benefits. With good numeracy skills, students and teachers can face the challenges of the times that require high thinking and reasoning. This is in line with

the Literacy and numeracy survey conducted through MCA; the measurement of literacy and numeracy encourages teachers to focus more on developing reasoning power rather than broad but shallow content knowledge (Kemendikbud, 2021).

This MCA survey can meet the skills needs of the 21st century (Andiani et al., 2020). 21st-century skills are critical, creative thinking, collaboration, and communication (4C). Teachers are still weak in understanding numeracy competencies in MCA, compiling questions, and teaching them. Teaching this is part of compiling learning tools, namely the Learning Implementation Plan (LIP), teaching materials, collecting student worksheets, and assessments.

Teachers who can understand MCA with numeracy competencies and their devices well hope to improve students' ability in numeracy skills that impact successful MCA surveys. As the spearhead of curriculum implementation in the classroom, teachers must have excellent numeracy competence and understanding of MCA. After the teacher understands, then the preparation of the learning tools is carried out. Learning tools are tools for teachers to teach their students. Teachers as facilitators in the classroom must master the learning terrain and learning experiences, such as giving what material to students later. In preparing this MCA, the teacher is a facilitator (Meriana & Murniarti, 2021) for the successful survey implementation.

Teachers as facilitators need teaching materials to learn and apply in their classes, which requires teaching materials such as module as a teacher's companion medium. In this digital age, the appropriate module is an interactive module or an interactive Electronic Module (E-Module) compared to a regular module (Sidiq & Najuah, 2020).

Electronic interactive module are exciting and systematic packaged learning materials that contain materials, methods, boundaries, and ways of evaluating (Sidiq & Najuah, 2020). Another definition of an E-module is a computer-based module consisting of fragments of questions so that users can more easily understand the material (Samiasih et al., 2013)

Apparently, no one has developed an interactive E-module that meets the development of this era for the understanding of numeracy MCA for teachers. The existing modules are still conventional and not interactive, and the designation is not for teachers. The results of the research only developed numeracy competencies for students. They even then did not deepen the understanding of MCA, and there was no use of interactive E-module (Ambarwati & Kurniasih, 2021; Widiantari et al., 2022; Widiastuti & Kurniasih, 2021).

The development of teaching materials in the form of technology-based interactive modules for understanding numeracy MCA for teachers is significant. Namely, in addition to meeting the demands of the times in the era of globalization, it also makes it easier for teachers to learn and interact with the teaching material and success in learning outcomes. (Pokhrel & Chhetri, 2021; Herawati & Muhtadi, 2018; Pokhrel & Chhetri, 2021) .

Thus, based on the description above, carried out research on developing interactive module electronics to improve understanding of MCA Numeracy. The proposed problem formulation is 1) How is the feasibility of the MCA Numeracy Interactive E-Module developed? 2) Can the Interactive E-module positively influence the mathematics teacher's comprehension ability of MCA numeracy?

METHOD

The target to be achieved from this research is in the form of learning media for mathematics teachers to understand the Numeracy Minimum Competency Assessment (MCA) in an interactive electronic module. Established a 4D model research and development design adopted from Thagarajan to achieve this target consisting of 4 main stages: define, design, develop and disseminate (Irmawati *et al.*, 2019). The above stages can be seen in Figure 1.

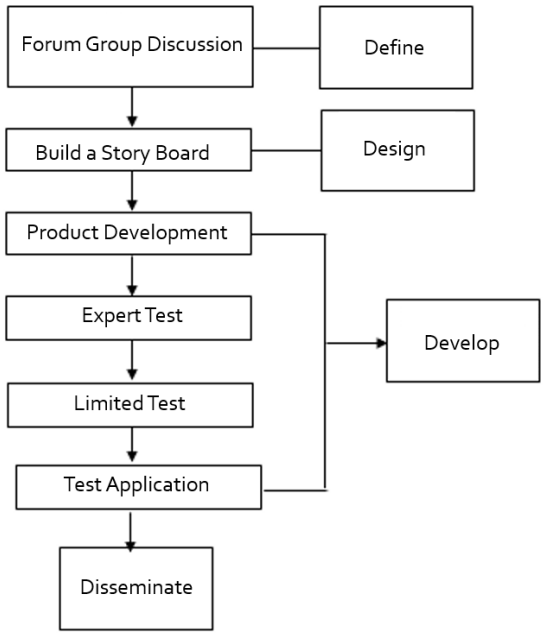

Figure 1. Research Process Stage

This activity is carried out in the defined stage to determine the needs of designing interactive module electronics and materials. This data was obtained by conducting a Focus Group Discussion (FGD) and providing questionnaires. The subjects of mathematics teachers in this activity were 102 people from various levels of school, both junior and senior high schools. The instruments used in this activity, in addition to interview guidelines, also questionnaire the need for an electronic module.

Design stage, this activity is to design an electronic product module according to needs based on defined activities, among them, compiling an electronic storyboard module.

The development stage is developing a product based on the design stage and validating activities At the scene of validating through expert tests consisting of educational experts, material experts, and media experts. The purpose of the exercise is to obtain validation of the developed product. In addition, researchers conducted both small and large-scale trials. A limited-scale test was conducted on ten mathematics teachers and carried out a practice of product application on 25 mathematics teachers with various levels of teaching, namely the junior and upper secondary levels. The limited test aims to obtain information and suggestions related to developing an electronic module, while the application of large-scale tests to determine the electronic effects of the MCA Numeracy module for understanding MCA numeracy.

The dissemination stage is the dissemination of research products, in this case, the MCA numeracy interactive E-module, aiming to introduce teachers to users. This dissemination activity is through a service activity forum in collaboration with the Nusantara Mathematics organization of Banten Province and the subject teacher deliberation.

The material expert test contains questionnaires about (1) the Definition of MCA and Numeracy Literacy. (2) Preparation of Numeracy Questions and examples, (3) learning activities and models. (3) Learning Tools that support numeracy skills. From the charge, the researcher divides into several indicators.

The education expert test contains the following content: (1) Numeracy Knowledge Delivery Approach in Interactive Module Electronics, (2) Interactive in

understanding knowledge in Interactive E-Module, (3) Games for feedback and providing motivation, (4) Systematics of module and indicators contained in numeracy knowledge. Media expert test, covering the payload: (1) display and (2) usage.

The instrument used for expert validation uses a Likert four-scale questionnaire. Then processed using descriptive statistics. The formula for obtaining a percentage score is as follows:

$$\rho = \frac{\text{Observed scores}}{\text{Expected score}} \times 100\%$$

The assessment of the percentage of the score has an interpretation of eligibility and attractiveness, namely:

Table 1. Eligibility Criteria

Percentage Score	Category
$80\% < \times \leq 100\%$	Very feasible
$60\% < \times \leq 80\%$	Feasible
$40\% < \times \leq 60\%$	Enough feasible
$20\% < \times \leq 40\%$	Less feasible
$0\% < \times \leq 20\%$	Very less feasible

(Rodiawati & Komarudin, 2018)

Table 2, interpretation of percentage score scoring based on attractiveness:

Table 2. Criteria for Attractiveness

Percentage Score	Category
$80\% < \times \leq 100\%$	Very attractive
$60\% < \times \leq 80\%$	Attractive
$40\% < \times \leq 60\%$	Enough attractive
$20\% < \times \leq 40\%$	Less attractive
$0\% < \times \leq 20\%$	Very less attractive

(Rodiawati & Komarudin, 2018)

Modifying from Herawati & Muhtadi (Herawati & Muhtadi, 2018), scores with a scale of 4 have intervals and categories in Table 3.

Table 3. Categories by Scale 4

Interval	Category
$x \geq 3.1$	Excellent
$3.1 > x \geq 2.5$	Good
$2.5 > x \geq 1.9$	Not Good Enough
$x < 1.9$	Bad

Researchers conducted application tests to see the effectiveness of interactive module electronics. Data analysis using the Wilcoxon test because the data is not a normal distribution.

RESULTS AND DISCUSSION

Results

This Development Research produces a product, namely an interactive electronic module for mathematics teachers at the Junior and Senior High School levels. The results of the study began with activities:

The define phase with respondents was 102 teachers from various levels of school. The define stage concludes that teachers urgently need interactive electronic modules to understand MCA numeracy. This is necessary for the electronic module because it facilitates access to knowledge, information sources, and learning. The desired interaction is that users can interact with existing menus, electronic modules discuss MCA and Numeracy knowledge, learning tools and models that support numeracy, examples of numeracy problems and their discussions, and how to prepare numeracy questions. Thus, based on these results, an interactive electronic module was created containing material: MCA knowledge and numeracy, preparation of numeracy questions, learning tools that support numeracy, and learning models and activities. The interactive that appears is that users can choose the menus related to the material and quizzes; on the knowledge menu, there are problems or questions from the indicators contained in each material. Based on these questions, users can choose the desired answer menu. For example, they select the yes or no option. Each option describes the presentation of

knowledge based on each material's indicators.

The design stage develops the module's electronic product design based on the previous stage's results. Design activities produce storyboards related to (1) The Opening Section. (2) The E-Module user identity section. (3) The Attractive design cover is equipped with a start button. (4) Exposure to the purpose of the E-Module. (5) Waiting for the page to go to the next page. (6) Main Menu consists of 6 submenus: Preface, Hints, Knowledge, Evaluation, Reference, and Profile. In addition, it is also equipped with a "Cover" button to make it easier for users if they want to go to the cover page. (7) The "Preface" menu contains the purpose and a brief description of the E-Module. This page is equipped with a "Next" button to go to the next page, a "Previous" button to go to the previous page, and a "Home" button to return to the main menu page. (8) The "Instructions" menu consists of instructions for the use and functions of the buttons and icons in the E-Module. As well as equipped with a "Next" button to go to the next page, "Previous" to go to the previous page, and "Home" to return to the main menu page. (9) The "Evaluation" menu contains questions to measure the extent to which the user understands the material in the E-Module. There are assessment results when you have finished working on the evaluation. The evaluation questions consist of 3 multiple-choice questions and 20 questions connected to the google form. This page has a "Start" button to go to the question page, a "Next" button to go to the next page, a "Previous" to go to the previous page, and a "Home" button to return to the main menu page. (10) The "References" menu contains the material referenced in creating E-Module material. References are taken from 3 sources: books, journals, and websites. This page has a "Next" button to go to the next page, "Previous" to go to the previous page, and "Home" to return to the main menu page. (11) The "Reference" menu contains material sources used as references in making E-Module materials. References are taken from 3 sources: books, journals, and websites. This page comes with a "Next" button to go to the next page, a "Previous" button to go to the previous page, as well as a "Home" button to return to the main menu page.

The product specification of the MCA Numeracy E-Module is an android-based learning media developed using the "Articulate Storyline Version 3" software. MCA Numeracy E-Module products can present video, image, animation, photo, and audio features. These features make the product more attractive and interactive. This E-Module is in the form of an application (.apk) that can download via an android phone.

In the development stage, researchers conduct various tests, namely material expert tests, educational expert tests, and media expert tests. This activity is to get validation from experts. Before the researcher conducted the expert test, the researcher and the team made improvements to the E-module product related to the material content, writing, and the approach used so that users could adapt to the material presented. After the product is feasible, then an expert test is carried out. The results of the expert test are in Table 4.

Table 4. Material Expert Test Results

Aspects	Indicators	Score
Definition of MCA and Numeracy Literacy	Definition of MCA	4
	Definition of Numeracy Literacy	4
Preparation of Numeracy Literacy questions and examples	Explaining about compiling numeracy literacy questions and lattice grids	4
	Explanation of examples of Numeracy problems	3

Aspects	Indicators	Score
Learning activities and learning models.	Explanation of Learning activities to develop numeracy literacy	4
	Activity Explained in the learning model	4
Learning Tools that support numeracy literacy capabilities	Explanation of LIP preparation to develop numeracy skills	3.5
	Preparation of student worksheets to develop numeracy.	4
Note: Score means Average Score		
Overall average	3,81	
Percentage	95,31%	
Interpretation	Very feasible and Very attractive	

Table 4, the material presented in the electronic module, the validation assessment is feasible and attractive at 95.31% so that can pass it on to the next stage of the test. In this test, consisting of several aspects and indicators, all had an average of 3.81 with excellent categories.

Table 5. Education Expert Test Results

Aspects	Indicators	Score
Approach to delivering numeracy literacy knowledge in an electronic Interactive Module	Numeracy literacy knowledge-understanding approach with the problem approach	4
Interactive in understanding knowledge of Interactive E-Module	E-Module adapts readers to more interactive activities	4
Games for feedback and providing motivation	Games on E-module for reader feedback activities	4
	Games on the E-Module to increase reader motivation	3
Systematics of module and indicators contained in numeracy knowledge	Systematics of module and indicators included in numeracy knowledge	4
	Indicators in the knowledge of numeracy literacy according to the content of the material	4
Approach to delivering numeracy literacy knowledge on the interactive electronic module	Numeracy literacy knowledge-understanding approach with the problem approach	3.5
Interactive in understanding knowledge of Interactive E-Module	E-Module adapts readers to more interactive activities	4
Note: Score means Average Score		
Overall average	3,16	
Percentage	79,17%	
Interpretation	Feasible and attractive	

Table 5 shows the results of the education expert test resulted in a percentage score of 79.17%, which means the use of interactive module electronics by the teacher's response in the feasible and attractive category. The overall average of aspects and indicators obtained was 3.16, with excellent types.

Table 6. Media Expert Test Results

Aspects	Indicators	Average score
Display	The design used	3.5
	Color selection	3.5
	Background	3
	Letter	4
	Button	3
	Image display	3.5
	Layout	3.5
	Background music	3.5
Use	Easy to use	3.5
	Easy to navigate	3.5
	Interactiveness	3.5
	Design composition	3.5
	Instructions for use	3.5
	Menu options	3.5
	Use of buttons	3.5
Note: Score means Average Score		
Overall average	3,46	
Percentage	86,67%	
Interpretation	Very feasible and very attractive	

Table 6 shows the media expert test results show a percentage of 86.67% means that it is feasible and very attractive for teachers as application users and can proceed to the next stage of the test. The

overall average of the aspects and indicators yields 3.46, which is in the excellent category.

Based on experts' assessment and declared feasible, feasible, and attractive, the E-module product proceeded to the trial stage for the teacher subjects. Here is an overview of the module's electronic products that have been declared valid in the assessment of experts:

Figure 2. Electronic Interactive Module

Figure 2 is an overview of the MCA numeracy interactive E-module from the opening cover, the content of the material provided, the material approach with the submission of questions as an effort so that readers can adapt well in understanding the material, as well as the constituent profiles. The basis for asking questions about several indicators of understanding MCA Numeracy, namely (1) understanding the meaning of MCA, (2) understanding the meaning of numeracy, (3) understanding the preparation of numeracy questions, (4) understanding examples of numeracy problems, (5) understanding learning activities that support numeracy, and (6) understanding the Preparation of numeracy LIP and its assessment.

In addition to providing material, there are also examples of numeracy problems and their solutions, examples of LIP and student worksheets, and Learning activities that support numeracy skills in Figure 3, which are as follows:

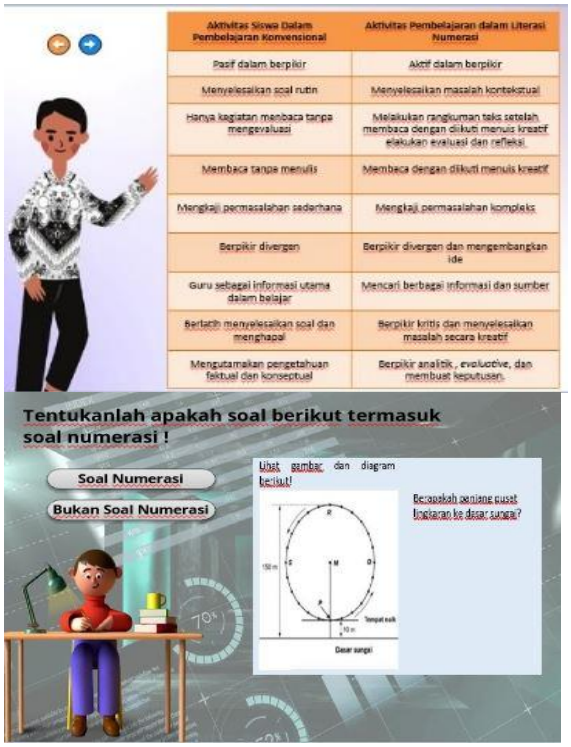

Figure 3. MCA Numeracy Interactive E-Module Material Content

Figure 4 (*See Figure 4*) evaluates the understanding of MCA numeracy in the Interactive E-Module. Its application is through the submission of questions based on the indicator. Application of interactive evaluation activities so that respondents can determine whether the answer choice is correct or wrong.

Figure 4. Evaluation of Understanding Interactive E-Module

Limited Trial

The application of the trial is limited to 10 mathematics teachers with various teaching levels. Competency review of 10 teachers from teaching experience, active in multiple pieces of training as facilitators, and become driving teachers. Based on this stage, the electronic module has led teachers to understand MCA Numeracy in the excellent category. This is because, based on the MCA numeracy comprehension test score after being given an interactive E-Module, I obtained an average score of 80. The average source of the achievement value of indicators from the understanding of numeracy MCA, namely knowledge of numeracy MCA, numeracy learning activities, LIP preparation, and numeracy questions. Advice from these teachers, this interactive E-module needs to be disseminated to other teachers. Before being given to a broader test or deployment test. Other suggestions, buttons need to be enlarged, and typographical writing needs to fix. Implementing

Table 7. Normality Test Results

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Pretest	0.240	25	0.001	0.889	25	0.011
Postest	0.195	25	0.015	0.902	25	0.021

Table 8. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Initial capabilities	25	40.00	90.00	70.2000	13.42262
K	25	50.00	95.00	79.6000	10.79352
Valid N (listwise)	25				

limited trials involving ten teachers as a basis for improvement and accuracy in compiling interactive E-module for broader trials or application tests.

Test of Electronic Application of MCA Numeracy Interactive Module

Test of electronic application of MCA numeracy interactive module to mathematics teachers in one Province with different school levels. The number of teacher respondents is 25 people. In this activity, before the teachers used the product, the teachers took a preliminary test on understanding MCA Numeracy. After that, the teacher uses the Interactive E-Module. Next, the teachers took the final test. The data obtained are in the form of initial test data and final examinations, and then the data are carried out with normality tests and two average difference tests. This study's data analysis activities did not prove the normality test and continued the parametric nontest with the Wilcoxon test. The results of the data analysis are as follows:

a) Data Normality Test

The results of the data normality test from the initial and final ability to understand MCA Numeracy are in Table 7. The test used is the Shapiro - Wilk normality test since the data used are no more than 50 samples. The data results in table z show that the data is not a normal distribution since the significance value is not more than the alpha value of 0.05. Table 7 shows the numbers 0.011 and 0.021 at significance values; this figure is more than the alpha of the study, which is 0.05.

b) Wilcoxon Flat Two Difference Test

The application of this test is to determine whether there is a difference in the initial and final capabilities, whether there is a difference after using the electronic module, and whether the data is not a normal distribution. Descriptively the data - the information statistically has resulted in Table 8.

Table 8 shows descriptive statistical summary results of the initial and final capability data of understanding MCA Numeracy after the electronic administration of the module. Of the 25 total data obtained, the mean data Initial ability is 70.20, the mean data final ability is 79.60, the standard deviation of the initial ability data is 13.42, and the standard deviation of the last ability data is 10.79. The Wilcoxon test replaces the paired sample t-test if the data is not a normal distribution. This test aims to compare the values before and after a specific treatment or treatment exists.

c) Proposed Hypothesis

Ha: There is a difference in understanding MCA numeracy pretest and post-test, which means that there is an influence on

the use of the MCA numeracy interactive E-module on the understanding of MCA numeracy in mathematics teachers.

Table 9. Test Statistics

	Postest - Pretest
Z	-4.189
Asymp. Sig. (2-tailed)	-0.000

Based on the Wilcoxon Signed Rank Test calculation results, the Z value obtained is -4.189 with a p-value (Asymp. Sig 2 tailed) of 0.000 less than the critical limit of research 0.05. Hence, the hypothesis decision is to accept Ha, which means that there is a difference in the understanding of MCA numeracy in the initial and final abilities, which means that there is an influence of the use of the MCA numeracy interactive E-module on the knowledge of MCA numeracy in mathematics teachers.

Researchers provide questionnaires with several aspects and indicators to determine teachers' responses. The questionnaire results are in Table 10.

Table 10. Response Questionnaire Results to MCA Numeracy Interactive E-Module

Aspects	Indicators	Score
Material clarity	Understanding Materials in an electronic module	3.89
	The material presented is godliness	3.75
Module e-learning approach	Application of the problem-based learning approach in the electronics module	3.64
	Asking questions can develop thinking.	3.64
Interactions in E-Module	MCA Numeracy and Motivation E-Module Interactions.	3.89
Media presented in the E-Module	Images and Features in the MCA Numeracy E-Module	3.54
	The sound conveyed clarifies the electronic use of the MCA Numeracy module.	3.54
	The colors and background in the E-Module support interest in reading the E-Module.	3.57
Sustainability of E-module usage	Sustainability of the use of module electronics	3.54
Note: Score means Average Score		
Overall average	3,67	
Percentage	91,67%	
Interpretation	Very feasible	

Table 10 shows that an average percentage of 91.67% interprets that the Interactive E-Module is feasible and attractive, and the average overall score of 3.67 belongs to the excellent category. The teachers also expressed that the MCA Numeracy Interactive E-module developed is better than the previous stage in the limited, extraordinary, and Creative test. The teachers hope that the E-module can open with other devices besides Android, will use make teaching materials with different themes, and the E-module features are even better.

Dissemination

Dissemination is carried out after the electronic module with revisions and trials and is suitable for use. Dissemination is implemented in the Learning Strategy Development workshop and its tools to develop numeracy. The activity results were welcomed and immensely helped the teachers understand MCA Numeracy.

Discussion

Electronic product of MCA numeracy module for understanding mathematics teachers. Feasible and exciting to use after validation assessment by experts in the form of media, education/material. This is because it meets the established aspects. For example, media experts are very feasible and very attractive because every indicator is excellent, educational experts in the category are feasible and attractive, and every indicator is good. In contrast, from the material experts, this product is very feasible and very attractive and, on each hand, produces an average score in the outstanding category. The electronic arrangement of modules so that the display is suitable for use must align with the goals we want to measure. Research on developing electronic modules to be ideal for use must be through

the testing of experts according to the aspects of the measured indicators (Aspriyani & Suzana, 2020) and (Barrimi et al., 2013).

In the electronic material section, the module provides mathematics teachers with an understanding of the need to understand MCA numeracy. Teachers understand the needs of MCA numeracy about knowledge, preparation of numeracy questions, discussion of numeracy questions, and preparation of learning tools. Learning tools in the form of learning implementation plans to develop numeracy activities, models, and activities that support numeracy. Understanding this electronic learning activity will help apply learning models suitable for improving numeracy skills (Winata et al., 2021).

In the education section, the electronic MCA numeracy interactive module first conveys an understanding of MCA numeracy knowledge by asking questions. The problem question is the teacher's ability to understand MCA Numeracy based on the determination of indicators. This activity is one of the successes in preparing electronic modules; this is in line with the fact that asking questions will indirectly develop thinking skills, especially the critical thinking skills of teachers (Ghiffar et al., 2018). Based on media tests, this electronic module is feasible and attractive. This very decent and exciting media will make it easier for users to use and help understand the electronic content of modules and improve understanding and learning outcomes (Aspriyani & Suzana, 2020).

Based on these experts, interactive electronic modules on numeracy MCA that are feasible, very feasible, exciting, and fascinating help the following process: tests to respondents in the form of limited and application tests. The results of both trials showed that teacher respondents showed excellent responses. The opinion is that the E-module is very interesting and unique, and already better features will be used and applied, engaging and creatively eliciting an excellent response.

There is a positive influence of interactive module electronics on the understanding of MCA numeracy of mathematics teachers. MCA numeracy comprehension ability is better than before being given the interactive E-module MCA numeracy causes a positive influence. The success of electronic modules in achieving goals is also in line with other research, including those related to scaffolding-based interactive teaching materials (Badri et al., 2019), digital literacy for higher education (McGuinness & Fulton, 2019), as well as increasing numeracy literacy with electronic modules charged with ethnomathematics (Widiantari, *et al.*, 2022), and teaching materials for student worksheets for mathematical ability (Novaliyosi et al., 2021).

There is a significant influence because the electronic module developed is by the criteria for compiling electronic modules, as well as compiling based on the needs of mathematics teachers. This electronic module presents the material needed by mathematics teachers. The presentation of the material on this media has an interactive display. So that users adapt to the material presented. Users also allow participants to be more active, interactive, and communicative to improve their understanding of concepts or materials (Ismah and Afifah, 2016). The success of the interactive module electronic development research is also in line with the in-active module electronic research in various fields and materials, including those related to the development of multimedia interactive media Model 4D (Wardani et al., 2019), inquiry-based interactive multimedia research (Syahdiani & Made Sanjaya, 2015), as well as the

development of interactive module electronics on circle materials assisted by GeoGebra (Aspriyani & Suzana, 2020).

The positive influence of electronic media in this module is inseparable from the approach of the material presented to the respondents, namely mathematics teachers. The material system is first asked problems in the form of questions. This question is also a form of help–helping/scaffolding probing and prompting techniques to the reader. The goal is to understand the material by associating previous knowledge with the present. This is in line with research that examines the effectiveness of scaffolding-based interactive teaching materials on the ability to think reflectively mathematically in students of prospective mathematics teachers (Nindiasari et al., 2020). Learning based on problems in the form of submissions has effectiveness on numeracy literacy skills such as YouTube digital media (Ambarwati & Kurniasih, 2021) and Cabri software media (Widiastuti & Kurniasih, 2021).

CONCLUSION

This electronic module is feasible and interesting for mathematics teachers to apply. It is a feasible and very interesting MCA Numeracy Interactive E-module because it was developed based on the development process of defining, designing, developing, and disseminating. Validation tests from experts show feasibility because they have met various aspects and indicators in terms of material, education, and media, and the teacher's response is excellent. Electronic interactive modules positively affect the comprehension ability of mathematics teachers related to MCA numeracy. This means that the MCA numeracy interactive E-module can better understand MCA numeracy than those that do not use the E-module.

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