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The impact of the Riau Malay culture e-module on high school students' understanding of self-identity values: Study in Riau -Indonesia

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Abstract

This study aims to determine the effect of using the Riau Malay cultural e-module on the understanding of self-identity values among high school students in Riau Province. The background of this research is the still low level of students' understanding of local cultural values due to the limited availability of contextual and interactive learning media. The method used is quasi-experimental with a pretest-posttest control group design. The research sample consists of high school students selected purposively. The instruments include a self-identity values comprehension test and a student response questionnaire toward the e-module. The results indicate that the use of the Riau Malay cultural e-module significantly enhances students' understanding of their self-identity values compared to conventional methods. Additionally, students responded positively to the interactive e-module containing local cultural content. In conclusion, the Riau Malay cultural e-module is effective as a learning medium to strengthen the self-identity values of high school students in Riau Province. The implication of this study encourages the broader development of locally-based cultural teaching materials in the school environment.

Keywords: Cultural learning, Riau Malay culture, Self-identity values.

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1. Introduction

The Riau Malay culture is an important cultural heritage and serves as the primary identity of the Riau community. However, the understanding of the self-identity values of this culture among high school students remains suboptimal. This is due to the lack of interactive and contextually relevant learning media related to local culture. Therefore, the use of a Riau Malay culture-based e-module emerges as a solution to improve students' understanding of these self-identity values,

considering the effectiveness of digital media in learning and the relevance of integrating local culture into the curriculum [1, 2]. The Riau Malay Culture (BMR) subject has been implemented in nearly all regencies and cities in Riau Province, from elementary to high school levels (SMA/SMK/MA). The learning materials refer to Riau Governor Regulation Number 921 of 2019, which outlines the following characteristics: (1) behaviors reflecting obedience to parents, loyalty to leaders, togetherness, unity, mutual cooperation, empathy, justice, sincerity and willingness to sacrifice, hard work, diligence and perseverance, self-confidence and independence, goodness, responsibility, shame, compassion, respect for ownership, deliberation and consensus, courage, honesty, thriftiness and carefulness, humility and positive assumptions, acceptance of winning and losing, self-awareness, openness, forgiveness, generosity, trustworthiness, time appreciation, foresight and simple living; (2) factual and conceptual knowledge about the environment and Malay ecological wisdom, language and politeness in social interactions, Malay customs and manners, history, clothing, arts, food, traditional games, traditional medicine, technology, economy and livelihood in Riau Malay culture, and leadership within the culture; (3) the ability to think and act productively and creatively, to process, reason, and present concrete and abstract matters related to independent school learning, acting effectively and creatively, and using methods according to scientific principles.

Through literature review, data show that local content subjects are less favored by students at schools. Local content subjects are perceived as additional subjects that do not support their academic achievements. This aligns with what Dinata and Sastrawati [3] stated, noting that the implementation of local content subjects faces challenges as students do not favor them. This is a challenge for teachers and the education sector. Identified inhibitors to local content subject implementation: (a) lack of variety in local language textbooks, (b) low student interest, and (c) insufficient number of local language teachers relative to the students taught [3]. Furthermore, found that many schools in Rokan Hilir lack Malay culture local content teachers, with many current teachers not matching their expertise and not receiving government training [4]. There has been no dissemination from the Office of Education and Culture about Regent Regulation Number 79 of 2017 concerning the implementation of local content learning for Rokan Hilir Malay culture. The conclusion of this study is that the authority of the Education and Culture Office to appoint local content teachers based on this regulation has not been implemented, with many teachers not appointed or trained by the government, and many schools lacking local content teachers or having teachers not suited to the subject who should be trained to possess the knowledge and skills regarding Rokan Hilir Malay culture local content. The Riau Malay culture is a vital cultural heritage and the main identity of the people in Riau Province. This culture encompasses not only arts and traditions but also norms, customs, language, and value systems that underpin the social life of the Malay Riau community [4]. The Malay Riau people strongly uphold customs ingrained in daily life and passed down through ceremonies, traditional arts, and social interactions that reflect values of togetherness, mutual respect, and harmony [5]. Traditional Riau Malay clothing, such as kebaya labuh and teluk belanga, symbolize elegance and cultural identity strength, reflecting social status and pride in their cultural heritage [6].

However, in the educational context, the understanding of high school students regarding the self-identity values of Riau Malay culture is still lacking. Various factors contribute, including limited interactive and contextually relevant learning media tied to the actual local culture in their environment. Conventional learning media, which tend to be textual and passive, fail to engage students deeply and support their comprehension of local cultural values [1]. In response, the development and use of a digital e-module based on Riau Malay culture emerges as an innovative and effective solution. The e-module offers interactive and flexible features that enable students to learn in a more engaging and contextual manner. Advantages include easy access anytime and anywhere, multimedia material presentation that supports various learning styles, and integration of local cultural content presented in a modern and appealing way [7]. This meets 21st-century learning needs, requiring information technology use in classrooms and integration of local values to prevent their disappearance amid globalization.

The Riau Malay culture-based e-module not only serves as a teaching aid but also functions as a media for preserving and strengthening students' cultural identity. Through this media, students can gain in-depth knowledge of various Malay cultural aspects such as customs, language, arts, and social ethics typical of Riau society. The understanding developed is not only cognitive but also affects students' attitudes and supports character and self-identity reinforcement as part of the Malay Riau community [1, 7]. Besides providing an innovative alternative learning method, the implementation of this e-module aligns with government policies to strengthen character education and local wisdom in the national curriculum. Integrating local culture in education is expected to prevent the erosion of noble cultural values that are the roots of national identity. Therefore, the Riau Malay culture-based e-module can be a model for learning that not only enhances student knowledge but also fosters pride and sustains local culture amid modernization [1, 7]. In conclusion, the Riau Malay culture, as a rich heritage and key identity of the Riau people, must be preserved by optimizing education and interactive, contextual learning media like the e-module. This effort will improve students' understanding of cultural self-identity values and strengthen the sustainability of the Riau Malay culture as part of Indonesia's cultural wealth.

2. Theoretical Review

Cultural self-identity values are essential and fundamental elements of cultural identity that intricately connect individuals to their communities. These values create a deep sense of belonging and provide distinctive traits that differentiate one community from another. They serve as the bedrock for shaping individual character and guiding behavior within societal contexts. By internalizing such cultural values, individuals develop cohesion with their community and preserve the unique characteristics that define their collective identity. According to [8], cultural values play a pivotal role in fostering characteristics that uphold local norms and traditions. This is particularly important in the context of education, where learning about one's cultural heritage can reinforce a student's connection to their roots. For example, in the Riau Malay community, cultural values include politeness, cooperation and mutual respect. These values are not only social

constructs but act as moral guidelines that influence behavior and interaction within the community. Understanding and embracing these values help students develop respect for themselves and others, promoting harmony and solidarity in society. Learning about Riau Malay culture is essential for students because it enables them to recognize and appreciate the distinct values and norms that define their community's identity. Through the educational process, students are introduced not only to the explicit cultural practices but also to the underlying moral messages embedded within these traditions. These noble values serve to strengthen the foundation of their cultural self-identity, guiding their attitudes, choices, and social conduct according to the wisdom passed down through generations.

The process of cultural learning creates a meaningful connection between students and their heritage, which is crucial in an era of globalization where cultural uniqueness is at risk of being diluted. Engaging with cultural teachings allows students to situate themselves within a broader cultural narrative, fostering pride and commitment to preserving their cultural legacy. This educational journey also enhances the development of an ethical and moral compass based on culturally rooted principles, which supports the formation of balanced individuals who contribute positively to their communities. In sum, cultural self-identity values represent more than just social conventions they are integral to the formation of character and foster a collective identity that sustains cultural continuity. Educating students about these values, particularly through the lens of Riau Malay culture, equips them with a profound understanding and appreciation of their cultural uniqueness. This, in turn, strengthens their sense of belonging and equips them to uphold and perpetuate the essential norms and traditions of their community, ensuring cultural vibrancy in the future. Furthermore, learning media in the form of e-modules offers significant advantages in facilitating the understanding of these cultural values in a more interactive and accessible manner. Emphasize that the Riau Malay culture-based e-module provides an innovative solution to the limitations of conventional learning media that are less contextual [1]. The e-module can present interactive material with attractive digital displays and easy navigation, motivating students to learn independently and relate the learning content to their daily lives. Another benefit is its accessibility anytime and anywhere, supporting flexible and personalized learning. The learning approach used in this e-module is strongly influenced by constructivist theory, which emphasizes active and meaningful learning where students build their knowledge through interaction with learning materials and their social environment. Combined with culture-based learning, this e-module not only teaches academic concepts but also integrates local wisdom that defines Riau's cultural identity. According to [9], culture-based learning through ethnomathematics e-modules can improve the relevance of mathematics learning with the students' surrounding culture, thereby enhancing understanding while preserving local culture within a modern educational context.

Moreover, this culture-based e-module media also provides teachers with an easier way to deliver materials integrated with Riau Malay cultural values, which have not been maximally realized in face-to-face learning. Research by Tambak and Syahraini [8] shows that the combination of learning technology and local culture in the e-module can increase students' learning interest and deepen their cultural knowledge. This contributes to character strengthening through the internalization of the taught cultural values.

Table 1.
Self-Identity Value Meaning.

No	Self-Identity Value	Meaning
1	Piety to God	All cultural values and social norms must refer to Islamic teachings and strictly prohibit contradicting or violating them.
2	Gratitude for His Blessings	Fully realizing that blessings from Allah are solely His grace and mercy.
3	Obedience to Parents	Doing good or serving both parents and obeying their commands except for sinful ones, and praying for them after their passing.
4	Loyalty to Leaders	Obeying and submitting to rules set by leaders to achieve common welfare.
5	Togetherness, Unity, and Cooperation	Demonstrating Malay attitudes that regard all humans as brothers, united and cooperating.
6	Justice and Truth	For the Malay people, justice and truth are the main keys to uphold dignity and honor.
7	Sincerity and Willingness to Sacrifice	This attitude strengthens social solidarity deeply and fosters true brotherhood.
8	Hard Work, Diligence, and Persistence	Those who work hard, diligently, and sincerely are considered exemplary and responsible.
9	Self-confidence and Independence	Represent the peak of one's ability to stand firm and strong on their own feet without dependence on others.
10	Noble-mindedness	Cultivating and reciprocating kindness and gratitude are noble and praiseworthy acts.
11	Responsibility	Every member of society is required to live responsibly toward themselves, family, community, nation, and country.
12	Sense of Shame	Means being ashamed of doing improper things.
13	Compassion Toward Others	Compassion extends not only within family or relatives but also in friendships and community.
14	Rights and Ownership	Upholding rights and ownership of individuals, society, or authorities.
15	Deliberation and Consensus	Any plan or work, whether personal, familial, or public, must be deliberated upon jointly.
16	Courage	Courage that is respected and admired is bravery for what is right and good.
17	Honesty	Honest, sincere, upright, and pure-hearted people are respected and esteemed by society.
18	Thriftiness and Prudence	Recognizing the benefits of being thrifty and prudent; calculating possibilities to ensure smooth life and economy.
19	Humility	Avoiding arrogance, pride, boasting, harsh words, and refusing to exalt oneself.
20	Positive Assumptions	Good assumptions maintain unity, harmony, and cooperation within the society.
21	Avoiding Sulking	Malays strongly avoid sulking in any form as it is considered disgraceful and irresponsible.
22	Self-awareness	Personal awareness of the essence, purpose, and end of life, along with rights and obligations that must be fulfilled.
23	Openness	Being straightforward and transparent, reflecting honesty.
24	Forgiving and Generous	Reflects high social solidarity, humility, sincerity, non-vengefulness, tolerance, and noble character.
25	Trustworthiness	Being reliable, responsible, honest, and loyal.
26	Utilizing Time	Time must be used wisely to live prosperously.
27	Forward-looking	Life is not only for the past and present but also for the future in both worldly and hereafter terms.
28	Living Simply	Reflects a modest lifestyle, avoiding luxury yet not being impoverished, and not neglecting worldly responsibilities.

Thus, the importance of utilizing the Riau Malay culture-based e-module extends beyond the cognitive aspect to include affective and psychomotor domains in shaping the self-identity of high school students in Riau Province. A deep understanding of these cultural self-identity values will equip students to become individuals who are not only academically intelligent but also possess strong character, cultural awareness, and a sense of pride and love for their ancestral heritage. This demonstrates that cultural values can act as a unifying force in society, preventing misperceptions and fostering relevance in education [10].

3. Research Methodology

This study employs a quasi-experimental method with a pretest-posttest control group design to examine the effect of using the Riau Malay cultural e-module on high school students' understanding of self-identity values in Riau Province.

The research sample consists of 360 students selected through a multistage random sampling system. Multistage random sampling was chosen due to the large and heterogeneous population in the Riau Province area, making this technique effective in obtaining a representative sample gradually and systematically. The first stage involves defining the population of high school students in several regencies/cities in Riau. The second stage randomly selects several sub-districts from those regencies/cities. The third stage randomly selects schools within the chosen sub-districts, and the final stage randomly selects students from these schools to reach a total of 360 students as the research sample [11].

The research instruments consist of a self-identity values understanding test administered before (pretest) and after (posttest) students use the e-module, as well as a questionnaire capturing students' responses to the effectiveness of the learning media. This approach allows measurement of changes in students' cultural value comprehension while controlling for other variables. Pretest and posttest data are analyzed using inferential statistical tests, such as the t-test to compare mean comprehension scores before and after the intervention, and descriptive analysis to assess students' attitudes and responses toward the e-module use ([1, 9]). The use of multistage random sampling in this study ensures that the obtained sample is a good representation of the large population in Riau Province, reduces sampling bias, and enhances the validity of the research results. This technique also provides efficiency in data collection by considering geographical and administrative layers. With a sample size of 360 students, this study has sufficient statistical power to detect significant effects of e-module use on understanding self-identity values, while also providing a comprehensive overview of students' perceptions of digital learning media based on Riau Malay culture.

With this systematic methodological design and sampling technique, the study can provide strong empirical evidence regarding the effectiveness of the Riau Malay culture e-module in enhancing high school students' understanding, which is useful for developing broader policies on culturally based learning in formal education settings.

4. Research Results and Discussion

The results show that the use of the Riau Malay culture e-module significantly improves high school students' understanding of their cultural self-identity values. The experimental group using the e-module achieved higher gains in comprehension test scores compared to the control group using conventional learning methods. Student responses to the e-module were also positive, expressing that the material was more engaging and easier to understand because it integrated local cultural aspects [1, 7].

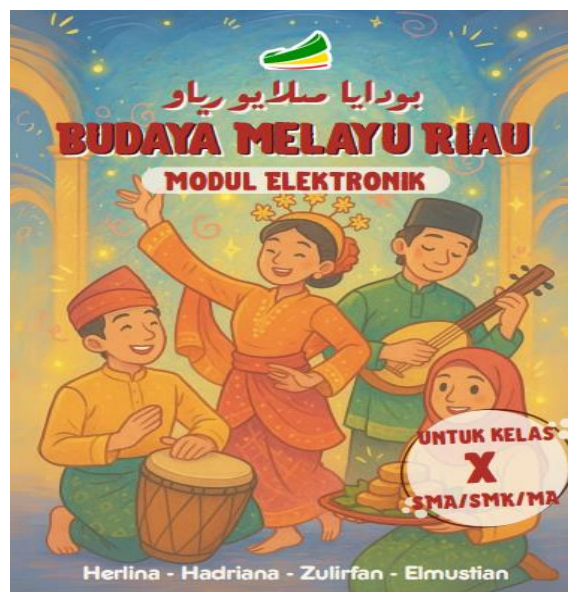


Figure 1.
The Riau Malay Culture E-Module.

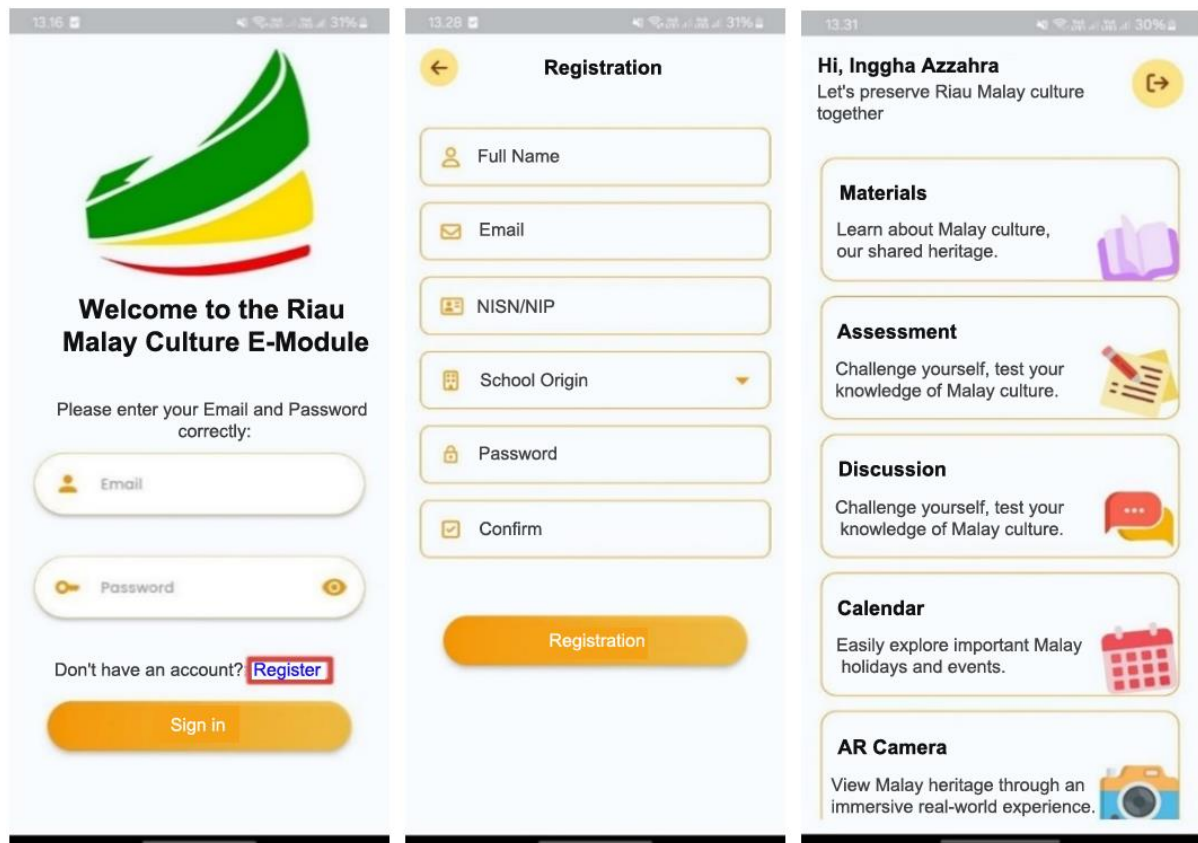


Figure 2.
Registration of Menu.

Based on statistical data processing, the following conclusions were drawn. Experimental Class Test Results Thus, the importance of utilizing the Riau Malay culture-based e-module extends beyond the cognitive aspect to include the affective and psychomotor domains in shaping the self-identity of high school students in Riau Province. A deep understanding of these cultural self-identity values will equip students to become individuals who are not only academically intelligent but also possess strong character, cultural awareness, and a sense of pride and love for their ancestral heritage.

Table 2.
Experimental Class Test Results.

Group Statistics										
Group		N	Mean	Std. Deviation	Std. Error Mean					
Test Result	PreTest	180	65.8778	6.43720	0.47980					
	PostTest	180	85.0056	1.43577	0.10702					
Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
										95% Confidence Interval of the Difference
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Test Result	Equal variances assumed	89.027	0.000	-38.910	358	0.000	-19.12778	0.49159	-20.09454	-18.16101
	Equal variances not assumed			-38.910	196.766	0.000	-19.12778	0.49159	-20.09724	-18.15832

The difference test results using SPSS showed that the average pretest score was 65.88, whereas the average posttest score significantly increased to 85.01 among 180 students. Levene's Test yielded an F value of 89.027 with a significance

of 0.000 (< 0.05), indicating that the variances of the two data groups differ, thus the t-test results with the assumption of unequal variances were used. The t value of -38.910 with 358 degrees of freedom and a significance of 0.000 ($p < 0.05$) indicates a highly significant difference between the pretest and posttest averages. The mean difference of -19.13 demonstrates a significant increase in posttest scores compared to the pretest. In conclusion, there is a significant improvement in understanding following the learning intervention using the Riau Malay culture e-module.

Table 3.
Control Class Test Results.

Group Statistics										
	Kelompok	N	Mean	Std. Deviation	Std. Error Mean					
HasilTest	PreTest	180	65.9333	6.41367	0.47805					
	PostTest	180	74.7778	1.73867	0.12959					
Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
HasilTest	Equal variances assumed	70.246	.000	-17.857	358	0.000	-8.84444	.49530	-9.81851	-7.87038
	Equal variances not assumed			-17.857	205.168	0.000	-8.84444	.49530	-9.82098	-7.86791

The difference test results in the control class show a significant increase from pretest to posttest. The average pretest score was 65.93, while the posttest score increased to 74.78. Levene's test indicated a significant difference in data variance ($p = 0.000$), so the t-test used the assumption of unequal variances. The t value of -17.857 with a significance of 0.000 ($p < 0.05$) indicates a statistically highly significant difference between the pretest and posttest averages. This means the average score increase of 8.84 points is not due to chance but reflects a positive effect from the learning during the testing period. Thus, the learning received by students in the control class successfully improved their understanding significantly from the beginning to the end of the test.

Table 4.
Comparison of Learning Outcomes between Control and Experimental Classes.

Group	Number of Students	Average Pretest	Average Posttest	Average Increase
Experimental	360	65.88	85.01	19.11
Control	360	65.93	74.78	8.85
Total	720			

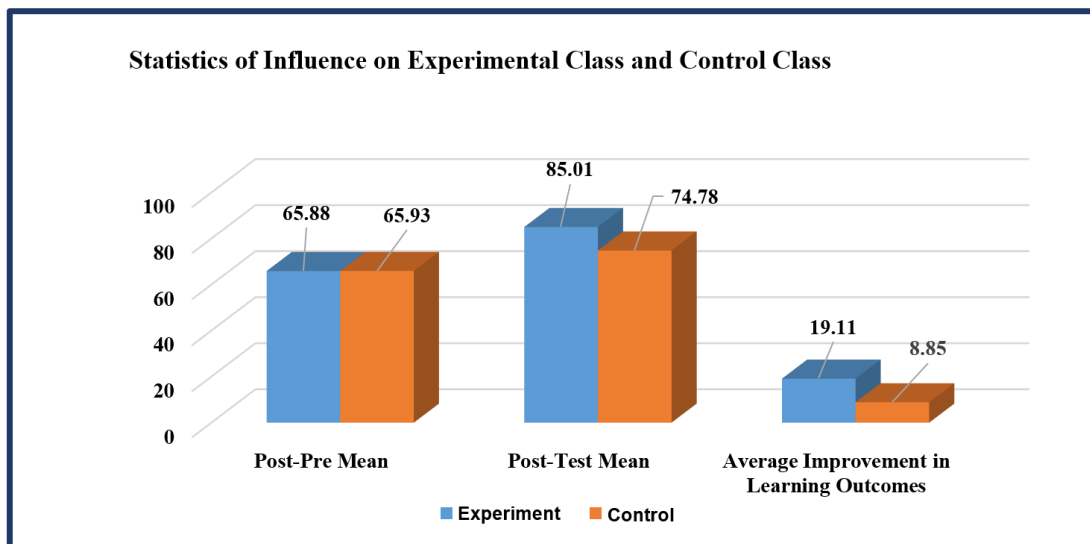


Figure 3.

Comparison of Learning Outcomes between Control and Experimental Classes.

The comparison chart of learning outcomes between the experimental and control classes shows significant results in the educational research series. The experimental class, which received treatment using the Riau Malay culture e-module, experienced an average score increase from 65.88 to 85.01, with a gain of 19.11 points. In contrast, the control class using conventional teaching methods only improved from 65.93 to 74.78, with an increase of 8.85 points. Furthermore, based on observation results, the following assessment outcomes were obtained. Below are the observational assessment results on the use of the Riau Malay culture e-module in enhancing high school students' understanding of self-identity values in Riau Province, presented in a table using a Likert scale of 1–5:

Table 5.

The Observational Assessment Results on the Use of the Riau Malay Culture E-Module in Enhancing High School Students'.

Aspect of Student Self-Identity Values	Assessment Description	Likert Scale	Rating
Malay Personality	Attitudes of mutual respect, manners, and ethics in behavior according to Malay cultural values	5	Very Good
Societal	Understanding and appreciation of Malay customs, behavioral patterns, and traditions	4	Good
Malay Language and Literature	Use of Malay language/literature that enhances pride and connection with local culture	4	Good
Interest and Relevance of Local Culture	Students' perception of the relevance of Malay culture in daily life and learning	3	Fairly Good
Teacher's Role in Implementation	Teachers' understanding and ability to teach Malay cultural values through the e-module	3	Fairly Good
Use of Interactive Media	Effectiveness of the e-module as interactive learning media that fosters interest and understanding	4	Good

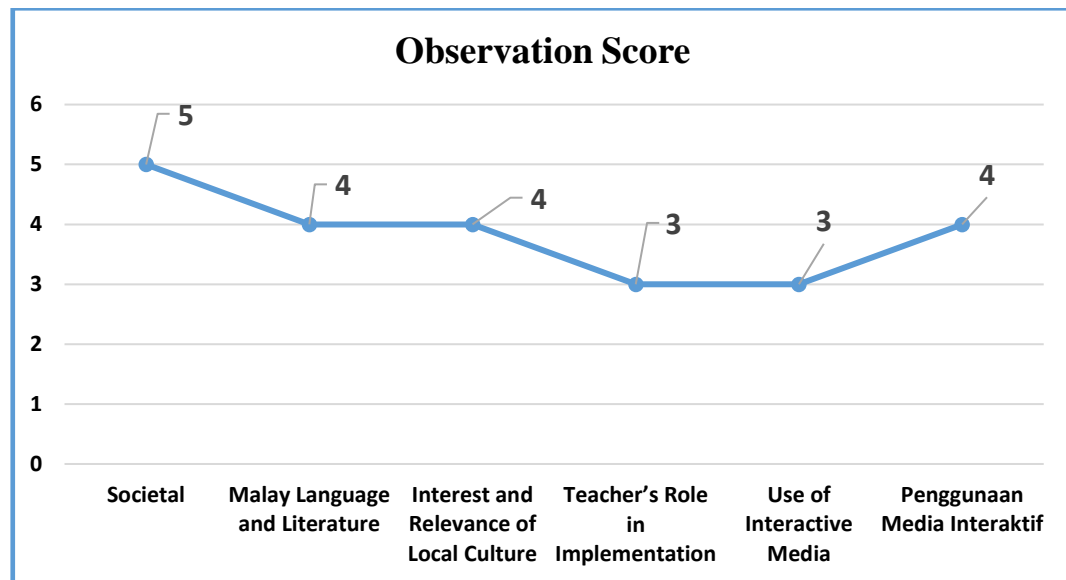


Figure 4.
The Observational Assessment Results on the Use of the Riau Malay Culture E-Module in Enhancing High School Students'.

The findings indicate that, overall, the use of the Riau Malay culture e-module yields positive outcomes in improving high school students' understanding and internalization of their cultural self-identity values. This suggests that incorporating culturally relevant digital learning tools effectively supports not only knowledge acquisition but also deeper emotional and behavioral connections to cultural heritage. However, it is important to note that certain areas, such as the role of teachers in facilitating learning and the cultural relevance of the content, still present opportunities for enhancement. Strengthening these aspects could further optimize the effectiveness of the e-module and provide a more holistic educational experience for students. From a scientific perspective, the more substantial improvement observed in the experimental class compared to the control group serves as strong evidence that the applied treatment—using the e-module—is effective in boosting students' academic performance. This conclusion aligns with experimental learning theory, which posits that interventions administered to the experimental group typically yield better learning outcomes than in those who do not receive such treatment [12]. This theory underlines the importance of controlled educational experiments in validating the impact of new learning approaches.

Moreover, the adoption of technology-based learning methods, such as e-modules, has been recognized as a significant factor in increasing students' interest and engagement in the learning process. The digital tools provide a dynamic and interactive platform that supports more comprehensive and in-depth understanding. E-modules engage multiple senses by combining text, visuals, and sometimes audio or animation, which helps cater to diverse learning preferences [13]. This multi-sensory approach not only makes learning more enjoyable but also facilitates better retention and comprehension of the material. Consequently, e-modules represent an innovative educational strategy that can effectively bridge cultural knowledge with modern pedagogical practices, fostering meaningful learning experiences while preserving local cultural identity. According to the concept of meaningful learning, interactive learning media that integrate local values, such as the Riau Malay culture e-module, support students' active engagement in the learning process, resulting in stronger and more applicable conceptual understanding [14]. Thus, the significant increase observed in the experimental class not only reflects improved cognitive abilities but also indicates strengthened character and self-identity values among students. This is primarily achieved through the systematic integration of local culture in the learning process, which enriches academic content while instilling social and cultural values that shape students' identity and positive attitudes toward their social environment. Integrating local culture into education is a crucial strategy that goes beyond simply transmitting knowledge; it plays a foundational role in shaping students' character and identity. By embedding cultural values such as honesty, cooperation, and respect into the curriculum, education fosters not only academic growth but also the ethical and social development necessary for students to thrive as responsible members of society. These values serve as guiding principles that influence how students interact with others, understand their roles within their communities, and cultivate meaningful relationships based on trust and mutual respect. Moreover, the integration of local culture increases students' cultural awareness, enriching their appreciation for the diversity and richness of their heritage. This cultural grounding encourages students to value their own identity while fostering openness and respect toward others' cultural backgrounds, ultimately contributing to social cohesion and harmony in increasingly multicultural societies.

This instructional approach aligns closely with Albert Bandura's social learning theory, which highlights the importance of social interaction and environmental factors in character formation. According to Bandura, individuals acquire new behaviors and values through observing and imitating models within their social contexts. When students engage with cultural content in their learning environment, they are exposed to positive models that exemplify desirable attitudes and behaviors. Through active participation and observation, students internalize these cultural values, making them an integral part of their character and moral compass. This process not only nurtures cognitive understanding but also shapes affective and behavioral aspects of learners, enabling them to apply learned values in real-life situations. In modern

educational settings, the use of electronic modules, or e-modules, as interactive learning media has become increasingly prominent and effective. E-modules leverage multimedia elements such as text, images, audio, and animations, creating dynamic and engaging instructional experiences that accommodate diverse learning styles. Empirical studies have consistently demonstrated that e-modules enhance students' motivation to learn by providing interactive and visually appealing materials that heighten engagement. Additionally, e-modules support the development of self-efficacy, where students build confidence in their abilities through scaffolded learning experiences and immediate feedback. Crucially, these digital tools also promote the cultivation of critical and creative thinking skills by encouraging learners to explore, analyze, and synthesize information in innovative ways.

The findings of this study further affirm and extend prior research results. Notable scholars including Lina and Desnita [15]; Sari and Malik [16]; Scott and Moxham [17]; Juanda and Festiyed [18]; Khalil, et al. [19]; Bains, et al. [20]; Purnamasari, et al. [21] and Tumiar, et al. [22] have all reported that incorporating e-modules as educational tools significantly boosts students' learning outcomes. Their research collectively shows improvements not only in cognitive domains such as knowledge acquisition and comprehension but also in affective domains like motivation, attitude, and engagement. These multidimensional benefits underscore the holistic impact of e-modules in modern education, particularly when aligned with culturally responsive pedagogy. In summary, embedding local culture in education provides a robust platform for comprehensive character development, cultivating essential values and cultural consciousness. When combined with innovative technologies such as e-modules, this approach enhances the quality and effectiveness of learning by promoting active engagement, confidence, and higher-order thinking skills. The convergence of culturally meaningful content and interactive digital media thus represents a powerful vehicle for nurturing well-rounded, culturally aware, and competent learners prepared to contribute positively to their communities and the broader society. In conclusion, this empirical evidence reinforces that innovative learning methods such as culture-based e-modules can increase learning achievement more significantly than conventional methods, while also contributing to the preservation of local cultural values within formal education. the application of e-modules in learning has a positive effect and significantly improves student science learning outcomes (cognitive, affective, and psychomotor skills) and student learning motivation. Therefore, it can be concluded that e-modules have a positive effect on students' science learning outcomes [23].

5. Closing

The use of the Riau Malay culture e-module has demonstrated clear effectiveness in enhancing high school students' comprehension of self-identity values. This innovative learning tool not only serves as a medium for delivering cultural knowledge but also plays a vital role in deepening students' connection to their heritage and strengthening their sense of belonging. By engaging with the e-module, students gain a more meaningful understanding of the cultural principles that shape their identity, which contributes positively to their character development. Given these benefits, it is imperative that the integration of local culture-based e-modules be actively supported and expanded within educational curricula. Such initiatives are essential to fostering a generation of learners who are not only academically competent but also culturally grounded and proud of their roots, especially in today's rapidly modernizing and globalizing world.

Moreover, expanding the variety and quality of e-module content and technology would offer students a richer, more engaging learning experience tailored to diverse learning preferences and technological advancements. This expansion should be complemented by further research aimed at exploring various factors that influence how students develop their self-identity through educational interventions. Understanding these factors will enable educators and policymakers to design more effective strategies that nurture cultural awareness and personal identity, ensuring that local cultural knowledge remains relevant and vibrant in formal education. Ultimately, the continued development and implementation of culturally based e-modules represent a promising path toward preserving cultural heritage while equipping students with the values and skills needed to navigate and contribute to the modern world. The use of the Riau Malay culture e-module has demonstrated clear effectiveness in enhancing high school students' comprehension of self-identity values. This innovative learning tool not only serves as a medium for delivering cultural knowledge but also plays a vital role in deepening students' connection to their heritage and strengthening their sense of belonging. By engaging with the e-module, students gain a more meaningful understanding of the cultural principles that shape their identity, which contributes positively to their character development. Given these benefits, it is imperative that the integration of local culture-based e-modules be actively supported and expanded within educational curricula. Such initiatives are essential to fostering a generation of learners who are not only academically competent but also culturally grounded and proud of their roots, especially in today's rapidly modernizing and globalizing world.

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