EduBasic Journal: Jurnal Pendidikan Dasar
Vol. 7 No. 2, October 2025, pp. 220-235
https://ejournal.upi.edu/index.php/edubasic

Integration of Local Cultural Values in Interactive E-Modules as an Innovation in Tolerance Learning in Elementary Schools

Muhamad Sudharsono[1]✉, Muhamad Afandi[2] & Evi Chamalah[3]

[1]✉Universitas Pelita Bangsa, 24502400021@std.unissula.ac.id, Orcid ID: 0009-0006-0468-7964
[2] Universitas Islam Sultan Agung, mafandi@unissula.ac.id, Orcid ID: 0000-0001-6799-9216
[3] Universitas Islam Sultan Agung, chamalah@unissula.ac.id, Orcid ID: 0000-0003-0669-2418

Article Info

History of Article
Received:
22 July 2025
Revised:
30 September 2025
Published:
15 October 2025

Abstract

It is crucial to formulate effective learning methods in instilling tolerance values in primary school students in the digital age. This research aims to develop and test the effectiveness of an interactive e-module based on local cultural values as a learning medium to foster tolerance among elementary school students. The study involved 120 fifth-grade students from four public schools in Bekasi Regency, West Java, divided into experimental (n = 61) and control groups (n = 59). The intervention was conducted over six sessions within three weeks, with teachers in the experimental group acting as facilitators of the e-module, while the control group received conventional tolerance lessons through lectures and discussions. The research employed a modified ADDIE model with a mixed-methods approach, content validation using the Fuzzy Delphi method, and a quasi-experimental design for effectiveness testing. Results revealed that the e-module significantly improved tolerance attitudes compared to the control group ($t = 8.913$, $p < 0.001$, Cohen's $d = 0.92$, large effect size). Teacher reflections highlighted increased student motivation, engagement, and positive social behavior. These findings underscore that integrating local cultural values into technology-based learning strengthens contextual character education in the digital era. The study provides both theoretical and practical contributions by addressing the gap between cultural preservation and educational technology, offering an innovative pathway for character education.

Keywords: Character Education, Interactive E-Module, Local Cultural Values, Tolerance

How to cite: Sudharsono, M., Afandi, M., & Chamalah, E. (2025). Integration of local cultural values in interactive e-modules as an innovation in tolerance learning in elementary schools. *EduBasic Journal: Jurnal Pendidikan Dasar, 7*(2), 220-235.

e-ISSN: 2549-4562, p-ISSN: 2987-937X

Info Artikel

Riwayat Artikel
Diterima:
22 Juli 2025
Direvisi:
30 September 2025
Diterbitkan:
15 Oktober 2025

Abstrak

Sangat penting untuk merumuskan metode pembelajaran yang efektif dalam menanamkan nilai-nilai toleransi pada siswa sekolah dasar di era digital. Penelitian ini bertujuan untuk mengembangkan dan menguji efektivitas e-modul interaktif berbasis nilai budaya lokal sebagai media pembelajaran untuk menumbuhkan sikap toleransi pada siswa sekolah dasar. Penelitian ini melibatkan 120 siswa kelas lima dari empat sekolah dasar di Kabupaten Bekasi, Jawa Barat, yang dibagi menjadi kelompok eksperimen (n = 61) dan kelompok kontrol (n = 59). Intervensi dilakukan selama enam sesi dalam waktu tiga minggu, dengan guru di kelompok eksperimen bertindak sebagai fasilitator modul elektronik, sementara kelompok kontrol menerima pelajaran toleransi konvensional melalui ceramah dan diskusi. Penelitian ini menggunakan model ADDIE yang dimodifikasi dengan pendekatan metode campuran, validasi konten menggunakan metode Fuzzy Delphi, dan desain kuasi-eksperimental untuk pengujian efektivitas. Hasil penelitian menunjukkan bahwa e-modul secara signifikan meningkatkan sikap toleransi dibandingkan dengan kelompok kontrol ($t = 8,913$, $p < 0,001$, Cohen's $d = 0,92$, ukuran efek yang besar). Refleksi guru menyoroti peningkatan motivasi, keterlibatan, dan perilaku sosial yang positif dari para siswa. Temuan ini menggarisbawahi bahwa mengintegrasikan nilai-nilai budaya lokal ke dalam pembelajaran berbasis teknologi dapat memperkuat pendidikan karakter kontekstual di era digital. Penelitian ini memberikan kontribusi teoritis dan praktis dengan mengatasi kesenjangan antara pelestarian budaya dan teknologi pendidikan, dengan menawarkan jalur inovatif untuk pendidikan karakter.

Kata Kunci: Pendidikan Karakter, E-Modul Interaktif, Nilai-nilai Budaya Lokal, Toleransi

Cara Mensitasi: Sudharsono, M., Afandi, M., & Chamalah, E. (2025). Integration of local cultural values in interactive e-modules as an innovation in tolerance learning in elementary schools. *EduBasic Journal: Jurnal Pendidikan Dasar, 7*(2), 220-235.

e-ISSN: 2549-4562, p-ISSN: 2987-937X

INTRODUCTION

Rapid social changes, along with the advancement of technology, have brought about changes in the value system and behavior of students in elementary schools. A study by the Ministry of Education, Culture, Research, and Technology (MoECT) noted that data show an improvement in test scores over the past year but also a decline in students' adherence to traditional values and a shift in cultural values among elementary school students. This is reflected in the decline of shared culture and local wisdom values, such as tolerance, *gotong royong*, discipline, and courtesy (Figure 1).

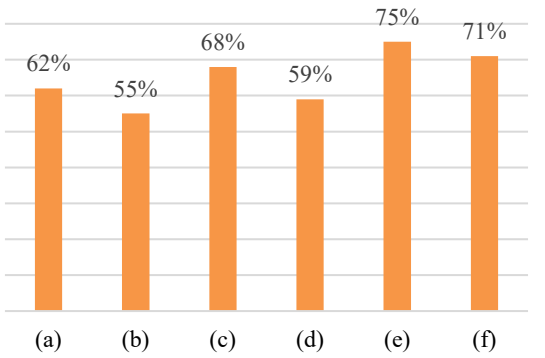


Figure 1. Percentage of Students Experiencing a Shift in Character Values in Elementary Schools

The data exhibits that 75% of students excessively use gadgets. As many as 71% experienced a decrease in direct social interaction, while 68% displayed a decline in student discipline. Also, 62% of students experienced a reduction in tolerance, 59% were less willing to work together, and 55% started using impolite language. These findings indicate that individualistic and competitive values are becoming stronger among elementary school students, directly impacting the decline in tolerance in the school environment (Mahartini et al., 2024).

There is also a growing emphasis on strengthening local cultural values, such as mutual assistance (*gotong royong)*, deliberation, tolerance, and respect for differences. Integrating these values into education is essential, as they can strengthen national identity, foster tolerance, and serve as a shield against the negative influences of globalization (Hasan et al., 2024; Misnah et al., 2024; Rafiuddin et al., 2024; Sukadari et al., 2020; Supeni et al., 2020; Syahrial et al., 2020).

The same phenomenon is also reflected locally, particularly in Bekasi Regency, West Java, which is experiencing rapid urbanization and cultural heterogeneity. These dynamics make Bekasi a relevant representation of the broader national issue, as urban growth often accelerates shifts in social behavior and weakens traditional values. A survey conducted in several regional public elementary schools confirmed this trend. As depicted in Figure 2, students demonstrated relatively low levels of traditional cultural values, especially regarding cooperation, tolerance, and mutual respect.

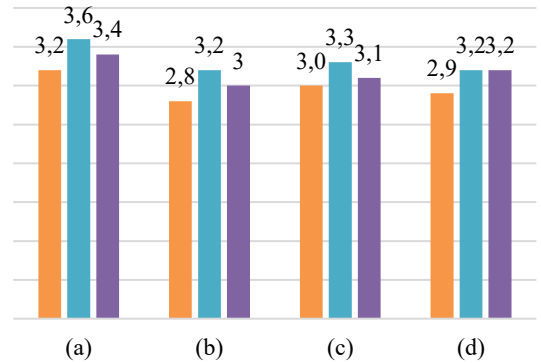


Figure 2. Average Shift in Cultural Values of Elementary School Students in Bekasi

The *gotong royong* score given was only 2.98 on a scale of 5, while tolerance and mutual respect were also low, at 3.18 and 3.3, respectively. A teacher at SDN 05 noted in an interview that students preferred working competitively and individually rather than collaboratively in group settings. This observation aligns with reports from the Ministry of Education and Culture's BPSDM and research conducted in other regions such as Tegal, Lombok, and Rejang Lebong (Astuti et al., 2024; Sadiah et al., 2024; Tohri et al., 2022).

This situation signifies the importance of culture-based character education and is

relevant to the digital age. For that season, interactive e-modules can efficiently integrate past cultural values with present technology (Bonanati & Buhl, 2022; Dewi et al., 2022; Hutson & Fulcher, 2023; Steinberg et al., 2020; Sunaryati et al., 2025). As mentioned earlier, e-modules can present local culture in a way that appeals to today's students. Research also demonstrates that it can increase student participation, engagement, and understanding (Jie & Chaetnalao, 2023; Smith et al., 2021).

E-modules enriched with multimedia, video, interactive simulations, and technologies such as augmented reality (AR) and virtual reality (VR) have been proven to be able to present cultural content in an immersive and fun way (Buthelezi et al., 2021; Krug et al., 2023; Puspasari et al., 2021; Tsene, 2022). This approach aligns with 21st-century learning needs, emphasizing critical, creative, and collaborative thinking skills (Burnett & Merchant, 2021; Dezuanni, 2021; Hobbs, 2020).

Global studies also verify that local culture-based educational technologies have value for increasing students' empathy and multicultural awareness from level to level of the age ladder, especially through digital storytelling (Chao et al., 2021; Fedorov & Mikhaleva, 2020; Remillard et al., 2021), even applicable to early childhood students (Ai et al., 2024; D'Olimpio, 2021; Manca, 2021). This is classified as global education, an educational approach that mixes global perspectives and local contexts (Manca et al., 2023; Supa et al., 2021).

Overall, although e-modules have many benefits, their implementation in Indonesia still has obstacles, such as limited internet access, teachers who lack digital understanding, and unprepared infrastructure (Grothaus et al., 2021; Mindu et al., 2023; Srinivasan et al., 2021). Therefore, the development of e-modules must be designed to be flexible and inclusive so that it considers the conditions in the region, the potential of the technology owned, and participation together by all stakeholders in the world of education (Srinivasan et al., 2021; Supa et al., 2021; Varinlioglu et al., 2022).

Unfortunately, there is still a lack of research that integrates explicitly local cultural values with interactive educational technology to foster tolerance among elementary school students (González-Betancor et al., 2021; Lodi & Martini, 2021; Stenalt, 2021). This gap exists for several reasons. First, much of the existing research on educational technology tends to emphasize cognitive outcomes such as digital literacy and academic achievement. At the same time, affective dimensions like tolerance, empathy, and cooperation receive limited attention. Second, methodological challenges arise in translating cultural values into operational variables that can be tested empirically and ensure their validity across diverse contexts. Third, the limited interdisciplinary collaboration between education, cultural studies, and information technology has further constrained innovation in this area. Nevertheless, addressing these challenges is crucial for creating learning experiences that are contextual, meaningful, and responsive to the demands of the digital era.

As reinforcement, the bibliometric study in Figure 3 illustrates the dominance of global themes such as digital literacy, blended learning, and social media. However, there is a lack of explicit linkages between educational technology and local cultural values. This finding confirms the urgency of interdisciplinary research integrating local cultural values, technology, and student character education (Foster et al., 2024; Rodríguez et al., 2022; Tsene, 2022). This visualization also indicates a research gap that needs to be filled by an interdisciplinary approach combining aspects of locality, technology, and student character education.

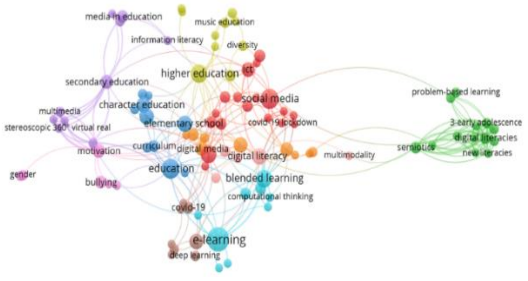


Figure 3. Bibliometric Visualization of Global Research Themes on Digital and Character Education

Figure 3 presents a bibliometric visualization of global research themes on

digital and character education using VOSviewer (2024). The map shows that dominant clusters focus on digital literacy, blended learning, and social media, while research that explicitly integrates local cultural values with interactive technology for tolerance remains marginal. This imbalance occurs for several reasons. First, most educational technology research has emphasized cognitive outcomes such as digital skills and academic achievement, while affective aspects like tolerance and empathy receive less attention. Second, methodological challenges arise in operationalizing and validating cultural values into measurable variables, making such studies more complex. Third, there is often a lack of interdisciplinary collaboration between education, cultural studies, and information technology, which is essential to bridge these domains. These gaps explain why integration of local wisdom with interactive technology is still rare, while highlighting the novelty and significance of this study.

Therefore, the development of interactive e-modules that incorporate local cultural values as teaching materials is likely to be an effective alternative for fostering tolerance and strengthening national identity among elementary school students in the era of globalization. This approach is not only relevant for implementation in Indonesia but has also demonstrated success in various countries (Baethge-Kinsky, 2020; Milyakina et al., 2020; Arkhangelsky & Novikova, 2021; Shliakhovchuk & Muñoz, 2020; Li et al., 2024). These findings suggest that such innovations are both necessary and worth adopting, provided they remain aligned with core cultural values.

To answer those problems, this research proposes the following problem formulation and objectives. This research specifically aims to: (1) Analyze the level of understanding and practice of local cultural values in elementary school students in the digital era; (2) Design and develop interactive e-modules based on local cultural values that are contextual and in accordance with the learning characteristics of elementary school students; (3) Test the effectiveness of interactive e-modules based on local cultural values in improving tolerance attitudes of elementary school students through a quasi-experimental approach.

This research makes an original contribution to technology-based character education innovation through six main novelties. First is the development of an interactive e-module based on local cultural values, specifically designed to instill tolerance in the context of elementary school students. Second, applying the ADDIE model comprehensively from analysis to evaluation is still rarely done in the development of culture-based media. Third is the transformation of local values into a communicative digital format as a response to shifting social values. Fourth is the use of the Fuzzy Delphi method for precise content validation. Fifth, the evaluation used a mixed methods approach through a quasi-experiment design and qualitative observation. Sixth is active involvement of cross-disciplinary stakeholders to ensure an inclusive, valid, and sustainable product.

METHODS

This research is research and development aimed at developing an interactive e-module based on local cultural values as a learning medium to foster tolerant attitudes in elementary schools. The development model used was ADDIE (Analysis, Design, Development, Implementation, Evaluation) modified with a mixed methods approach, the Fuzzy Delphi method, and a quasi-experimental evaluation design to increase the validity of the development process and products. Figure 4 illustrates the flow of the overall research method.

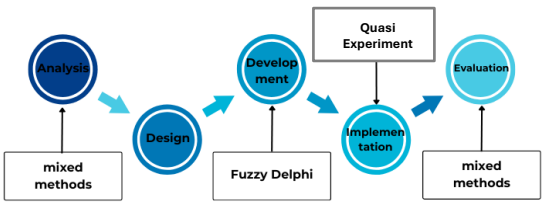


Figure 4. Modification of the ADDIE Model in Educational Research

1. The analysis stage was conducted with a mixed methods approach, combining qualitative and quantitative data to identify

learning needs related to tolerance attitudes and integration of local cultural values. Data was collected through in-depth interviews, field observations, and documentation studies.

2. In the design stage, an interactive e-module framework was designed based on the results of the previous analysis. At this stage, the content structure, learning flow, and interactive elements relevant to the local cultural context were determined.
3. In the development stage, a validation process using the Fuzzy Delphi method was conducted to obtain consensus from experts on the feasibility of e-module content and design. The steps of Fuzzy Delphi analysis include the following.

Table 1. Conversion of Likert Scale to Triangular Fuzzy Numbers (TFN)

Likert Scale	Linguistic	TFN (l, m, u)
1	Strongly Disagree	(0.0, 0.0, 0.1)
2	Disagree	(0.0, 0.1, 0.3)
3	Neutral	(0.1, 0.3, 0.5)
4	Agree	(0.3, 0.5, 0.7)
5	Strongly Agree	(0.5, 0.7, 1.0)

a. Calculate the Average TFN of Each Statement.

$$l_{avg} = \frac{\sum l_i}{n}, \quad m_{avg} = \frac{\sum m_i}{n}, \quad u_{avg} = \frac{\sum u_i}{n}$$

$l_i m_i u_i$, is the fuzzy value of the i-th expert, and n is the number of experts.

b. Calculate Defuzzification Value (D-Conversion).

$$D = \frac{l_{avg} + m_{avg} + u_{avg}}{3}$$

This value was used for the final interpretation numerically (crisp).

c. Calculate Threshold Value (d-value) for Consensus.

$$d_{ij} = \frac{1}{3}[|l_i - l_j| + |m_i - m_j| + |u_i - u_j|]$$

Consensus is considered achieved if the average value of$d \leq 0.2$ and at least 75% of experts give TFN judgement > 0.5. Once consensus was reached, the module was digitally developed and tested for content validity based on expert input.

4. The implementation stage was conducted through a quasi-experiment approach by applying the e-module in real classroom settings. In the experimental group, students used the e-module for six sessions spread over three weeks (two sessions per week, each lasting 80 minutes). During the sessions, teachers acted as facilitators, guiding students in exploring cultural content, completing interactive quizzes, and reflecting on tolerance scenarios presented in the module. In contrast, the control group did not use the e-module but instead received conventional tolerance lessons through lectures, textbook readings, and class discussions. This parallel structure ensured that both groups had the same instructional time, but with different delivery methods. Such a design made it possible to isolate the impact of the e-module as the primary intervention factor.
5. Evaluation was conducted using a mixed methods approach. Quantitative data were collected through pretests and posttests, while qualitative data were obtained from classroom observations and interviews with students and teachers.

This research was conducted in four public elementary schools located in Bekasi Regency, West Java Province, as shown in Table 2.

Table 2. Distribution of Research Subjects

No.	School Name	Number of Students
1	SDN Pasirsari 03	27
2	SDN Sukaresmi 06	34
3	SDN Cijengkol 03	27
4	SDN Wanajaya 05	32

The main participants were 120 fifth-grade students recruited from four public elementary schools in Bekasi Regency. Two schools (SDN Pasirsari 03 and SDN Sukaresmi 06) were assigned as the experimental group (n = 61), while the other two (SDN Cijengkol 03

and SDN Wanajaya 05) were assigned as the control group (n = 59). This allocation was done at the school level to avoid mixing between treatments. Prior to the intervention, a pretest on tolerance attitudes was administered to both groups, and the results indicated no significant difference ($p > 0.05$), confirming baseline equivalence. Additional informants in this study included four classroom teachers, four school principals, and several local community leaders who provided contextual insights through interviews and observations.

The choice of location was based on the consideration that the Bekasi district is an area experiencing social and cultural dynamics due to the rapid urbanization process. In this context, the integration of local cultural values into learning becomes crucial to maintain identity and foster tolerance from an early age. The four schools were purposively selected because they represent the diversity of student backgrounds and are committed to strengthening character education based on local cultural values.

The stages of data analysis are presented in Table 3.

Table 3. Details of Data Analysis Techniques Based on Stages

Stages (Type)	Instrument	Technique
Analysis (Qualitative)	Interviews with teachers, classroom observations & documentation	Thematic coding, data reduction, and triangulation
Design (Quantitative)	Delphi questionnaire (expert panel)	Triangular Fuzzy Number (TFN), threshold value, and consensus level (Fuzzy Delphi)
Development (Qualitative)	Expert validation sheets and qualitative comments	Categorization of comments, narrative interpretation, and triangulation
Implementation (mixed)	Classroom observations, field notes, learning documentation, and field notes	Qualitative descriptive analysis, activity analysis, and process documentation
Evaluation (Quantitative)	Tolerance Attitude Questionnaire (20 items, 5-point Likert scale); Pre/Post Test	Validity test (Aiken's V = 0.87), Reliability test (Cronbach's Alpha = 0.89), T-test (if normal), Wilcoxon (if abnormal), comparative analysis

Quantitative data were then analyzed with the help of SPSS software for statistical tests and NVivo for qualitative data. A triangulation approach was used to ensure the validity of results from multiple sources and instruments.

RESULTS AND DISCUSSION

Analysis Stage

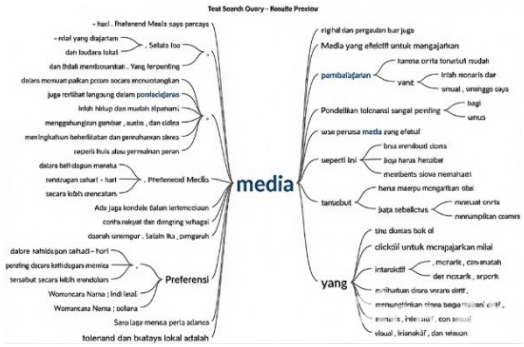
The initial stage in the development of learning media for the Integration of Local Cultural Values in Interactive E-Modules as an Innovation in Tolerance Learning in Elementary Schools began with a needs analysis using a qualitative approach. Data was obtained through in-depth interviews with classroom teachers and direct observation of the learning process in several elementary schools.

Data from interviews and observations were analyzed using data reduction techniques, followed by thematic coding to identify relevant main themes. This process resulted in some significant findings, among others:

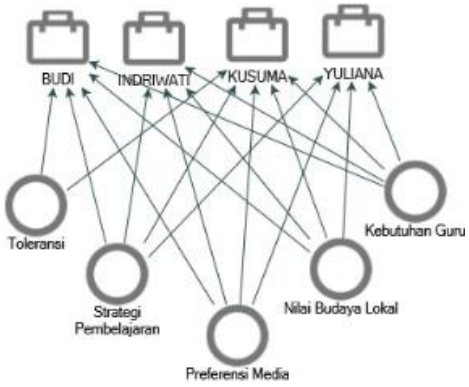
1. The need for contextualized and interactive learning media
2. The lack of availability of materials on tolerance at the elementary school level
3. Teachers' expectations of media that integrate local cultural values

As part of the representation of the analysis results, several forms of data visualization were used, shown in Figures 5a, 5b, and 5c.

(a)



(b)



(c)

Figure 5. Results of Qualitative Analysis Stage

Figure 5a displays the results of the Word Cloud analysis, showing words with high frequency in the interview narratives. Words such as *"tolerance"*, *"local culture"*, *"interactive"*, and *"learning media"* appeared predominantly in Indonesian, reflecting the informants' main focus of attention. Figure 5b is a Mind Map of the text search query results, illustrating the association of "media" with concepts such as *interactive*, *cultural values*, *folklore,* and *visualization*. This confirms the importance of learning media that is not only engaging but can also convey the message of tolerance through a local cultural approach. Figure 5c results from data triangulation, combining information from four informants (Budi, Indriwati, Kusuma, and Yuliana) on five main themes: *tolerance*, *learning strategies*, *local cultural values*, *media preferences,* and *teacher needs*. These visualizations illustrated the consistency between the results of interviews, observations, and literature review on the urgency of integrating tolerance values in basic education.

Design Stage

A quantitative approach was used through the Fuzzy Delphi method to agree on the main components of the e-module. The expert panel comprised teachers, primary education lecturers, and learning technology experts. The Delphi questionnaire was administered in two rounds and analyzed using the threshold value (d), TFN, and consensus level. Results showed high consensus on:

1. Presentation of tolerance material through folklore
2. Use of interactive visual and audio media
3. Integration of local cultural values in the context of students' daily lives

The application design was arranged as a flowchart, with a web-based platform that can be accessed through Android devices, supporting learning in class and independently, as depicted in Figure 6.

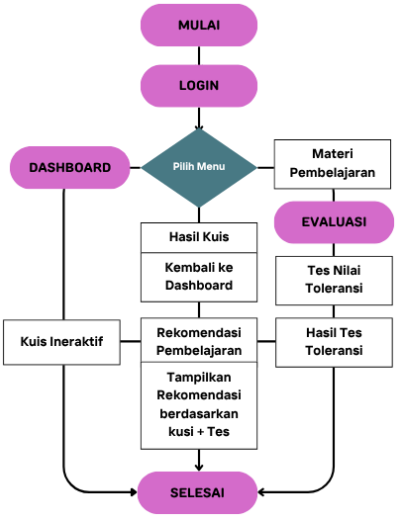


Figure 6. Cultural Value E-Module Application Flowchart Design

1. Login Page - User access (student/teacher).
2. Main Dashboard - Displays the main menu (Materials, Quizzes, Tolerance Value Tests, and Learning Recommendations).
3. Learning Materials - Contains interactive e-modules with local cultural content.
4. Interactive Quiz - Evaluation of student understanding with contextual questions.
5. Tolerance Value Test - Assessment of students' attitudes through scenario-based tests.
6. Learning Recommendations - The system

provides further recommendations based on test and quiz results.

Development Stage

In the development stage, an interactive e-module based on local culture was developed to strengthen tolerance values in learning. This e-module consisted of several main features: the login page, main dashboard, Jaipong cultural learning materials from West Java, interactive quizzes, and scenario-based tolerance value tests. The development was carried out iteratively and refers to learning design principles that are in accordance with the characteristics of learners. After the initial development was completed, the e-module was validated by three experts with expert backgrounds in learning, local culture, and educational technology.

The validation was conducted using a quantitative rating sheet with a scale of 1-5 and accompanied by qualitative comments. The results of expert validation of the content and display aspects of the e-module are shown in Table 4. This blueprint was designed to ensure a fun, contextualized, and meaningful learning experience. The aim was to shape students' understanding and attitude of tolerance from an early age through a local cultural approach that is close to their daily lives.

Table 4. Results of Expert Validation

No.	Aspects	Expert			Mean	Criteria
		A	B	C		
1	Suitability of the material with learning objectives	4	4	5	4.33	Very good
2	Appropriateness of the material to the level of student development	5	4	4	4.33	Very good
3	Clarity of local cultural value content	5	5	5	5.00	Very good
4	Media interactivity	4	3	4	3.67	Good
5	Visual appearance and design	4	4	5	4.33	Very good
6	Ease of use (user-friendly)	4	4	4	4.00	Good
7	Relevance of tolerance value in e-module	5	5	5	5.00	Very good
8	Media innovation and novelty	4	4	5	4.33	Very good

The validation results using the Fuzzy Delphi method showed that all aspects of the e-module received excellent ratings, with consensus reached among experts. The developed e-module has met the content, design, and educational value standards and is ready to be further tested at the implementation stage. To complement the quantitative validation, qualitative comments from the experts were categorized to deepen the interpretation of the results in Table 5.

Table 5. Categories of Comments and Narrative Interpretation

Category	Expert Comment
Visual and design	*"The display is attractive and appropriate for elementary school students."*
Local cultural values	*"The material is very contextual, suitable for introducing culture."*
Interactivity	*"Interactive quizzes can increase student engagement."*
Relevance of tolerance values	*"The content contains tolerance messages that are easy for children to understand."*

Based on validation and feedback, the e-module was developed in digital form with an interactive and responsive interface. The following is the display of the e-module.

(a) (b)

(c) (d)

Figure 7. Visual of Interactive E-Module

Figure 7 shows the main display of the developed interactive e-module. The interface was designed with an attractive and child-friendly visual appearance, using bright color elements and simple icons. The main menu included direct access to materials, quizzes, tolerance score tests, and learning recommendations. These visuals aimed to increase student attraction and ease navigation during learning. The e-module can be downloaded at https://educsmart.net/e-modul-budaya.php

Implementation Stage

The results of observations in the field are shown in Figure 8, the documentation of the research implementation stage, consisting of three parts.

(a)

(b)

(c)

Figure 8. Research Implementation Stages Documentation

In Figure 8a, about experiment class observation, the learning process in the experimental class showed students actively paying attention to the material through digital e-modules, with the teacher acting as a facilitator. On the other hand, Figure 8b about the control class observation depicts the condition of the control class, where students tended to be passive because learning was still conventional. Furthermore, Figure 8c about discussion and reflection with the teacher shows the discussion process between researchers and teachers after using e-modules in the experimental class.

Evaluation Stage

Statistical Result

Normality tests were conducted on pretest and posttest data in both experimental and control groups using Kolmogorov-Smirnov and Shapiro-Wilk tests. The results are presented in Table 6.

Table 6. Normality Test of Pretest and Posttest Data

Class	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Stats	df	Sig.	Stats	df	Sig.
Pretest experiment	.114	61	.047	.969	61	.125
Posttest experiment	.103	61	.170	.979	61	.385
Pretest control	.108	59	.084	.967	59	.116
Posttest control	.093	59	.200*	.963	59	.072

Although one Kolmogorov-Smirnov significance value was < 0.05 in the experimental pretest (p = 0.047), the Shapiro-Wilk significance values for all data were above 0.05. According to the literature, the Shapiro-Wilk test is more accurate for small samples (<200), so it can be concluded that all data are normally distributed. This allows the use of parametric analyses such as the t-test.

Furthermore, to test the equality of variances between groups, the Levene test was conducted. The results are shown in Table 7.

Table 7. Test of Homogeneity of Variance

	Levene Statistic	df1	df2	Sig.
Based on Mean	.790	1	118	.376
Based on Median	.432	1	118	.512
Based on Median and with adjusted df	.432	1	117.95	.512
Based on the trimmed mean	.811	1	118	.370

The results showed all significance values > 0.05, so it can be concluded that the data from both groups had homogeneous variances. With the fulfilment of this homogeneity assumption, it is allowed to use the independent samples t-test with the assumption of equal variance.

The t-test of two independent samples was conducted to determine the difference in posttest scores between the experimental and control groups. The test results are shown in Table 8.

Table 8. Independent Sample T-Test Results

Independent Sample T-test				
	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
			Lower	Upper
Equal variances assumed	.000	11.830	9.197	14.463
Equal variances not assumed	.000	11.830	9.196	14.464

The significance value (p) of 0.000 < 0.05 indicates a significant difference between the experimental and control groups. The experimental group had a higher mean posttest score by 11.83 points. This finding is reinforced by the 95% confidence interval (CI) range of [9.197, 14.463], which does not include zero, signaling strong evidence of a significant difference between the groups.

The experimental group showed an average increase of 19.66 points, while the control group increased by 10.08. Both increases were statistically significant (p < 0.05). This denotes that the treatment in the form of using e-modules had a greater impact on improving student learning outcomes. Visualization of the data in boxplot form is shown in Figure 9, the comparison of posttest scores of experimental and control groups.

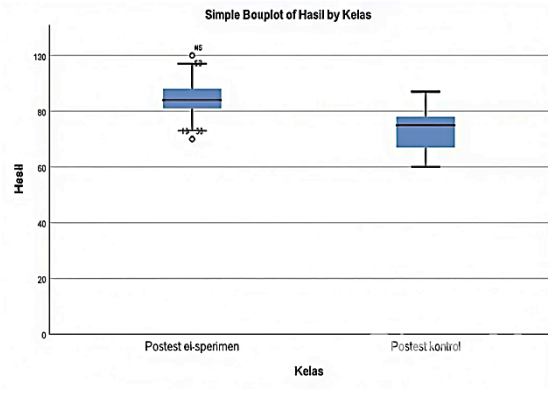


Figure 9. Comparison of Posttest of Experimental and Control Groups (Boxplot)

Based on the boxplot, it can be seen that the median score in the experimental group was higher than that in the control group. The distribution of the experimental group's scores

was also narrower, indicating more even learning outcomes. The presence of outliers in the experimental group indicates that some students experienced a very significant increase in learning outcomes, most likely because they were positively affected by the treatment. In contrast, the control group showed a wider spread and a lower median, reflecting greater variation in learning outcomes and relatively lower achievement.

Teacher Reflection and Observation

The two teachers involved in the study agreed that learning using e-modules based on local social and cultural values was able to improve students' understanding of tolerance values relevant to the local cultural context. Teacher Yuliana highlighted the positive changes in students' social attitudes as an indicator of the success of learning in shaping character. Meanwhile, teacher Indriwati noted the high enthusiasm displayed by students during the learning process, indicating the approach's success in terms of motivation.

In addition, the teachers also provided a number of inputs for the future development of the e-module, which can be used to evaluate and improve the learning program. The results of the reflection analysis with teachers are depicted in Figure 10.

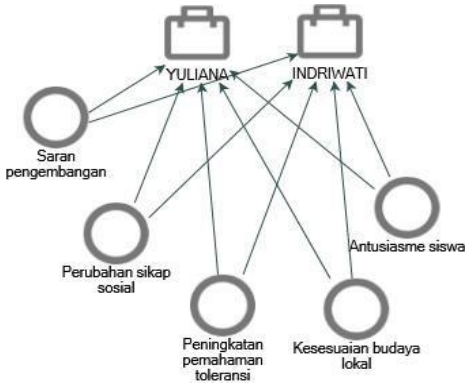


Figure 10. Teachers' Reflection on the Learning Effectiveness with E-Modules Based on Local Social and Cultural Values

The visualization above reinforces previous findings that using e-modules based on social values and local culture not only presents a more contextual learning experience but also encourages the formation of positive social characteristics such as cooperation, empathy, tolerant attitudes, and caring. In other words, this e-module is effective not only in cognitive aspects but also in the affective domain that supports character learning.

The following figure displays the results of qualitative analysis in the form of a Text Search Query Tree on the keyword "social," obtained from teacher reflection data and observations during the learning process using e-modules based on social values and local culture.

Figure 11. Visualization of Social Attitudes Changes and Student Motivation after the Implementation of the E-Modules

Figure 11 shows the context of using the word "social" in various statements, indicating that the e-module not only touches on academic aspects but also shapes students' character through social values, such as cooperation, empathy, and tolerance. Some responses stated that the module is quite relevant to real conditions and could provide contextualized learning experiences in accordance with local culture.

Discussion

More than just a learning tool, the e-module serves as a contextual medium that integrates values such as *gotong royong*, empathy, and tolerance into an engaging and accessible digital format. This aligns with the findings of Sunaryati et al. (2025) and Hutson & Fulcher (2023), who argue that culture-based educational technology bridges the gap between local wisdom and 21st-century learning needs. Teacher observations reinforced this conclusion, as students displayed higher enthusiasm, engagement, and positive social attitudes, particularly cooperation and mutual respect (Mahartini et al., 2024; Supeni et al., 2020).

In addition, teachers observed a significant change in students' social attitudes in their daily behavior, which served as an indicator of the success of the e-module implementation. Students became more active, engaged, and demonstrated positive attitudes towards learning that contained social values. This success can be explained through several pedagogical and psychological mechanisms. First, the e-module offered contextual learning, where cultural narratives and local practices (e.g., folklore and traditional arts) were directly connected to students' everyday experiences, making tolerance values more meaningful (Dewi et al., 2022; Hasan et al., 2024). Second, the integration of multimedia—text, visuals, and interactive quizzes provided multimodal representation, which is known to increase attention, motivation, and retention (Buthelezi et al., 2021; Krug et al., 2023). Third, the active involvement of students in interactive tasks fostered experiential engagement, aligning with constructivist learning theory that emphasizes active knowledge construction rather than passive reception (Burnett & Merchant, 2021; Hobbs, 2020).

From a novelty perspective, this study is among the first to combine local cultural values with interactive technology for character education in Indonesian elementary schools. While many digital learning innovations focus on cognitive outcomes such as literacy and numeracy, this e-module highlights affective dimensions, tolerance, empathy, and cooperation, often neglected in Edutech research (González-Betancor et al., 2021; Stenalt, 2021). The implications are significant—integrating cultural values into digital platforms can serve as a model for balancing global technological advancement with the preservation of national identity and local wisdom. Nevertheless, the study has limitations. The intervention lasted only three weeks, so its long-term impact on students' character development remains uncertain. In addition, the research was limited to four schools in Bekasi, meaning the findings may not fully represent the diversity of Indonesia's cultural and educational contexts. Future studies should explore larger samples, more extended implementation periods, and other affective aspects beyond tolerance.

CONCLUSION

This study demonstrates that integrating local cultural values into interactive e-modules significantly improves the tolerance attitudes of elementary school students. Using a modified ADDIE development approach and rigorous validation with the Fuzzy Delphi method, the e-module not only met pedagogical and cultural standards but also proved empirically effective. Statistical tests revealed significant differences between the experimental and control groups, with greater improvements in tolerance scores among students who used the e-module.

Successful scaling of the innovation requires strong support systems, leading to several stakeholder recommendations: (1) Policymakers should incorporate local culture-based digital resources into the national character education curriculum; (2) School principals must ensure infrastructure, such as stable internet and devices, and support teacher professional development in digital pedagogy; (3) Teachers are encouraged to adapt and update the e-module content to reflect local traditions; (4) Curriculum developers should create frameworks linking cultural values with digital learning tools. Additionally, future research should explore the study's implications across various regions and cultural contexts.

In conclusion, integrating cultural wisdom into interactive e-modules offers a powerful approach to shaping students' character in the digital era. With coordinated support from all stakeholders, this model can become a sustainable innovation for character education in Indonesia.

REFERENCES

Ai, Z., Chiu, D. K. W., & Ho, K. K. W. (2024). Social media analytics of user evaluation for innovative digital cultural and creative products: Experiences regarding Dunhuang Cultural Heritage. *Journal on Computing and Cultural Heritage, 17*(3), 42.

Arkhangelsky, A., & Novikova, A. (2021). A transmedia turn in educational strategies: Storytelling in teaching literature to

school students. *Voprosy obrazovaniya / Educational Studies Moscow, 2,* 63–81.

Astuti, T., Suyahmo, S., Masrukhi, M., & Ngabiyanto, N. (2024). Strategies of social adaptation of students in multi ethnic schools in the new normal era in elementary school, Tegal City, Indonesia. *Kasetsart Journal of Social Sciences 45*(4), 1089–1098.

Baethge-Kinsky, V. (2020). Digitized industrial work: Requirements, opportunities, and problems of competence development. *Frontiers in Sociology, 5*, 33.

Bonanati, S., & Buhl, H. M. (2022). The digital home learning environment and its relation to children's ICT self-efficacy. *Learning Environments Research, 25*(2), 485–505.

Burnett, C., & Merchant, G. (2021). Returning to text: Affect, meaning making, and literacies. *Reading Research Quarterly, 56*(2), 355–367.

Buthelezi, M., Chatikobo, T., & Dalvit, L. (2021). United in diversity? Digital differences and inequalities within a South African rural community. *Information Communication and Society, 24*(3), 455–469.

Chao, H. W., Wu, C. C., & Tsai, C. W. (2021). Do socio-cultural differences matter? A study of the learning effects and satisfaction with physical activity from digital learning assimilated into a university dance course. *Computers and Education, 165,* 104150.

D'Olimpio, L. (2021). Critical perspectivism: Educating for a moral response to media. *Journal of Moral Education, 50*(1), 92–103.

Dewi, C. A., Awaliyah, N., Fitriana, N., Darmayani, S., Nasrullah, N., Setiawan, J., & Irwanto, I. (2022). Using Android-based e-module to improve students' digital literacy on chemical bonding. *International Journal of Interactive Mobile Technologies, 16*(22), 191–208.

Dezuanni, M. (2021). Re-visiting the Australian media arts curriculum for digital media literacy education. *Australian Educational Researcher, 48*(5), 873–887.

Fedorov, A., & Mikhaleva, G. (2020). Current trends in media and information literacy in research and scientific publications of the early 21st century. *International Journal of Media and Information Literacy, 5*(2), 153–163.

Foster, B., Mihailidis, P., Johnson, P. R., Burth, S., Tully, M., Ramasubramanian, S., & Riewestahl, E. (2024). Designing equitable media literacy interventions for critical youth agency. *Global Studies of Childhood, 14*(4), 462–76.

González-Betancor, S. M., López-Puig, A. J., & Cardenal, M. E. (2021). Digital inequality at home. The school as compensatory agent. *Computers and Education, 168,* 104195.

Grothaus, C., Dolch, C., & Zawacki-Richter, O. (2021). Use of digital media in higher education across country contexts: A comparison between Germany and Thailand. *International Journal of Emerging Technologies in Learning, 16*(20), 64–83.

Hasan, M. F., Monita, D., & Sukiman, S. (2024). Revitalisation of Rejang tribal local wisdom: Integration of cultural values in the operational curriculum innovation of elementary schools in Rejang Lebong, Indonesia. *Education 3-13,* 1–18.

Hobbs, R. (2020). Propaganda in an age of algorithmic personalization: Expanding literacy research and practice. *Reading Research Quarterly, 55*(3), 521–533.

Hutson, J., & Fulcher, B. (2023). A virtual reality educational game for the ethics of cultural heritage repatriation. *Games and Culture, 18*(6), 759–782.

Jie, G., & Chaetnalao, A. (2023). Application of motion capture technology in the digital recreation of Tang dynasty mural art: A case study of Han Xiu's tomb. *International Journal of Arts and Technology, 14*(4), 298–319.

Krug, M., Thoms, L.-J., & Huwer, J. (2023). Augmented reality in the science classroom—Implementing pre-service teacher training in the competency area of simulation and modeling according to the DiKoLAN framework. *Education Sciences, 13*(10), 1016.

Li, K., Wang, F., & Pi, Z. (2024). Culture and self-construal in the age of globalization: an empirical inquiry based on multiple approaches. *Frontriers in Psychology, 15*, 1353898.

Lodi, M., & Martini, S. (2021). Computational thinking, between Papert and Wing. *Science and Education, 30*(4), 883–908.

Mahartini, K. T., Suastra, I. W., Sudiana, I. N., Gading, I. K., & Sanjaya, D. B. (2024). Crafting cultural narratives: Developing storybooks enriched with Bali's local heritage to improve students' understanding of spiritual and social attitude. *Edelweiss Applied Science and Technology, 8*(6), 9322–9327.

Manca, S. (2021). Digital memory in the post-witness era: How Holocaust Museums use social media as new memory ecologies. *Information, 12*(1), 31.

Manca, S., Raffaghelli, J. E., & Sangrà, A. (2023). A learning ecology-based approach for enhancing digital Holocaust memory in European cultural heritage education. *Heliyon, 9*(9), e19286.

Milyakina, A., Ojamaa, M., Pilipovec, T., & Rickberg, M. (2020). Literature on screen: Teaching adaptations in a multimodal course. *Media Practice and Education, 21*(3), 229–239.

Mindu, T., Mutero, I. T., Ngcobo, W. B., Musesengwa, R., & Chimbari, M. J. (2023). Digital mental health interventions for young people in rural South Africa: Prospects and challenges for implementation. *International Journal of Environmental Research and Public Health, 20*(2), 1453.

Misnah, M., Arafah, B., Usman, S., Ratu, B., Nurwahyuni, N., & Ruslin, R. (2024). Lore Lindu culture-based education learning development for elementary school students. *International Journal of Learning, Teaching and Educational Research, 23*(6), 620–639.

Puspasari, S., Suhandi, N., & Iman, J. N. (2021). Evaluation of augmented reality application development for cultural artefact education. *International Journal of Computing, 20*(2), 237–245.

Rafiuddin, R., Budiningsih, A. C., Suwarjo, S., Megawati, M., Puspitasari, E., & Harefa, E. (2024). Development of a social sciences learning model based on local wisdom Pangngadakkang Tupanrita by utilizing digital resources to improve prosocial behavior of elementary school: students South Sulawesi Province, Indonesia. *Revista de Gestao Social e Ambiental 18*(8), e05186.

Remillard, J. T., Van Steenbrugge, H., Machalow, R., Koljonen, T., Krzywacki, H., Condon, L., & Hemmi, K. (2021). Elementary teachers' reflections on their use of digital instructional resources in four educational contexts: Belgium, Finland, Sweden, and U.S. *ZDM – Mathematics Education, 53*(6), 1331–1345.

Rodríguez, N. C., Lorenzo-Rial, M. A., & Rodríguez, U. P. (2022). Digital competence of teachers in terms of content creation: Self-perception of

teachers in educational-scientific training in Galicia (Spain). *Educacao e Pesquisa, 48,* e243510.

Sadiah, E., Yanti, P. G., & Tarmini, W. (2024). Global diversity values in Indonesia: An elementary school high-grade Indonesian language textbook analysis. *International Electronic Journal of Elementary Education, 16*(3), 377–390.

Shliakhovchuk, E., & Muñoz, A. (2020). Intercultural perspective on impact of video games on players: Insights from a systematic review of recent literature. *Educational Sciences Theory & Practice, 20*(1), 40–58.

Smith, B. E., Pacheco, M. B., & Khorosheva, M. (2021). Emergent bilingual students and digital multimodal composition: A systematic review of research in secondary classrooms. *Reading Research Quarterly, 56*(1), 33–52.

Srinivasan, M., Dineshan, J., & Ramappa, S. (2021). COVID-19 and online education: Digital inequality and other dilemmas of rural students in accessing online education during the pandemic. *World of Media, 2021*(4), 34–54.

Steinberg, C., Zühlke, M., Bindel, T., & Jenett, F. (2020). Aesthetic education revised: A contribution to mobile learning in physical education. *German Journal of Exercise and Sport Research, 50*(1), 92–101.

Stenalt, M. H. (2021). Digital student agency: Approaching agency in digital contexts from a critical perspective. *Frontline Learning Research, 9*(3), 52–68.

Sukadari, S., Prihono, E. W., Singh, C. K. S., Syahruzah, J. K., & Wu, M. (2020). The implementation of character education through local wisdom based learning. *International Journal of Innovation, Creativity and Change, 11* (4), 389–403.

Sunaryati, T., Fatchan, M., Sudharsono, M., & Angela, P. (2025). Ethno-Edutainment Electronic Module (EMEE) to strengthen local cultural character in elementary school students. *EduBase: Journal of Basic Education, 6*(1), 136–145.

Supa, M., Nečas, V., Rosenfeldová, J., & Nainova, V. (2021). Children as cosmopolitan citizens: Reproducing and challenging cultural hegemony. *International Journal of Multicultural Education, 23*(2), 23–44.

Supeni, S., Ersta, L., Handinic, O., & Yusuf, Y. (2020). Moral values of the Javanese traditional game songs to strengthen character education at elementary schools in Surakarta. *International Journal of Innovation, Creativity and Change, 12*(11), 57–70.

Syahrial, S., Asrial, A., Maison, M., Mukminin, A., & Kurniawan, D. K. (2020). Ethnoconstructivism analysis: Study of pedagogic mathematics competence of primary school teachers. *International Journal of Evaluation and Research in Education, 9*(3), 614–624.

Tohri, A., Rasyad, A., Sururuddin, M., & Istiqlal, L. M. (2022). The urgency of Sasak local wisdom-based character education for elementary school in East Lombok, Indonesia. *International Journal of Evaluation and Research in Education, 11*(1), 333–344.

Tsene, L. (2022). Using comics as a media literacy tool for marginalised groups: The case of Athens comics library. *Media and Communication, 10*(4), 289–293.

Varinlioglu, G., Afshar, S. V., Eshaghi, S., Balaban, O., & Nagakura, T. (2022). GIS-based educational game through low-cost virtual tour experience Khan game. *POST-CARBON: Proceedings of the 27th International Conference of the Association for Computer-Aided Architectural Design Research in Asia (CAADRIA) 2022, 1,* 69–78.