

## E-MAWATIK: MAWARIS ELECTRONIC MODULE DEVELOPMENT BASED ON REALISTIC MATHEMATICS

Rini Agustini<sup>1</sup>, Jumaita Nopriani Lubis<sup>2</sup>, Masdelima Azizah Sormin<sup>3</sup>, Safran Efendi Pasaribu<sup>4</sup>,  
Nurul Arifah Zahra<sup>5</sup>

<sup>1,2,3,4,5</sup>Universitas Muhammadiyah Tapanuli Selatan, Indonesia

\*Corresponding Author: [rini@um-tapsel.ac.id](mailto:rini@um-tapsel.ac.id)

### Article Info

#### Article history:

Received :  
Revised :  
Accepted :  
Available online  
<http://jurnal.uinsu.ac.id/index.php/analytica>

E-ISSN: 2541-5263

P-ISSN: 1411-4380



*This is an open access article under the [CC BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license*

### ABSTRACT

The study of mawaris (Islamic inheritance law) is often considered complex due to the involvement of precise mathematical calculations. However, conventional teaching methods tend to be less engaging and difficult to understand, especially for the younger generation who are more familiar with technology. Therefore, the development of an electronic module based on realistic mathematics, such as e-Mawamatik, becomes highly important. This module not only facilitates the understanding of mawaris concepts through an applied mathematical approach but also leverages technology to enhance students' interest and engagement. This study aims to develop an e-Mawamatik module for teaching mawaris that integrates mathematical concepts to simplify the understanding and calculation of inheritance distribution. The module is designed to help students comprehend inheritance division according to Islamic law through concrete examples and digital simulations. In addition, e-Mawamatik seeks to increase learning interest, support independent learning. The development of e-Mawamatik adopts a research and development (R&D) method, involving the stages of needs analysis, design, development, implementation, and evaluation. Furthermore, the module will be tested by students and experts to ensure the accuracy of its content and the effectiveness of the learning process. Evaluation is carried out through user feedback and continuous improvement to produce an optimal module. The media expert validation score was 88.3%, language expert validation 87.5%, and material expert validation 90% and matematic realistic expert validation 87,5%, with an average score percentage categorized as very valid. The trial conducted by teachers and students of Grade XI at Madrasah Aliyah Pondok Pesantren K.H. Ahmad Dahlan Sipirok showed that respondents scored 85.10% for the needs and interest aspect, and 90.88% for the usage evaluation aspect. The average percentage score across all aspects was 88.6%, falling into the category of very valid.

**Keywords:** Electronic Module, Mawarith, Realistic Mathematics

## 1. INTRODUCTION

Mawaris is classified as a difficult subject for students to master (Nugraha et al., 2023). Few students or individuals are interested in studying Mawaris because the subject is complex and involves mathematical calculations (Sulistyo et al., 2021). The Prophet Muhammad, in his sayings, recommended studying this subject with the phrase *faraid*, namely "Ta'allam al-Faraid." The issue of inheritance distribution is a constant topic of discussion among Muslims (Purkon, 2018). Studying the science of *faraid* (mawaris) is a collective obligation (*fardu kifayah*), meaning that if no one in the Muslim community studies it seriously, all Muslims will bear the sin (Kamulia et al., 2022). Inheritance law is a provision that regulates the status of a person's property after his death (Kurniawan & Listiani, 2022). Conflicts within families often arise due to inheritance distribution issues, where some heirs try to control all the inherited assets. This can be detrimental to others and even potentially trigger criminal acts such as robbery and murder (Aksin et al., 2020).

Therefore, inheritance law is a crucial legal instrument, and its position in Islam receives special attention (Wasman & Muamar, 2023). Mathematics, as the "Queen of Science," plays a crucial role in supporting the understanding of various disciplines, including inheritance law in Islam (Marwan et al., 2024). The Realistic Mathematics Education (RME) approach is implemented to help students overcome difficulties in learning mathematics through solving contextual or real-world problems (Widiastuti & Nindiasari, 2022). Realistic mathematics learning begins with the presentation of a phenomenon, then students, with teacher guidance, are given the opportunity to rediscover and construct their own mathematical concepts (Hermawan, 2016). After that, they are applied to everyday problems or other fields (Habiburrahman, 2022). Through a realistic mathematics approach, students are given the space to reconstruct and reformulate mathematical concepts, thus developing a deep and solid understanding of the material being studied. The research questions include: 1) How to design a Mawaris electronic module (E-Mawamatik) based on Realistic Mathematics that is valid and practical for learning Islamic inheritance law? 2) To what extent is the E-Mawatik module effective in enhancing students' understanding of realistic mathematics concepts and the application of Islamic inheritance law?

This research presents a key novelty: the integration of the RME approach with Mawaris law as an innovative solution to solving abstract problems in Islamic inheritance through real-life contexts. Previous studies by Gravemeijer have demonstrated the effectiveness of RME in mathematics learning, but its application to Mawaris material has not been widely explored. This module is designed interactively, with visualizations of inheritance distribution using digital-based simulations, a practice that has not been widely developed in previous research. This research combines Mawaris Sharia principles with mathematical modeling, such as fractions and algebra, thus providing an innovative solution to learning Islamic jurisprudence, which is often considered complex. The development of e-Mawamatik not only contributes to innovation in digital-based inheritance science learning but also opens up new opportunities for a realistic approach to mathematics education within an Islamic context. This e-module is expected to be an effective solution for facilitating understanding of the concept of *faraidh* while simultaneously encouraging learning interest through an interactive and contextual approach.

## 2. RESEARCH METHOD

This study employed a Research and Development (R&D) method with the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) model development approach. The ADDIE model is designed to form the basis for performance in the learning process, particularly in designing and developing learning products (Meldi et al., 2023). The Research and Development (R&D) method is designed to design and produce a specific product, while simultaneously evaluating the effectiveness of that product in its implementation (Hidayat & Nizar, 2021). The ADDIE model served as the development framework in this study, encompassing five systematic steps: analysis, design, development, implementation, and evaluation (Waruwu, 2024).

This study involved two main groups as trial subjects: students at the KH Ahmad Dahlan Sipirop Islamic Boarding School and validators. In the validation phase, the e-mawamatik module was evaluated by validators on learning media, language, Mawaris materials, realistic mathematics, and others. Validators assessed the module's feasibility in terms of material adequacy, RME suitability, and technical quality using a Likert-based validation instrument. Meanwhile, the trial subjects consisted of two phases: the first small class trial conducted on 10 students to evaluate the clarity of the electronic module material. The second large group trial involving 50 students to measure the initial effectiveness of the electronic module before full-scale implementation. The data obtained were analyzed qualitatively (revisions based on feedback) and quantitatively (validation scores & pretest-posttest results). The types of research data used were qualitative and quantitative data. The instruments used to collect data in this study included observation, interviews, and questionnaires. The data analysis techniques applied included quantitative and qualitative data analysis. Quantitative data analysis used the formula from Riduwan (Riduwan, 2016).

## 3. RESULT AND ANALYSIS

### Validation Result

#### *Validation Data Analysis by Learning Media Expert (Design)*

Validation by learning media experts was conducted to obtain information regarding the feasibility of E-Mawatik and to solicit input and suggestions for refining the developed media to achieve a quality product. The validation results from the media experts are outlined in the following table:

Table 1. Expert Design Validation Results

| No | Assessed Aspects                                                                                  | Score |
|----|---------------------------------------------------------------------------------------------------|-------|
| 1  | Consistency of color, font, and icon use                                                          | 4     |
| 2  | Back and next features work well                                                                  | 4     |
| 3  | Visual quality that supports the appeal of the E-Mawatik learning media                           | 3     |
| 4  | Color composition on the E-Mawatik display using Canva                                            | 4     |
| 5  | Aesthetic aspects and clarity of illustrations that attract attention to e-Mawatik                | 4     |
| 6  | Clarity of writing and font size in the E-Mawatik using Canva                                     | 3     |
| 7  | Effectiveness of media content display in attracting the attention of E-Mawatik users using Canva | 4     |
| 8  | Effectiveness of learning media in optimizing available learning time                             | 3     |
| 9  | Layout between module elements                                                                    | 4     |

|    |                                                                |            |
|----|----------------------------------------------------------------|------------|
| 10 | Suitability of interactive media (audio/video/quizzes)         | 3          |
| 11 | User ease of access and navigation of the module               | 4          |
| 12 | Efficient file size and loading speed                          | 3          |
| 13 | Color selection that is unobtrusive and comfortable to the eye | 3          |
| 14 | Consistency of icons, buttons, and other visual elements       | 4          |
| 15 | Font size and spacing between elements facilitate reading      | 3          |
|    | Maximum Score                                                  | 60         |
|    |                                                                | 53         |
|    | Total Score                                                    | 88,3%      |
|    | Percentage Score                                               | Very Valid |
|    | Category                                                       |            |

The results of the e-Mawatik design validation analysis contained in the table show that the E-Mawatik validity percentage is 88.3%, indicating that this media is in the 'very valid' category.

#### *Data from Validation Results of Linguist Experts*

Before the e-Mawatik was tested by the students, the e-module developed through the Canva platform was first validated by a language expert lecturer to obtain information on the suitability of the Mawaris science material. Furthermore, validation by the language expert was conducted to assess the linguistic feasibility of e-Mawatik and to obtain constructive criticism and suggestions to ensure the developed media becomes a quality product. The results of the validation by the language expert are explained as follows:

Table 2. Results of Validation by Linguists

| No | Assessed Aspects                                                                   | Score      |
|----|------------------------------------------------------------------------------------|------------|
| 1  | The language used in the module is communicative and easy to understand for users. | 4          |
| 2  | The language used conforms to good and correct Indonesian grammar.                 | 4          |
| 3  | The terms used are relevant and consistent.                                        | 3          |
| 4  | The sentence structure is clear and unambiguous.                                   | 4          |
| 5  | Sentences and paragraphs are structured logically and systematically.              | 3          |
| 6  | There are no spelling or punctuation errors.                                       | 3          |
| 7  | The language style is appropriate for the characteristics of mathematics learning. | 4          |
| 8  | Sentences are free from ambiguity.                                                 | 3          |
| 9  | Specific terms (mawaris, realistic mathematics) are used consistently.             | 3          |
| 10 | The module text explains concepts clearly and coherently.                          | 4          |
|    | Maximum Score                                                                      | 40         |
|    | Total Score                                                                        | 35         |
|    | Percentage Score                                                                   | 87,5%      |
|    | Category                                                                           | Very Valid |

The results of the validation by language experts show that E-Mawatik on the Mawaris material obtained a score of 87.5%, so it is categorized as very valid.

### *Data from the Validation Results of Material Experts*

Before E-Mawatik was piloted among students, the e-module developed using Canva was first validated by a subject matter expert lecturer to obtain data on the feasibility of the Realistic Mathematics-based E-Mawatik. The validation process by the subject matter expert was carried out to assess the suitability and appropriateness of the module's content, as well as to obtain constructive criticism and suggestions so that E-Mawatik could become a quality learning product. The validation results from the subject matter expert are explained as follows:

Table 4. Results of Validation by Mawaris Material Experts

| No               | Assessed Aspects                                                                                                     | Score      |
|------------------|----------------------------------------------------------------------------------------------------------------------|------------|
| 1                | Suitability of learning objectives to module content                                                                 | 4          |
| 2                | The material is structured systematically and coherently                                                             | 3          |
| 3                | The Mawaris fiqh material aligns with the Qur'an, Hadith, and the consensus of scholars                              | 4          |
| 4                | The description of the categories of heirs and those entitled to inheritance is appropriate according to Islamic law | 3          |
| 5                | The inheritance cases presented represent a variety of common inheritance issues                                     | 4          |
| 6                | The presentation of sharia evidence is clear and contextualized                                                      | 4          |
| 7                | There are no errors in the use of Mawaris fiqh terms and laws                                                        | 3          |
| 8                | The calculation of inheritance shares is in accordance with Islamic inheritance law.                                 | 4          |
| 9                | The Mawaris fiqh material presented aligns with the learning outcomes of the Mawaris Fiqh course                     | 4          |
| 10               | The module can be used as supporting teaching materials                                                              | 4          |
| 11               | The language and terms of Mawaris fiqh in the e-module are easy to understand                                        | 3          |
| Maximum Score    |                                                                                                                      | 40         |
|                  |                                                                                                                      | 36         |
| Total Score      |                                                                                                                      | 90%        |
| Percentage Score |                                                                                                                      | Very Valid |
| Category         |                                                                                                                      |            |

The results of the analysis of the validation of the Mawaris material developed in E-Mawatik, as shown in the table, show a percentage of 90%. This percentage indicates that the material is in the very valid category.

### *Results of Validation by Mathematics Experts*

Validation by realistic mathematics experts was conducted to obtain information regarding the feasibility of E-Mawatik and to obtain input and suggestions for improving the developed product to ensure its quality. The validation results from media experts are outlined in the following table:

Table 5. Validation by Realistic Mathematics Approach

| No | Assessed Aspects                                                               | Score |
|----|--------------------------------------------------------------------------------|-------|
| 1  | Suitability of learning activities with a realistic mathematical approach      | 3     |
| 2  | Integration of religious content (faraidd science) and a mathematical approach | 4     |

|    |                                                                                                                  |            |
|----|------------------------------------------------------------------------------------------------------------------|------------|
| 3  | Use of a mathematical approach in inheritance distribution does not violate Islamic jurisprudence principles     | 4          |
| 4  | Solving inheritance cases through realistic mathematical models strengthens understanding of sharia              | 4          |
| 5  | Use of illustrations (numerical examples) supports understanding of inheritance law                              | 3          |
| 6  | The module supports the integration of Islamic jurisprudence and mathematical approaches in an applicable manner | 4          |
| 7  | Writing of mathematical symbols or terms is consistent and precise                                               | 3          |
| 8  | The module facilitates students' independent mathematical exploration and modeling                               | 3          |
| 9  | Materials and activities support students' reflection on the solutions found                                     | 4          |
| 10 | The module considers the horizontal and vertical levels of mathematization in the RMR approach                   | 3          |
| 11 | Practice problems reflect the application of concepts in various real-life contexts                              | 3          |
| 12 | The module emphasizes students' active contribution to the concept discovery process                             | 4          |
|    | Maximum Score                                                                                                    | 48         |
|    |                                                                                                                  | 42         |
|    | Total Score                                                                                                      | 87,5%      |
|    | Score Percentage                                                                                                 | Very Valid |
|    | Category                                                                                                         |            |

The results of the analysis of the validation of the realistic mathematics approach developed in E-Mawatik, as shown in the table, show a percentage of 87.5%. This percentage indicates that the material is in the very valid category.

### Results of Validation of the Effectiveness of E-Mawatik Products

The E-Mawatik product trial was conducted at the K.H. Ahmad Dahlan Sapirok Islamic Boarding School, involving 50 students as research subjects. This trial was conducted to determine the students' responses to the product developed, namely Realistic Mathematics-Based E-Mawatik. The following are the results of the pretest and posttest data on 50 respondents who assessed the E-Mawatik module. The questionnaire consisted of 30 statements: 10 statements regarding the need for and interest in E-Mawatik, and 20 statements regarding the assessment of E-Mawatik use.

Table 5. Results of Student Product Assessment

| Aspect              | Number of Statements | Actual Score | Maximum Score | Percentage (%) | Category   |
|---------------------|----------------------|--------------|---------------|----------------|------------|
| Needs and Interests | 10                   | 1702         | 2000          | 85.10          | Very Valid |
| Usage Assessment    | 20                   | 3635         | 4000          | 90.88          | Very Valid |
| Total               | 30                   | 5337         | 6000          | 88.95          | Very Valid |

Based on the validity test results, the researchers conducted several revisions to refine the developed product, resulting in a feasibility rating in the highly valid category. The validation test results by media experts were 88.3%, by language experts 87.5%, by

material experts 90%, and by realistic mathematics approach experts 87.5%, with an average score in the highly valid category. The final product was created based on the validator's assessment results, along with comments and feedback.

The revised final product was tested on 50 students to determine the practicality of the E-Mawatik product. The trial, involving teachers and students, yielded data reflecting the effectiveness and acceptance of the product developed by the 11th grade students of the K.H. Ahmad Dahlan Sapiro Islamic Boarding School. Respondents scored 85.10% for the needs and requests aspect and 90.88% for the usability assessment aspect. The average score for each aspect was 88.6%, falling into the highly valid category.

The data obtained shows that the Realistic Mathematics-based E-Mawatik, developed through the Canva platform, makes a positive contribution as a learning medium that supports the effectiveness of the teaching and learning process. This medium serves as a supporting tool in achieving educational goals. Furthermore, E-Mawatik also allows students to learn independently, both at school and at home, thereby strengthening mastery of the material and helping to maximize the achievement of learning objectives.

#### 4. CONCLUSION

This research produced a product in the form of an electronic module E-Mawatik designed to facilitate the learning of Mawaris (Islamic inheritance law) through a realistic mathematical approach. This module was developed by paying attention to the needs of students at the K.H. Ahmad Dahlan Islamic Boarding School, especially grade XI students of Madrasah Aliyah, to more easily understand the concept and calculation of inheritance in accordance with Islamic law. The results of the validity test by experts showed that the E-Mawatik module was classified as very valid, with a validation score Validation of E-Mawatik showed very satisfactory results, with a validity percentage from media experts of 88.3%, language experts 87.5%, material experts 90% and realistic mathematical approach experts 87.5%. In addition, trials conducted on students showed a very positive response, namely 85.10% in the aspects of learning needs and interests, and 90.88% in the aspect of assessment of module use. The overall average percentage reached 88.6%, which indicates that this module is very feasible and effective for use in the learning process. Thus, E-Mawatik can be concluded as an innovative, interactive, and effective learning media in facilitating students' understanding of Islamic inheritance law, while at the same time being able to increase students' interest in learning and encourage students' independence in the learning process. This module also provides a positive contribution in the use of technology in education in Islamic boarding schools.

#### References

- Aksin, N., Waliyansyah, R. R., & Saputro, N. D. (2020). Sistem Pakar Pembagian Harta Waris Menurut Hukum Islam. *Walisongo Journal of Information Technology*, 2(2), 115. <https://doi.org/10.21580/wjit.2020.2.2.5984>
- Aziz, H. (2023). The Distribution of Children's Inheritance in the Islamic Law and Custom Law's Perspective. *International Journal of Law Reconstruction*, 7(1), 12. <https://doi.org/10.26532/ijlr.v7i1.30895>
- Habiburrahman, M. (2022). 24.+M.+Habiburrahman+Galley+++Cover (1). 8(4), 1398–1410.

- Hermawan, R. (2016). Pembelajaran Matematika Realistik Untuk Meningkatkan Pemahaman Siswa Tentang Bangun Datar. *EduHumaniora | Jurnal Pendidikan Dasar Kampus Cibiru*, 2(2). <https://doi.org/10.17509/eh.v2i2.2765>
- Hidayat, F., & Nizar, M. (2021). 2. Evaluasi. *Jurnal Inovasi Pendidikan Agama Islam (JIPAI)*, 1(1), 28–38. [https://d1wqtxts1xzle7.cloudfront.net/111186059/pdf-libre.pdf?1707145124=&response-content-disposition=inline%3B+filename%3DModel\\_Addie\\_Analysis\\_Design\\_Development.pdf&Expires=1726424196&Signature=SgUFUgisZBELLrsnJ0p4-1KYm~DvvorPkCIYNhJJCU760ebbIAdoPY6Ujp](https://d1wqtxts1xzle7.cloudfront.net/111186059/pdf-libre.pdf?1707145124=&response-content-disposition=inline%3B+filename%3DModel_Addie_Analysis_Design_Development.pdf&Expires=1726424196&Signature=SgUFUgisZBELLrsnJ0p4-1KYm~DvvorPkCIYNhJJCU760ebbIAdoPY6Ujp)
- Kamulia, A. A. U., Tohir, M., Safitri, H. D. S. D., & Rosyidah, U. (2022). Keterampilan Memecahkan Masalah Faraid Ditinjau Dari Kemampuan Matematis Mahasiswa. *Kadikma*, 13(1), 40. <https://doi.org/10.19184/kdma.v13i1.31298>
- Kurniawan, C., & Listiani, W. (2022). Menghitung Pembagian Faraid (Waris) Dengan Metode Kelipatan Persekutuan Terkecil (KPK) Dalam Perspektif Hukum Islam. *Jurnal Jendela Pendidikan*, 2(01), 87–92. <https://doi.org/10.57008/jjp.v2i01.131>
- Marwan, M., Nurdin, M., Zein, N., & Khaidir, E. (2024). Pengaruh Pemahaman Bilangan Pecahan terhadap Kemampuan Soal Mawaris: Peran Metodologi Pembelajaran di MA Muhammadiyah Pekanbaru. *Instructional Development Journal*, 7(2), 527. <https://doi.org/10.24014/idj.v7i2.32669>
- Meldi, N. F., T, A. Y., Bistari, Sugiatno, & Nursangaji, A. (2023). Klarifikasi Perhitungan Matematika Menggunakan Aplikasi I Waris Terintegrasi Hukum Waris. *Alwatzikhoebillah: Kajian Islam, Pendidikan, Ekonomi, Humaniora*, 9(1), 49–69. <https://journal.iaisambas.ac.id/index.php/ALWATZIKHOEBILLAH/article/view/1540/1230>
- Nugraha, R. E., Puspitasari, N., & Sumartini, T. S. (2023). Analisis Kemampuan Koneksi Matematis Pada Ilmu Waris Terhadap Matematika Di Pondok Pesantren. *Jurnal Padagogik*, 6(2), 109–118. <https://doi.org/10.35974/jpd.v6i2.3136> <https://jurnal.unai.edu/index.php/jpg/article/view/3136>
- Purkon, A. (2018). Pembagian Harta Waris Dengan Wasiat (Pendekatan Ushul Fiqih). *Mizan: Journal of Islamic Law*, 2(1), 47–56. <https://doi.org/10.32507/mizan.v2i1.133>
- Riduwan. (2016). *Skala Pengukuran Variabel-Variabel Penelitian*. Alfabeta.
- Sulistyo, A., Suyadi, S., & Wantini, W. (2021). Problematika Pembelajaran Ilmu Faraidh di Tingkat SLTA Serta Alternatif Solusinya. *Cahaya Pendidikan*, 7(1), 25–36. <https://doi.org/10.33373/chypend.v7i1.3288>
- Waruwu, M. (2024). Metode Penelitian dan Pengembangan (R&D): Konsep, Jenis, Tahapan dan Kelebihan. *Jurnal Ilmiah Profesi Pendidikan*, 9(2), 1220–1230. <https://doi.org/10.29303/jipp.v9i2.2141>
- Wasman, W., & Muamar, A. (2023). ANALISIS KEPATUHAN MUSLIM INDONESIA DALAM PRAKTIK KEWARISAN ISLAM (Studi Relasi Ayat Waris dengan Hadits Punahnya Ilmu Kewarisan). *Al-Mustashfa: Jurnal Penelitian Hukum Ekonomi Syariah*, 8(1), 1. <https://doi.org/10.24235/jm.v8i1.13267>

Widiastuti, B., & Nindiasari, H. (2022). Penerapan Pembelajaran Matematika Realistik untuk Mengembangkan Kemampuan Pemecahan Masalah Matematika Peserta Didik Sekolah Dasar. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, 6(3), 2526–2535. <https://doi.org/10.31004/cendekia.v6i3.1190>