

INTERACTIVE E-MODULE BASED ON THE WISDOM OF THE BADUY TRIBE TO IMPROVE NUMERACY IN STATISTICS MATERIALS

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ABSTRACT

This development research was motivated by students' low numeracy skills and the limited use of contextual teaching materials that integrate local wisdom in mathematics learning. This is evidenced by Indonesia's mathematics score in PISA 2022, which reached only 366, far below the OECD average of 472. Therefore, this study aimed to develop interactive e-modules based on the local wisdom of the Baduy tribe that are feasible, practical, and effective in improving students' numeracy skills in statistics. One of the contributing factors to low numeracy skills is the limited use of contextual and technology-based teaching materials, as well as learning approaches that have not fully emphasized Higher Order Thinking Skills (HOTS) and authentic problem-solving contexts. Therefore, integrating local wisdom and interactive digital media into teaching materials can be a relevant strategy to enhance students' numeracy skills. This study employed a Research and Development (R&D) approach using the ADDIE model. Data were collected through questionnaires and numeracy tests administered in the form of pretests and posttests based on AKM-type questions. Validation results from media, material, and education experts were all categorized as very feasible, while teacher and student responses were categorized as very practical. The effectiveness test using the N-gain score yielded 0.81, indicating high effectiveness. The integration of contextual cultural content, interactive features, and data visualization in the e-module can support students in understanding statistical concepts and solving real-world problems. Therefore, the developed product can serve as an alternative contextual digital learning resource to support numeracy-oriented mathematics learning in secondary schools.

Keywords: baduy tribe; interactive e-module; local wisdom; numeracy; statistics.

ABSTRAK

Penelitian pengembangan ini melatar belakangi pada rendahnya kemampuan numerasi peserta didik dan terbatasnya penggunaan bahan ajar kontekstual yang mengintegrasikan kearifan lokal dalam pembelajaran matematika. Hal ini dibuktikan dengan skor matematika Indonesia pada PISA 2022 yang hanya mencapai 366, jauh di bawah rata-rata OECD sebesar 472. Oleh karena itu, penelitian ini tujuannya untuk memberi pengembangan e-modul interaktif berbasis kearifan lokal suku Baduy yang layak, praktis, dan efektif dalam meningkatkan kemampuan numerasi peserta didik pada materi statistika. Suatu faktor penyebab rendahnya kemampuan numerasi adalah terbatasnya penggunaan bahan ajar kontekstual berbasis teknologi, serta pendekatan pembelajaran yang belum sepenuhnya menekankan pada Higher Order Thinking Skills (HOTS) dan konteks pemecahan masalah autentik. Oleh karena itu, pengintegrasian kearifan lokal dan media digital interaktif ke dalam bahan ajar dapat menjadi strategi yang relevan untuk meningkatkan kemampuan numerasi peserta didik. Penelitian ini memakai suatu pendekatan Research and Development (R&D) dengan model ADDIE. Data dikumpul kan pada angket dan tes numerasi yang diberikan dalam bentuk pretest dan posttest berbasis soal tipe AKM. Hasil validasi dari ahli media, ahli materi, dan ahli pendidikan seluruhnya berkategori sangat layak, sementara respons guru dan

peserta didik berkategori sangat praktis. Uji efektivitas menggunakan skor N-gain menghasilkan nilai 0,81 yang termasuk dalam kriteria tinggi. Pengintegrasian konten budaya kontekstual, fitur interaktif, dan visualisasi data dalam e-modul dapat membantu peserta didik dalam memahami konsep statistika dan menyelesaikan masalah kehidupan nyata. Dengan demikian, produk yang dikembangkan dapat dijadikan alternatif sumber belajar digital kontekstual untuk mendukung pembelajaran matematika berorientasi numerasi di sekolah menengah..

Kata kunci: e-modul interaktif; kearifan lokal; numerasi; statistika; suku baduy



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Introduction

Mathematics is a discipline that continually evolves in response to the needs of people and developments in technology. It plays a vital role in the progress of science, information and communication technology, and industry. Therefore, the quality of mathematics education must be regularly enhanced and aligned with the relevant curriculum (Kamarallah, 2017). The curriculum presently implemented in Indonesia is known as the Merdeka Curriculum. This curriculum emphasizes the importance of literacy and numeracy as core elements that need to be cultivated, with numeracy being understood as the capacity to apply mathematical reasoning in a critical and contextual manner (Kemendikbudristek, 2022).

However, numeracy achievement in Indonesia is still relatively low. Data from the Minimum Competency Assessment (AKM) and the Programme for International Student Assessment (PISA) show that students' numeracy skills are still inadequate, as seen from Indonesia's mathematics score in PISA 2022, which only reached 366, far below the OECD average of 472 (Avicenna, Wijaya, & Khabibah, 2025). Students also have difficulty understanding questions, planning problem-solving strategies, and reading and analyzing data in charts, tables, and graphs. Similar difficulties were found in statistics, where students often experienced obstacles related to understanding concepts, modeling, calculations, and drawing conclusions (Djamilah, Hidayati, & Ikrimah, 2023). Students also find it difficult to analyze story problems because they are accustomed to memorizing the steps given by the teacher (Rosyidah & Mustika, 2021). This is exacerbated by the abstract presentation of the material and the lack of relevant examples (Ningrum, Basir, & Maharani, 2023). The ability to solve problems in statistical material is still very low (Vahlia et al., 2022).

The use of technology in learning is one alternative for improving the quality of mathematics learning. Twenty-first century education requires the optimal use of information and communication technology in the learning process (Rahayu, Iskandar, & Abidin, 2022). One medium with great potential for development is interactive e-modules, which are multimedia-based media that combine text, images, animations, audio, and video and enable user interaction (Sidiq & Najuah, 2020). Then, to make learning more contextual, interactive e-modules can be integrated with local wisdom. Utilizing local wisdom as a learning context can help students understand mathematical concepts in a more meaningful way that is relevant to their daily lives (Nugroho, Permanasari, Firman, & Riandi,

2019) . The daily activities of the Baduy tribe, which are closely related to agriculture, food management, as well as the production and sale of handicrafts, generate various real-world data that can be processed mathematically. Through the *ngahuma* (traditional rice farming) activity, the rice harvest data obtained can be categorized as quantitative data. This data can be utilized as an engaging learning resource for students to practice identifying and classifying types of data, presenting data in the form of tables or diagrams, and conducting simple analyses. Furthermore, the production and sale of handicrafts such as bracelets, *koja* bags, and keychains generate weekly or monthly production and sales data. This data can be utilized as an engaging learning resource for students to practice calculating measures of central tendency, such as finding the mean of handicraft production results, the median, or the most frequently sold handicraft item (mode). The integration of local culture in mathematics learning is also in line with ethnomathematics studies and Vygotsky's learning theory, which emphasize the role of culture and social environment in knowledge formation (Agustyaningrum, Pradanti, & Yuliana, 2022; Hendrawati, Muttaqin, & Susanti, 2019).

Previous research has indicated that engaging e-modules positively influence students' comprehension regarding AKM, along with enhancing their literacy and numeracy abilities. These interactive e-modules have been found to be more effective compared to traditional print learning resources. While many studies have explored the creation of interactive e-modules, a review of the literature reveals that there have yet to be any e-modules developed for statistics that specifically incorporate the local knowledge of the Baduy tribe as a framework for numeracy education.

(Nindiasari, Fatah, Sukirwan, & Madadina, 2022) conducted a study on interactive e-modules that demonstrated a positive influence on mathematics teachers' understanding of numeracy AKM. In line with this, (Pratiwi, Sapti, Astuti, & Purwoko, 2021) developed an interactive e-module based on ethnomathematics, which was proven feasible as a learning medium. However, the local wisdom context used was the *jamjaneng* traditional musical instrument, not the Baduy tribe, and the subject matter covered was geometry, not statistics. Furthermore, that study did not specifically aim to improve students' numeracy skills. Meanwhile, (Putra & Drastini, 2023) examined the effect of interactive e-modules on students' literacy and numeracy skills. Nevertheless, their study was not integrated with local wisdom and was conducted in the context of science learning, not mathematics.

Although many studies have investigated the creation of interactive e-modules, a review of the literature reveals that no such modules focusing on statistics have been designed that explicitly incorporate the local wisdom of the Baduy tribe for teaching numeracy. Most past research has predominantly addressed either the development of interactive e-modules or the inclusion of local wisdom separately, neglecting to systematically evaluate their effectiveness in enhancing students' numeracy skills.

In light of this situation, an interactive e-module that weaves in the local wisdom of the Baduy tribe has been created. The purpose of this module is to assess its appropriateness based on evaluations from media specialists, content experts, and educational professionals. It also aims to determine how practical the

module is according to feedback from both teachers and students, as well as to assess its effectiveness in boosting students' numeracy abilities through comparisons of pretest and posttest results. Furthermore, this e-module seeks to offer more engaging and relevant teaching resources, assisting students in grasping statistical concepts through relatable, real-life examples.

Research Methods

This study uses a Research and Development (R&D) approach referring to the ADDIE model as illustrated in Figure 1. (Sugiyono, 2023)

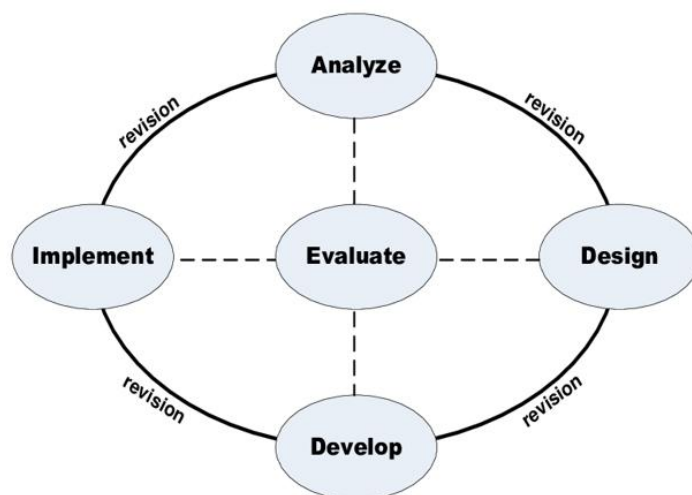


Figure 1. The ADDIE model stages

Based on Figure 1, the ADDIE model comprises five phases: analysis, design, development, implementation, and evaluation. The analysis phase serves as the starting point for this research. This phase involves reviewing the curriculum, assessing student needs, observing the school setting, and directly studying the Baduy tribe. During the design phase, materials pertinent to the teaching resources were gathered, learning goals were defined, instructional strategies were outlined, indicators for the chosen content were established, and relevant videos or images were collected. Following this, the interactive e-module was crafted by preparing a storyboard along with creating research tools. The next step is the development phase. This includes producing the interactive e-module based on the storyboard, validating the product, making revisions, and conducting small group trials. Afterward, the implementation phase took place through large group trials. The concluding phase is evaluation, which encompasses both formative and summative assessments.

The participants in this research comprised validation specialists, including media professionals, subject matter experts, and educational specialists, along with mathematics educators and 38 eighth-grade students from SMP Negeri 6 Cilegon. For data gathering, the methods employed in this study were interviews, surveys, and examinations. The tools used for data collection consisted of interview guides, product validation surveys, feedback questionnaires, and assessments measuring numeracy skills. These tools underwent validation by experts to ensure their suitability regarding content relevance, structure, and clarity of language before being applied during the data collection phase. Additionally, data analysis in this

research involved qualitative and descriptive statistical methods. The qualitative method was used to analyze insights drawn from interviews with mathematics teachers, while descriptive statistics were applied to examine quantitative data obtained from product validation surveys, feedback questionnaires, and numeracy assessments (pretest and posttest).

Feasibility Analysis

Feasibility analysis was conducted based on the validation results from media experts, material experts, and education experts, which were compiled using a Likert scale of 1-5, where the scores obtained were then calculated using the formula according to (Hikmah, Kuswidyanarko, & H. M. Lubis, 2022).

$$P = \frac{\text{Total score obtained}}{\text{Maximum score}} \times 100\%$$

The results obtained were then interpreted according to the validity criteria presented in Table 1.

Table 1. Validity criteria

| No. | Interval | Criteria |
|-----|------------|------------------|
| 1 | 81% - 100% | Highly Valid |
| 2 | 61% - 80% | Valid |
| 3 | 41% - 60% | Moderately Valid |
| 4 | 21% - 40% | Invalid |
| 5 | 0% - 20% | Highly Invalid |

Practicality Analysis

Practicality analysis was conducted based on the responses of teachers and students, which were compiled using a Likert scale of 1-5, where the scores obtained were then calculated using the formula according to (Oktafiana, Ratnawuri, & Pritandhari, 2020)

$$P = \frac{\text{The score obtained}}{\text{Maximum score}} \times 100\%$$

The results obtained were then interpreted according to the validity criteria presented in Table 2.

Table 2. Practicality criteria

| No. | Interval | Criteria |
|-----|------------|------------------|
| 1 | 81% - 100% | Very Practical |
| 2 | 61% - 80% | Practical |
| 3 | 41% - 60% | Fairly Practical |
| 4 | 21% - 40% | Impractical |
| 5 | 0% - 20% | Very Impractical |

Effectiveness Analysis

Effectiveness evaluation was carried out to measure how well the created interactive e-module performed. This evaluation relied on analyzing the test scores from students both before (pretest) and after (posttest) using the e-module. The

initial task involved tallying the total points and grades achieved by each student. The pretest and posttest outcomes were subsequently examined to assess how effective the developed module was. Following this, a Paired Sample T-Test was performed to see if there was a noteworthy difference between the pretest and posttest scores. Before this test could occur, it was necessary to complete the normality prerequisite assessment. The normality assessment was conducted using IBM SPSS Statistics 26 software, with the criterion for decision-making being that the data is regarded as normally distributed if the significance value is *Sig.* < 0.05.

If the data were not normally distributed (*Sig.* < 0.05), the analysis would be continued using the Wilcoxon test as a nonparametric test, with the following decision-making criteria:

- a) There is no significant difference between the *pretest* and *posttest* results of students' numeracy skills before and after the use of the interactive e-module based on the local wisdom of the Baduy tribe on statistics material if *Sig.* (2 – tailed) > 0.05.
- b) There is a significant difference between the *pretest* and *posttest* results of students' numeracy skills before and after the use of the interactive e-module based on the local wisdom of the Baduy tribe on statistics material if *Sig.* (2 – tailed) < 0.05.

The following phase involves carrying out the N-Gain assessment. The purpose of the N-Gain test is to evaluate if there is a change in students' achievements before and after they have received instruction through the interactive e-module. The formula for calculating N-Gain is based on (Sukarelawan, Indratno, & Ayu, 2024).

$$g = \frac{\text{Posttest score} - \text{Pretest score}}{\text{Maximum score} - \text{Pretest score}}$$

The results obtained were then interpreted according to the N-Gain criteria presented in Table 3.

Table 3. N-Gain criteria

| No. | N-Gain Score | Criteria |
|-----|-------------------------|----------|
| 1 | $0,70 \leq g \leq 1,00$ | High |
| 2 | $0,30 \leq g \leq 0,70$ | Medium |
| 3 | $0,00 \leq g \leq 0,30$ | Low |

The N-Gain score was then converted into a percentage form to determine how effective the developed product is. The effectiveness criteria are presented in Table 4.

Table 4. Effectiveness criteria

| No. | N-Gain Score | Criteria |
|-----|--------------|------------------|
| 1 | ≥ 76 | Effective |
| 2 | 56 – 75 | Fairly Effective |
| 3 | 40 – 55 | Less Effective |
| 4 | < 40 | Ineffective |

Results and Discussion

Result

The interactive e-module rooted in the traditional knowledge of the Baduy tribe, explored in this research, was created to enhance the mathematical abilities of eighth-grade students at SMP Negeri 6 Cilegon in the area of statistics. The creation of this educational tool follows the ADDIE framework, comprising five methodical steps: Analysis, Design, Development, Implementation, and Evaluation. The innovation of this study is found in the creation of an interactive e-module that weaves in the Baduy tribe's local wisdom as a framework for teaching statistics, aiming to boost students' numeracy skills, a topic that has not been widely addressed in earlier research. The development results based on each of these stages are as follows:

Analysis Stage

The tasks performed in this phase of analysis included examining the curriculum and assessing needs. During the curriculum assessment phase, the researcher held a discussion with the vice principal responsible for curriculum matters about the curriculum presently utilized at SMP Negeri 6 Cilegon. From this discussion, it was learned that the curriculum being applied is the Merdeka Curriculum.

Subsequently, in the needs analysis stage, the researcher conducted an interview with one of the mathematics teachers at SMP Negeri 6 Cilegon and observed the school environment, including the availability of school facilities that support the learning process. Based on the interview and observation, it was found that teachers still rely on printed textbooks as the primary learning medium and that the use of technology in the learning process is very minimal.

In addition, the researcher also conducted direct observation to the Baduy tribe community to obtain information regarding various forms of local wisdom. The social and cultural activities of the community that can be integrated as a numeracy context in the development of the interactive e-module on statistics material include farming activities in the fields (*Ngahuma*), and the sale of handicrafts such as bracelets, *Koja* bags, keychains, and woven fabrics, which serve as data sources and problem contexts within the material.

Design Stage

The creation was conducted in accordance with the findings from the analysis phase to guarantee that the produced educational media meets the specified requirements. The procedures involved in the design phase consist of material preparation, the development of the interactive e-module, and the assembly of research tools.

In this development research, the material used in the interactive e-module is statistics, with a focus on the sub-topics of mean, median, and mode. The statistics material presented covers definitions, formulas, and solving problems related to these concepts. The preparation of the material refers to several sources, such as mathematics textbooks published by the Ministry of Education and Culture and several journals on the local wisdom of the Baduy tribe.

The next step in the interactive e-module design process was compiling a storyboard. The storyboard display is presented in Figure 2.

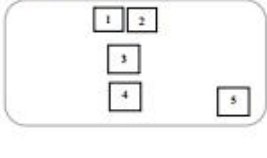
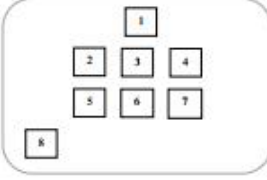
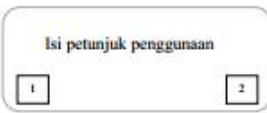
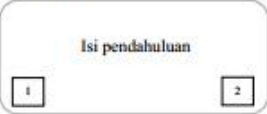
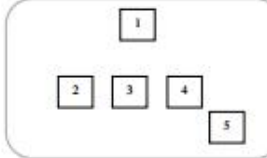



| No. | Bagian Modul | Keterangan |
|-----|--|---|
| 1. | Halaman Awal  | 1) Logo universitas 2) Logo tutwuri 3) Judul modul 4) Navigasi masuk 5) Tombol exit |
| 2. | Halaman Utama  | 1) Judul modul 2) Petunjuk 3) Pendahuluan 4) Materi 5) Kuis 6) Profil pengembang 7) Daftar Pustaka 8) Tombol ke halaman sebelumnya |
| 3. | Petunjuk  | 1) Tombol ke halaman sebelumnya 2) Tombol ke halaman selanjutnya |
| 4. | Pendahuluan  | 1) Tombol ke halaman sebelumnya 2) Tombol ke halaman selanjutnya |
| 5. | Materi  | 1) Judul materi 2) Sub materi 1 3) Sub materi 2 4) Sub materi 3 5) Tombol kembali ke Home |
| 6. | Kuis  | |
| 7. | Profil Pengembang  | 1) Tombol kembali ke Home |
| 8. | Daftar Rujukan  | 1) Tombol kembali ke Home |

Figure 2. Storyboard

Based on Figure 2, The storyboard was prepared to illustrate the sequence of displays, visual elements, text, and interactions to be presented in the interactive e-module. In the interactive e-module design process, an application and website that supports product design was required, namely Canva. The display in Canva is presented in Figure 3.

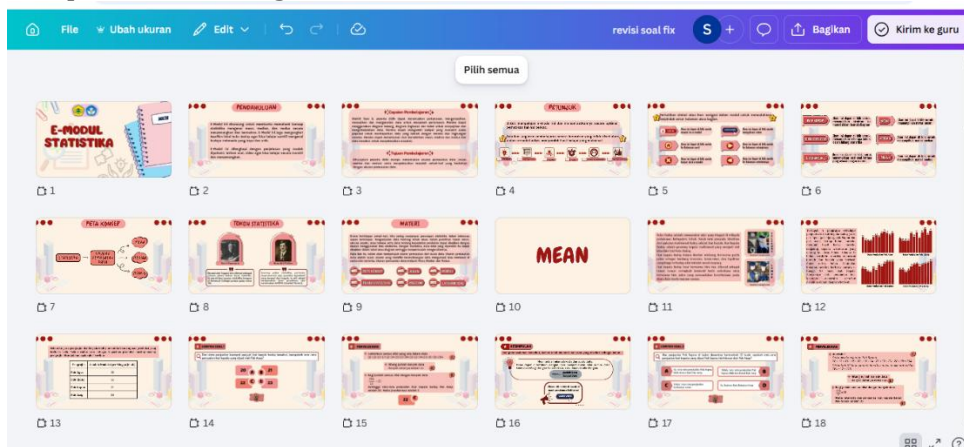


Figure 3. Interactive E-Module Design Process in Canva

Based on Figure 3, Canva was used to design and visualize the appearance of the e-module, including graphic elements, layout, and supporting visual components from the opening to the closing page.

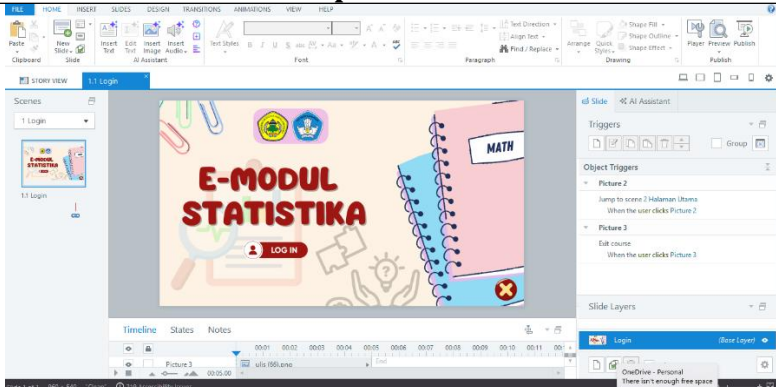
The following step involved gathering research tools. The tools employed in this developmental study feature validation surveys given to a group of nine validators, which includes three specialists in media, three specialists in content, and three educators, to evaluate the viability of the created interactive e-module. Additionally, feedback surveys were distributed to three teachers and students from Grade VIII to evaluate the usability of the interactive e-module. Moreover, this research also included a numeracy skills assessment that consisted of pretest and posttest items designed to gauge the effectiveness of the interactive e-module.

Development Stage

The center exercises at this arrange incorporate the improvement of the intuitively e-module, taken after by a approval prepare conducted by specialists to evaluate the achievability of the created e-module. Taking after the approval prepare, corrections were made to the intuitively e-module in understanding with the recommendations and input from the specialists. Along these lines, the changed e-module was trialed on a little bunch comprising of 10 understudies chosen arbitrarily from the course that served as the inquire about subject. Arbitrary determination was conducted to supply break even with openings for students to take part within the trial of the created intelligently e-module.

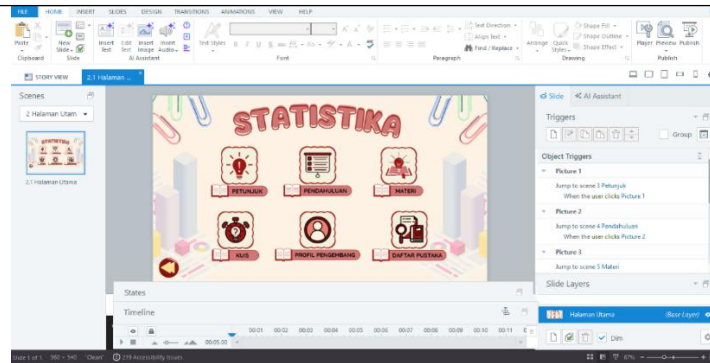
Advance modifications were at that point made based on the comes about of the trial. The improvement of the intuitively e-module was carried out by referring to the storyboard that had been designed within the past arrange. The taking after may be a brief diagram of the intuitively e-module advancement prepare utilizing Storyline 360, displayed in Table 5.

Table 5. Interactive e-module development process

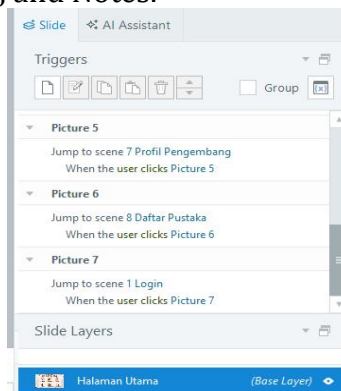
| No. | Development Process |
|-----|--|
| 1 |  |

The first step in developing the interactive e-module is designing the initial display on a new slide.

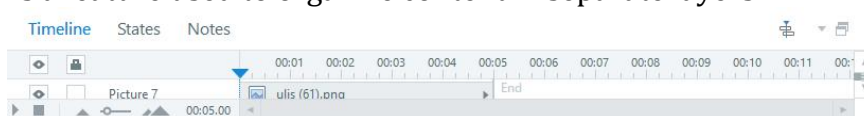
2



Subsequently, the process continues with the creation of the main page. On the right side of the slide, there is a panel containing several features that play an important role in the development of the interactive e-module, namely Trigger and Slide Layer. Meanwhile, at the bottom of the slide, there are Timeline, State, and Notes.

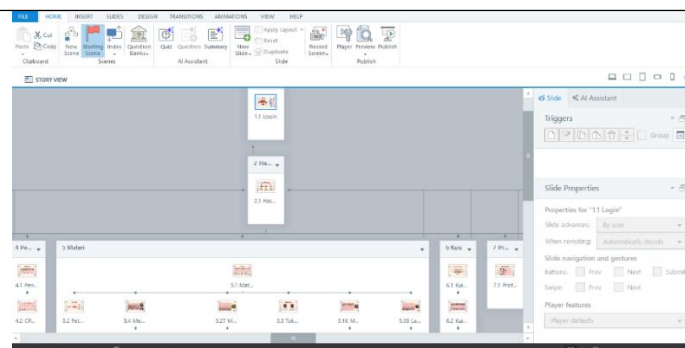


Trigger is a feature used to control commands and object interactions. Slide Layer is a feature used to organize content in separate layers.



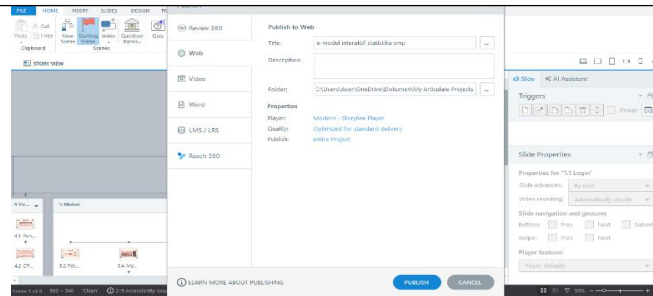
Timeline is a feature used to manage the display duration of objects. State is a feature used to provide display variations for objects. Notes is a feature used to write additional narration or scripts that do not appear on the slide.

3



The final display of the interactive e-module that is ready to be published.

4



The publication process is carried out in the form of an HTML5-based web page.

Based on Table 5, the development process of the interactive e-module proceeded in a structured, systematic manner and in accordance with the storyboard design that had been established. The developed interactive e-module has a structure that includes a Login page, main page, instructions, introduction, material, quiz, developer profile, and bibliography, as presented in Figure 4.

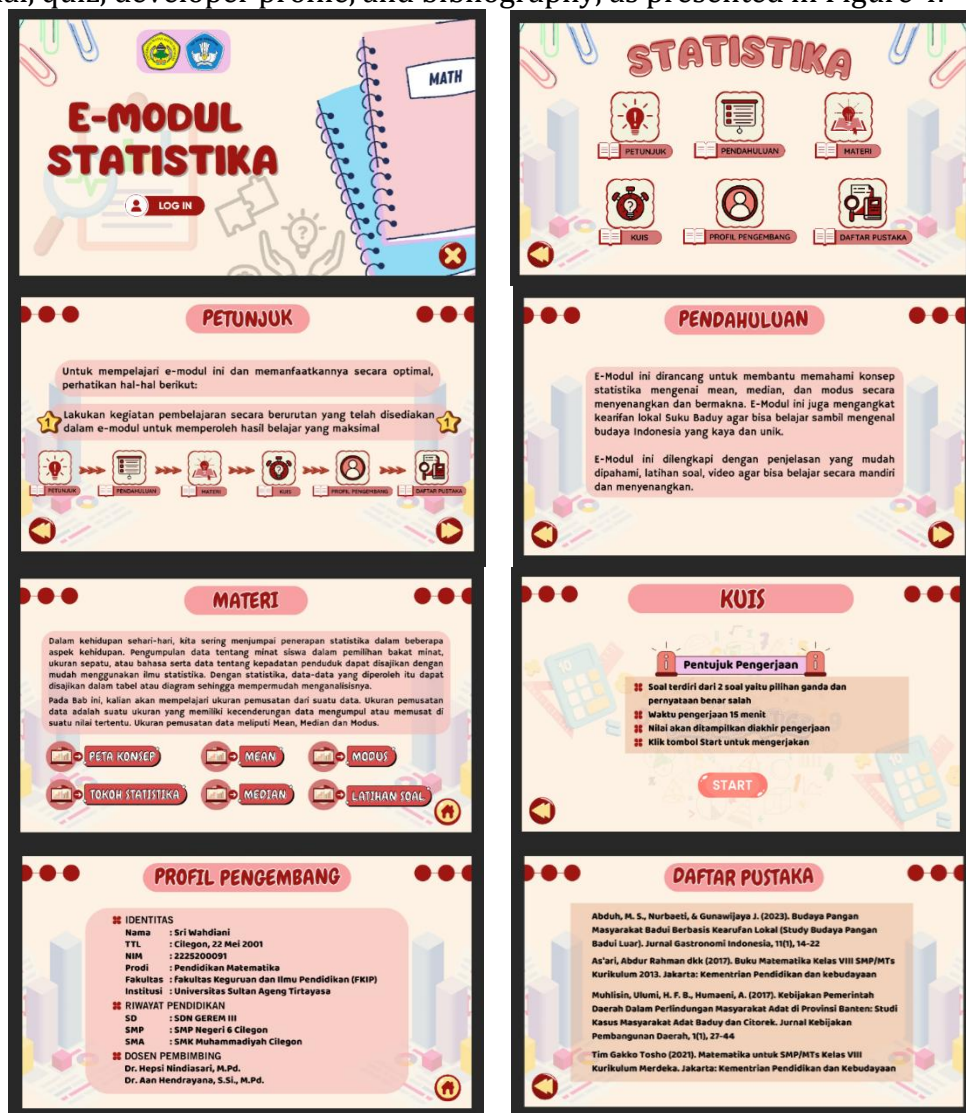


Figure 4. Interactive E-Module Structure

Based on Figure 4, the developed interactive e-module is arranged in a systematic and well-structured manner, starting from the presentation of material, worked examples, exercises, and evaluation, thus supporting a more directed learning process and making it easier for students to understand the concepts being studied.

The media expert validation used five indicators with 23 statements. The validators designated for media expert validation were Dr. Aan Hendrayana, S.Si., M.Pd., Yohanah, S.Kom., and Siti Aryanik, S.Pd. The validation results are presented in Table 6.

Table 6. Media expert validation results

| No | Indicators | Scores Obtained | Maximum scores | Percentage |
|---------------------------|------------------------------|-----------------|----------------|------------|
| 1 | Display Design | 65 | 75 | 86,6% |
| 2 | Presentation | 62 | 75 | 82,6% |
| 3 | Interactivity and Navigation | 60 | 75 | 80% |
| 4 | Usage | 49 | 60 | 81,6% |
| 5 | Benefits | 47 | 60 | 78,3% |
| Average Percentage | | | | 82% |

Based on Table 6, the media expert validation results obtained a percentage of 82%, which is categorized as highly valid. This indicates that the developed interactive e-module is feasible to support learning activities.

The material expert validation used six indicators with 17 statements. The validators designated for material expert validation were Dinar Nirmalasari, M.Pd., Neneng Maulida, S.Pd., and Siti Aryanik, S.Pd. The validation results are presented in Table 7.

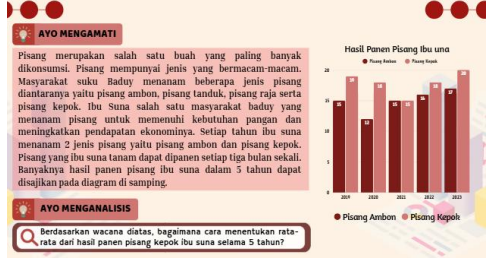

Table 7. Material expert validation results

| No | Indicators | Scores Obtained | Maximum scores | Percentage |
|---------------------------|-----------------------------------|-----------------|----------------|---------------|
| 1 | Material alignment with KI and KD | 41 | 45 | 91, 1% |
| 2 | Accuracy of Material | 40 | 45 | 88, 89% |
| 3 | Presentation | 28 | 30 | 93, 33% |
| 4 | Numeracy | 39 | 45 | 86, 67% |
| 5 | Local Wisdom | 54 | 60 | 90% |
| 6 | Language | 26 | 30 | 86, 67% |
| Average Percentage | | | | 89, 4% |

Based on Table 7, the material expert validation results obtained a percentage of 89.4%, which is categorized as highly valid. This indicates that the statistics material in the interactive e-module has been developed accurately, is well-structured, and is in accordance with the learning objectives. Although the assessment indicated very feasible, there were suggestions for improvement regarding the numeracy content, namely to more specifically incorporate the daily life of the Baduy tribe community, such as their everyday activities and aspects that are more closely associated with their culture. The results of product revision

carried out based on the suggestions from the material experts are presented in Table 8.

Table 8. Before and after revision

| Before Revision | After Revision |
|---|--|
|  |  |

The context of the questions was made more specific regarding the local wisdom of the Baduy tribe.

Based on Table 8, In the initial version, the questions used the context of bananas as harvest produce, which was still general in nature. After receiving feedback from the validators, the context was revised by replacing the example used with one that is more specific and related to the culture of the Baduy tribe, namely the traditional headband of the Baduy community. This revision was made so that the questions more accurately reflect the local wisdom that serves as the foundation of the e-module development.

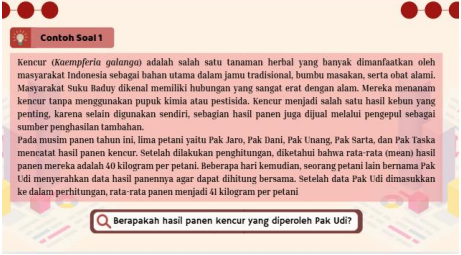
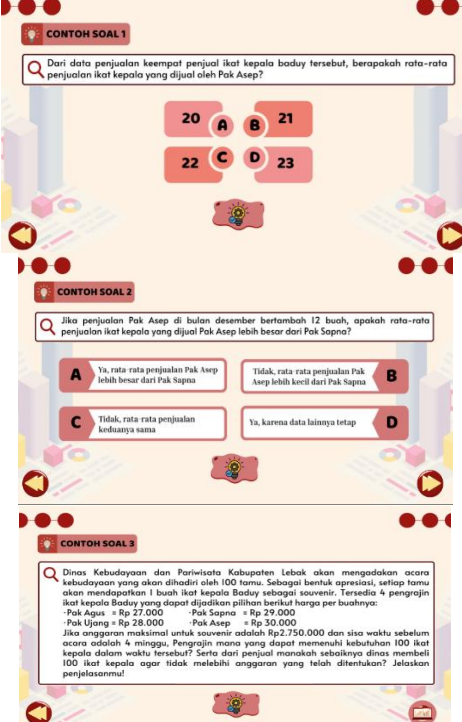
The education expert validation used four indicators with 12 statements. The validators designated for education expert validation were Isna Rafianti, M.Pd., Neneng Maulida, S.Pd., and Hayati Nufus, S.Pd. The validation results are presented in Table 9.

Table 9. Education expert validation results

| No | Indicators | Scores Obtained | Maximum scores | Percentage |
|---------------------------|--|-----------------|----------------|------------|
| 1 | Content alignment with Curriculum and Numeracy | 39 | 45 | 86,67% |
| 2 | Cognitive Level Integration | 41 | 45 | 91,1% |
| 3 | Local wisdom | 42 | 45 | 93,33% |
| 4 | Language and Clarity of Instructions | 43 | 45 | 95,56% |
| Average Percentage | | | 91,7% | |

Based on Table 9, the instruction master approval comes about gotten a rate of 91.7%, which is categorized as exceedingly substantial, demonstrating that the intelligently e-module has satisfied student-centered learning standards and underpins an successful learning prepare. All things considered, the validators given proposals for change with respect to the boosts within the fabric and questions to more ideally fortify students' numeracy abilities at the knowing, applying, and thinking levels. The comes about of item amendment carried out based on the recommendations from the instruction specialists are displayed in Table 10.

Table 10. Before and after revision

| Before Revision | After Revision |
|---|---|
|  |  |

The questions in the interactive e-module are arranged into three cognitive levels, namely knowing, applying, and reasoning

Based on Table 10, In the initial version, the questions compiled had not yet referred to the cognitive level classification in the AKM Numeracy assessment. After receiving feedback from the validators, the researcher made improvements by arranging the questions based on the three cognitive levels of AKM Numeracy, namely knowing, applying, and reasoning, so that the questions can measure students' numeracy skills more comprehensively.

After revisions were made based on the feedback from the nine validators, the interactive e-module was then trialed on 10 students and 3 teachers. This trial aimed to assess the readability, ease of use, and to obtain initial responses toward the interactive e-module. If any shortcomings or aspects requiring improvement were identified, the researcher made revisions to the interactive e-module accordingly. The revisions were carried out to refine the product before proceeding to the large group trial stage. The response results of the small group trial and teacher trial are presented in Table 11 and Table 12.

Table 11. Teacher trial response results

| No | Indicators | Scores Obtained | Maximum scores | Percentage |
|---------------------------|-----------------------------|-----------------|----------------|------------|
| 1 | Material Suitability | 55 | 60 | 91,6% |
| 2 | Media Suitability | 55 | 60 | 91,6% |
| 3 | Numeracy | 41 | 45 | 91,1% |
| 4 | Integration of Local Wisdom | 42 | 45 | 93,3% |
| 5 | Language | 28 | 30 | 93,3% |
| Average Percentage | | | | 92% |

Table 12. Small group student trial response results

| No | Indicators | Scores Obtained | Maximum scores | Percentage |
|---------------------------|-------------------------------|-----------------|----------------|--------------|
| 1 | Ease of Use | 41 | 50 | 82% |
| 2 | Appearance | 203 | 250 | 81,2% |
| 3 | Clarity of material presented | 177 | 200 | 88,5% |
| 4 | Language | 85 | 100 | 85% |
| Average Percentage | | | | 84,3% |

Based on Tables 11 and 12, the results of the group trial response are categorized as very practical. However, the trial results indicate that there are still several issues that need to be addressed in the developed interactive e-module. The issues identified and the revisions carried out are presented in Table 13.

Table 13. Before and after revision

| Before Revision | After Revision | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|------------------|------|------|--|--|------|------|------|----------|----|----|----|-------|----|----|----|-------|----|----|----|---------|----|----|----|----------|----|----|----|----------|----|----|----|------------------|--|--|--|--|------|------|------|----------|----|----|----|-------|----|----|----|-------|----|----|----|---------|----|----|----|----------|----|----|----|----------|----|----|----|--|------------------|--|--|--|--|------|------|------|----------|----|----|----|-------|----|----|----|-------|----|----|----|---------|----|----|----|----------|----|----|----|----------|----|----|----|------------------|--|--|--|--|------|------|------|----------|----|----|----|-------|----|----|----|-------|----|----|----|---------|----|----|----|----------|----|----|----|----------|----|----|----|
|  <p>Bapak Asni dan Bapak Seno merupakan salah satu masyarakat suku baduy yang menjual madu kepada wisatawan yang berkunjung ke desa baduy. Biasanya panen madu dapat dilakukan dua musim yaitu februari hingga april dan oktober hingga desember. Berikut adalah data penjualan madu Bapak Asni dan Bapak Seno (dalam jumlah botol) selama musim panen tahun 2021 dan 2024.</p> <p>Data Penjualan Madu Bapak Asni</p> <table border="1"> <thead> <tr> <th colspan="4">Jumlah Penjualan</th> </tr> <tr> <th></th> <th>2022</th> <th>2023</th> <th>2024</th> </tr> </thead> <tbody> <tr> <td>Februari</td> <td>12</td> <td>15</td> <td>14</td> </tr> <tr> <td>Maret</td> <td>13</td> <td>16</td> <td>15</td> </tr> <tr> <td>April</td> <td>12</td> <td>15</td> <td>13</td> </tr> <tr> <td>Oktober</td> <td>14</td> <td>16</td> <td>15</td> </tr> <tr> <td>November</td> <td>14</td> <td>16</td> <td>14</td> </tr> <tr> <td>Desember</td> <td>12</td> <td>15</td> <td>16</td> </tr> </tbody> </table> <p>Data Penjualan Madu Bapak Asni</p> <table border="1"> <thead> <tr> <th colspan="4">Jumlah Penjualan</th> </tr> <tr> <th></th> <th>2022</th> <th>2023</th> <th>2024</th> </tr> </thead> <tbody> <tr> <td>Februari</td> <td>11</td> <td>16</td> <td>14</td> </tr> <tr> <td>Maret</td> <td>13</td> <td>16</td> <td>15</td> </tr> <tr> <td>April</td> <td>12</td> <td>15</td> <td>13</td> </tr> <tr> <td>Oktober</td> <td>14</td> <td>17</td> <td>16</td> </tr> <tr> <td>November</td> <td>14</td> <td>16</td> <td>14</td> </tr> <tr> <td>Desember</td> <td>15</td> <td>15</td> <td>15</td> </tr> </tbody> </table> | Jumlah Penjualan | | | | | 2022 | 2023 | 2024 | Februari | 12 | 15 | 14 | Maret | 13 | 16 | 15 | April | 12 | 15 | 13 | Oktober | 14 | 16 | 15 | November | 14 | 16 | 14 | Desember | 12 | 15 | 16 | Jumlah Penjualan | | | | | 2022 | 2023 | 2024 | Februari | 11 | 16 | 14 | Maret | 13 | 16 | 15 | April | 12 | 15 | 13 | Oktober | 14 | 17 | 16 | November | 14 | 16 | 14 | Desember | 15 | 15 | 15 |  <p>Pak Asni dan Pak Seno merupakan salah satu masyarakat suku baduy yang menjual madu kepada wisatawan yang berkunjung ke desa baduy. Biasanya panen madu dapat dilakukan dua musim yaitu februari hingga april dan oktober hingga desember. Berikut adalah data penjualan madu Pak Asni dan Pak Seno (dalam jumlah botol) selama musim panen tahun 2021 dan 2024.</p> <p>Data Penjualan Madu Pak Asni</p> <table border="1"> <thead> <tr> <th colspan="4">Jumlah Penjualan</th> </tr> <tr> <th></th> <th>2022</th> <th>2023</th> <th>2024</th> </tr> </thead> <tbody> <tr> <td>Februari</td> <td>12</td> <td>15</td> <td>14</td> </tr> <tr> <td>Maret</td> <td>13</td> <td>16</td> <td>15</td> </tr> <tr> <td>April</td> <td>12</td> <td>15</td> <td>13</td> </tr> <tr> <td>Oktober</td> <td>14</td> <td>16</td> <td>15</td> </tr> <tr> <td>November</td> <td>14</td> <td>16</td> <td>14</td> </tr> <tr> <td>Desember</td> <td>12</td> <td>15</td> <td>16</td> </tr> </tbody> </table> <p>Data Penjualan Madu Pak Seno</p> <table border="1"> <thead> <tr> <th colspan="4">Jumlah Penjualan</th> </tr> <tr> <th></th> <th>2022</th> <th>2023</th> <th>2024</th> </tr> </thead> <tbody> <tr> <td>Februari</td> <td>11</td> <td>16</td> <td>14</td> </tr> <tr> <td>Maret</td> <td>13</td> <td>16</td> <td>15</td> </tr> <tr> <td>April</td> <td>12</td> <td>15</td> <td>12</td> </tr> <tr> <td>Oktober</td> <td>14</td> <td>17</td> <td>16</td> </tr> <tr> <td>November</td> <td>14</td> <td>16</td> <td>14</td> </tr> <tr> <td>Desember</td> <td>15</td> <td>15</td> <td>15</td> </tr> </tbody> </table> | Jumlah Penjualan | | | | | 2022 | 2023 | 2024 | Februari | 12 | 15 | 14 | Maret | 13 | 16 | 15 | April | 12 | 15 | 13 | Oktober | 14 | 16 | 15 | November | 14 | 16 | 14 | Desember | 12 | 15 | 16 | Jumlah Penjualan | | | | | 2022 | 2023 | 2024 | Februari | 11 | 16 | 14 | Maret | 13 | 16 | 15 | April | 12 | 15 | 12 | Oktober | 14 | 17 | 16 | November | 14 | 16 | 14 | Desember | 15 | 15 | 15 |
| Jumlah Penjualan | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Desember | 12 | 15 | 16 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Februari | 11 | 16 | 14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maret | 13 | 16 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| April | 12 | 15 | 13 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Oktober | 14 | 17 | 16 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| November | 14 | 16 | 14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Desember | 15 | 15 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Jumlah Penjualan | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2022 | 2023 | 2024 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Februari | 12 | 15 | 14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maret | 13 | 16 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| April | 12 | 15 | 13 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Oktober | 14 | 16 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| November | 14 | 16 | 14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Desember | 12 | 15 | 16 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | 2022 | 2023 | 2024 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Februari | 11 | 16 | 14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maret | 13 | 16 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| April | 12 | 15 | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Oktober | 14 | 17 | 16 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| November | 14 | 16 | 14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Desember | 15 | 15 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

There is an error in the data used in the practice problem.

Based on Table 13, the data that was supposed to show the honey sales of Pak Asni and Pak Seno was written as Pak Asni's honey sales for both datasets. The error was then corrected by writing the correct data, namely the honey sales of Pak Asni and Pak Seno.

Implementation Stage

After the modification based on the comes about of the little gather trial was completed, the following arrange was the execution arrange with a huge gather trial. This trial included 28 understudies to assess the adequacy of the intuitively e-module in a more agent learning setting. The inquire about exercises were carried out over two meetings on measurements fabric. Within the to begin with assembly, understudies were given an clarification of how to utilize and the capacities of the intelligently e-module, followed by the organization of a pretest. Within the taking after assembly, understudies taken an interest in learning utilizing the intelligently e-module and completed a posttest. At the end of the learning session, students were asked to provide responses regarding the use of the e-module through a provided questionnaire. The results of the large group trial students' responses in Tables 14.

Table 14. Large group trial response results

| No | Indicators | Scores Obtained | Maximum scores | Percentage |
|---------------------------|-------------------------------|-----------------|----------------|--------------|
| 1 | Ease of Use | 130 | 140 | 92,86% |
| 2 | Appearance | 621 | 700 | 88,7% |
| 3 | Clarity of material presented | 524 | 560 | 93,57% |
| 4 | Language | 265 | 280 | 94,28% |
| Average Percentage | | | | 91,6% |

Based on Tables 14, the results of the group large response are categorized as very practical. The effectiveness of the interactive e-module is reflected in the alignment of the material with numeracy indicators at the cognitive levels of knowing, applying, and reasoning, as well as the presentation of problems that integrate context, data, and reasoning. This helps students connect statistical concepts with relevant real-life situations.

In expansion, a pretest and posttest were managed to understudies to decide their numeracy abilities some time recently and after utilizing the intelligently e-module within the learning prepare, so that the change in numeracy skills that happened may well be recognized. The pretest and posttest comes about are displayed in Table 15.

Table 15. Pretest and posttest result

| | Highest Score | Lowest Score | Total | Average |
|-----------------|---------------|--------------|-------|---------|
| Pretest | 70 | 20 | 1250 | 44,64 |
| Posttest | 100 | 75 | 2510 | 89,64 |

Based on Table 15, there is a difference between students' pretest and posttest scores, indicating a change in numeracy skills after learning using the interactive e-module. The improvement in scores indicates that the learning process carried out had an impact on students' numeracy skills.

To determine the difference between the pretest and posttest scores, a statistical test was conducted by first testing the normality of the data using the Shapiro-Wilk test. The calculation results are presented in Figure 5.

| | Kolmogorov-Smirnov ^a | | | Shapiro-Wilk | | |
|------------------|---------------------------------|----|-------|--------------|----|------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| Pretest e-modul | .134 | 28 | .200* | .951 | 28 | .207 |
| Posttest e-modul | .182 | 28 | .018 | .919 | 28 | .034 |

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Figure 5. Shapiro-Wilk Normality Test Results

Based on Figure 5, Based on Figure 5, it can be seen that the Sig. pretest value on Shapiro-Wilk obtained is 0.207, while the Sig. posttest value obtained is 0.034. Therefore, the requirement of normal distribution is not met because the Sig. posttest < 0.05, so the pretest and posttest data are not normally distributed. Based on the SPSS data results above, the next step is to perform the Wilcoxon test

as an alternative for data that is not normally distributed. The calculation results are presented in Figure 6.

| | posttest e- modul - pretest e- modul |
|------------------------|---|
| Z | -4.635 ^b |
| Asymp. Sig. (2-tailed) | .000 |

a. Wilcoxon Signed Ranks Test
 b. Based on negative ranks.

Figure 6. Wilcoxon Test Results

Based on Figure 6, it can be seen that the Asymp. Sig. (2-tailed) result is 0.000. Since the Asymp. Sig. (2-tailed) result of $0.000 < 0.05$, there's a noteworthy contrast between the (pretest) some time recently the utilize and the (posttest) after the utilize of the intuitively e-module. After conducting the Wilcoxon test, the following step is to perform the N-Gain test. The N-Gain test points to decide whether or not there's an change in students' scores some time recently and after being given treatment utilizing the intuitively e-module. Based on the calculation comes about, the normal N-Gain score gotten from the pretest and posttest values is 0.81, where $0.81 \hat{=} 0.70$ which falls into the "tall" category. Therefore, it can be concluded that there's an enhancement in students' numeracy abilities some time recently and after accepting learning utilizing the intelligently e-module, and the intuitively e-module is pronounced viable in making strides students' numeracy abilities.

This significant improvement not only reflects differences in quantitative outcomes, but also indicates that the instructional design within the interactive e-module functions effectively and educationally. The integration of local wisdom in the delivery of material and practice problems serves as a cognitive bridge that helps students understand concepts, interpret data, and perform numerical reasoning. Furthermore, the gradual delivery of material and exercises relevant to daily life help students develop understanding from the knowing, applying, to reasoning levels. Therefore, the high N-Gain score supports the finding that the interactive e-module based on the local wisdom of the Baduy tribe is effective in improving students' numeracy skills, both in terms of learning process and outcomes.

Evaluation Stage

The final stage in the ADDIE development model is the evaluation stage. At this stage, the researcher conducted an analysis of the research data, which includes validity analysis based on the assessments of media experts, material experts, and education experts. Furthermore, the analysis of media practicality was carried out through teacher questionnaires and student responses, as well as effectiveness through numeracy skills tests. The evaluation process was carried out at every stage of development, and the final results indicate that the developed interactive e-module has very practical criteria and is worthy of being used as a learning aid in the teaching of statistics material, particularly the sub-topics of mean, median, and mode.

Discussion

Feasibility

Based on the assessment conducted by nine validators comprising three media expert validators, three subject matter validators, and three education expert validators, the interactive e-module based on the local wisdom of the Baduy tribe is declared suitable for use as teaching material in statistics subject matter.

The presence of the interactive e-module helps teachers innovate to create a fun and engaging learning atmosphere and has a positive influence on students. The aspects contained in the interactive e-module also play an important role in increasing student motivation. The interactive e-module is capable of enhancing student interest and motivation due to the availability of texts, images, videos, and interactive problems. These findings are in line with (Belanisa, Amir, & Sudjani, 2022; Hartati, 2022; Rahmawati, Bachri, & Maureen, 2025), who emphasize that interactive e-modules can boost learning motivation and create more interesting and relevant learning experiences.

Based on subject matter expert validation, the high validation score reflects a novel contribution of this study, namely the successful operationalization of Baduy local wisdom as a mathematical context in statistics learning. By integrating mean, median, and mode problems into authentic Baduy cultural scenarios, this e-module bridges the gap between abstract statistical concepts and students' lived cultural experiences, thereby offering a replicable model for contextual mathematics learning rooted in indigenous knowledge systems. This is in line with (Hermaliani, Mufliva, Usbah, & Rahmi, 2023; Sabila, Putri, & Arrsyi, 2022) who state that material is considered suitable if it meets learning needs and has a positive impact on student motivation.

Furthermore, such an approach contributes to the development of contextual mathematics education frameworks in Indonesia, particularly by demonstrating that local cultural values can be systematically integrated into standards-aligned digital learning products without compromising curriculum fidelity or cognitive appropriateness.

Practicality

The practicality of the e-module can be seen from the teacher response results in the very practical category. These results show that the suitability of the material, media feasibility, numeracy, integration of local wisdom, and language are considered clear and easy to understand. This indicates that the e-module is not only technically functional but also pedagogically intuitive for educators to integrate into their teaching practice. These findings are in line with (Kumalasan, 2018), who stated that interactive multimedia in the very practical category is generally easy to use by both teachers and students, as well as (Rahmawati et al., 2025) who emphasized that interactive e-modules provide high flexibility in learning.

Students' responses showed a very high level of practicality in terms of ease of use, appearance, clarity of material, and language, indicating that the interactive e-module is considered easy to use because it is equipped with initial instructions and displays featuring images and videos that increase reading interest, in accordance with the findings of (Kholisah, Qohar, & Susanto, 2024). The high

student practicality score in this study indicates that the e-module's interface design — characterized by clear navigation, visually engaging displays, and culturally familiar contexts drawn from Baduy local wisdom — successfully minimized cognitive friction and enhanced students' sense of comfort and confidence in interacting with the learning medium. Furthermore, the e-module is considered practical because the clarity of material and language also helped students' understanding, supporting learning and increasing motivation and comprehension (Awaliya, Salmilah, & Thalhah, 2025; Santuti, Primayana, & Wiguna, 2025; Wulandari, Yogica, & Darussyamsu, 2021).

In general, the feedback from both educators and learners indicates that the interactive e-module is highly functional and appropriate for educational use. By addressing factors such as ease of use, visual design, clarity of content, and language, this interactive e-module can positively influence the enhancement of students' numeracy abilities. The inclusion of local knowledge in the e-module's design not only improves its cultural significance but also adds value to the overall usability and experience for users, thus creating a valuable and replicable example for developing culturally attuned digital teaching resources in math education.

Effectiveness

The success of the interactive e-module that incorporates the local wisdom of the Baduy tribe is evident through the enhanced numeracy skills observed in students after they engaged with the e-module during their studies. This effectiveness is shown in the organized way the content is delivered, a user-friendly navigation system that aids students in following the learning process, and the inclusion of multimedia elements that stimulate active participation from the students.

In this research, the effectiveness of the interactive e-module is evaluated by comparing pretest and posttest results concerning numeracy skills. There is a notable difference in the learning outcomes observed before and after the interactive e-module was utilized, indicating that it significantly boosts numeracy skills. These results support the findings of (Aeni & Widodo, 2022), which indicated that the use of interactive e-modules led to considerable improvements in learning results, provided favorable reactions to the learning experience, and resulted in better educational achievements than traditional learning methods.

Not only that, the use of Baduy tribal local wisdom aspects in examples, images, and practice problems helps reinforce learning so that the material becomes easier to understand. The incorporation of Baduy tribal local wisdom serves as a contextual stimulus in the material and problems, so that learning related to real experiences also helps students understand the material more easily and makes it closer to their lives, thereby being able to improve numeracy skills. The use of the Baduy tribal local wisdom context also helps students understand statistical contexts through real situations and fosters positive responses toward local values. This is in line with the research of (Lindang, Bhoke, & Wewe, 2024) which found that the use of local wisdom in learning material can improve numeracy skills. Furthermore, linking statistics material with local culture makes learning more engaging, contextual, and meaningful for students (Sari, Purwaningrum, & Rahayu, 2025). Therefore, it can be concluded that the

interactive e-module based on the local wisdom of the Baduy tribe that was developed is effective in improving students' numeracy skills.

Conclusion and Suggestion

The development research of an interactive e-module with local wisdom nuances of the Baduy tribe using the ADDIE model shows that the resulting product is feasible, practical, and effective in improving students' numeracy skills. The validity, practicality, and effectiveness obtained at the implementation and evaluation stages confirm that this e-module can be used as a learning resource that supports the mathematics learning process, especially statistics material. These findings extend existing contextual learning theory by providing empirical evidence that cultural specificity, rather than generic real-world contexts, can more meaningfully bridge the gap between abstract mathematical concepts and students' lived experiences.

The interactive e-module developed in this study also serves as a concrete and replicable model of how teachers can integrate local wisdom into numeracy-based learning activities that are aligned with the vision of the Merdeka Curriculum for contextual, meaningful, and student-centered education. Furthermore, the e-module's proven effectiveness in improving numeracy skills makes it a valuable supplementary learning resource for schools seeking to strengthen students' numeracy competencies in accordance with national education priorities, including the Asesmen Nasional (AN) and Asesmen Kompetensi Minimum (AKM) frameworks.

As for suggestions for further research based on the findings of this study, the development of interactive e-modules should be designed with varied and attractive color combinations in order to enhance students' interest and learning motivation. In addition, learning also needs to utilize elements of local wisdom, as the use of contexts that are close to students' daily lives can help them understand the material more deeply. The developed interactive e-module can be utilized by mathematics subject teachers as teaching material as well as supporting media in the classroom learning process. Furthermore, future researchers are advised to develop interactive e-modules based on local wisdom for other subject matter so as to expand innovative teaching materials that are relevant to learning needs.

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