TEKNODIKA
e-ISSN: 2656-6621
http://jurnal.uns.ac.id/Teknodika

Developing a Culturally Responsive Teaching-Based E-Module on Local Wisdom in My Community to Improve Students' Critical and Creative Thinking Skills

Desi Nurwidiawati*, Dadang Jaenudin, Yuyun Elizabeth Patras

Master of Primary Education Study Program, Graduate School, Universitas Pakuan, Bogor, Indonesia
*Email: desi.nurwidiawati87@gmail.com

Abstract: *This research aims to develop electronic modules (e-modules) on local wisdom in my community based on a culturally responsive teaching approach to improve students' critical and creative thinking skills. The research subjects were 20 fourth-grade students from classes IVA and IVB at SDIT Utsmanil Hakim in Bogor. The development (R&D) model using the ADDIE design (Analysis, Design, Development, Implementation, Evaluation) and a pre-experimental method with a single-group pre-test post-test pre-experimental design to test effectiveness. Research subjects were selected using probability sampling. Data collection techniques included pre-tests, post-tests, and surveys. from the initial urgency stemming from the low critical thinking skills of students based on the core components of critical thinking in the 2024 education report card data, which was around 48.99%. The results after the effectiveness test in April 2025 showed an N-Gain value for critical thinking of 0.68 and for creative thinking of 0.78. Both values fall into the "Strong" category. The high N-Gain value is based on the average critical thinking skill scores in the pre-test (49.75) and post-test (84), as well as the average scores for creative thinking skills in the pre-test (62.40) and post-test (91.75). This study successfully developed an innovative electronic module that functions as an adaptive learning prototype based on CRT with integrated technology that can enhance students' critical and creative thinking skills.*

Keywords: *Creativity; CRT; E-Module; R&D; Thinking Skills*

Submitted: June 2025 | Reviewed: June 2025 | Accepted: June 2025 | Published: October 2026

1. INTRODUCTION

Education plays a very important role in producing quality human beings. Current education tends to be teacher-centered and to emphasize only the cognitive aspect, whereas the education that should be developed is student-centered and able to develop all aspects of students' abilities, including cognitive, affective, and psychomotor aspects (Yuniarti et al., 2021). According to the Ministry of Education, Culture, Research, and Technology (Kemendikbudristek, 2023), the results of the 2022 PISA survey show Indonesia's position in the 2022 PISA ranking: Indonesia ranked 69th, or 12th from the bottom of the list, with a total score of 1,108. In line with Yampap & Bay (2020), this indicates that the low critical thinking skills among students, caused by difficulties in understanding material taught abstractly, need to be addressed immediately. Low critical thinking skills indicate that the learning applied has not fully accustomed students to thinking critically and solving problems (Herlina et al., 2020). Therefore, critical and creative thinking skills must be developed, because they can improve the quality of learning and students' learning outcomes (Pentury & Anggraeni, 2022). In the current digital era, learning technology plays an important role in accommodating the diverse learning needs of elementary school students (Nurwidiawati et al., 2024). Advances in information technology have brought significant changes in the way students access information and interact with learning material. In this context, it is important for educators to understand and use technology effectively in order to meet different educational needs. Based on pre-research observations and interviews, the researcher conducted a

more in-depth needs analysis of students and teachers at a private institution, SDIT Utsmanil Hakim, Bogor City. The 2024 education report card data show that critical thinking skills among students were still low, and the main problem in their learning process was the absence of teaching materials in the form of CRT-based e-modules. Based on these findings, to overcome this problem, the researcher sought to design an e-module that went through rigorous validation stages, ensuring that the module is not only informative but also attractive to students. The intervention using a Culturally Responsive Teaching (CRT)-based e-module was carried out to provide an approach that is more responsive to students' needs. The analysis and interviews with 20 students revealed various preferences and challenges they face in the learning process. The survey showed that the e-module succeeded in attracting students' attention, with 90% of them stating that the material in the module was interesting to read. Based on these findings, the development of innovative technology-based media, such as a flipbook e-module focusing on culturally responsive teaching, is a solution that can be applied as a learning approach in elementary schools. By utilizing existing technology, it is expected that the learning process can become more effective, enjoyable, and relevant for students, thereby improving their critical thinking skills and engagement in learning.

2. RESEARCH METHOD

This study aims to develop and evaluate the effectiveness of a Culturally Responsive Teaching (CRT)-based e-module using a research and development (R&D) model with the ADDIE design (Analysis, Design, Development, Implementation, Evaluation) and a pre-experimental method with a one-group pretest-posttest design to test effectiveness.

Table 1 presents the one-group pretest-posttest design used in this study, where O1 is the pretest, X is the treatment using the CRT-based e-module, and O2 is the posttest.

Table 1. Pre-Experimental Research Design

Class	Pretest	Treatment	Posttest
Experimental	O1	X	O2

The study used a qualitative approach with a descriptive-analytical method. The data collection technique used by the authors to describe and analyze the ADDIE model was based on literature studies drawn from primary and secondary sources.

3. RESULTS AND DISCUSSION

Research and Development model using the ADDIE approach:

Table 2 presents the instructional design stages based on the ADDIE approach.

Table 2. Instructional Design: The ADDIE Approach

	Concept	General Procedure	Notes
Analyze	Identifying problems, analyzing user needs (students and teachers), and analyzing the characteristics of the material and the learning environment.	1. Observation and discussion with students and teachers 2. Questionnaire or interview data 3. A summary report of the analysis findings to formulate the e-module design objectives.	Analysis summary
Design	E-module concept, structure of teaching materials, characteristics of teaching materials, curriculum, student analysis, concept analysis and objective analysis, types of interactive activities, and evaluation instruments (such as teaching material blueprints and questionnaires).	1. Concept design 2. student analysis, concept analysis, and learning objective analysis 3. evaluation instruments such as teaching material blueprints and questionnaires 4. e-module validation to ensure its validity, practicality, and effectiveness	Brief design
Develop	Developing the e-module teaching material flow concept, validating learning resources, and developing the required supporting materials and strategies	1. Develop the CRT-based e-module teaching material flow concept and conduct initial validation by experts. 2. Revise the e-module based on input from the initial trial. 3. Validation and assessment by experts and teachers	Development of the CRT E-Module
Implement	Preparing the learning environment and implementing learning using the CRT-based e-module on local wisdom in my community with student involvement	1. Limited trial 2. Full implementation 3. Effectiveness measurement	Implementation strategy

Evaluate	Assessing the quality of the product and the learning process	1. Analysis of pretest and posttest learning outcomes 2. CVI CVR 3. N Gain 4. Normality test, homogeneity test, hypothesis test	Evaluation summary

1) Analysis Stage (Analyze)
Based on the ADDIE instructional design scheme, the authors used a procedural approach that emphasizes the corresponding stages: analysis, design, development, implementation, and evaluation. This provides an overview of a generic system design model. The ADDIE model also provides a clear framework for the learning process, from the analysis stage to evaluation. There are variations in the sub-stages of each activity according to the needs described, which is important for developing the CRT-based local wisdom e-module. 1. Analysis stage: This stage involves identifying problems, analyzing user needs (students and teachers), and analyzing the characteristics of the material and the learning environment. This study was conducted at SDIT Utsmanil Hakim, Tanah Sareal District, Bogor City (Kp. Munjul RT 02 RW 06, Kayu Manis Subdistrict), focusing on developing a Culturally Responsive Teaching-based e-module on local wisdom in my community to improve students' critical and creative thinking skills. According to Mardina (2022), presenting an e-module in flipbook form makes it easier for students to understand because it contains pictures, animated videos, and digital comprehension tests. The research involved 20 fourth-grade students as the main focus of the e-module implementation, 15 teachers who provided pedagogical and practical perspectives, and 4 expert validators consisting of 1 material expert, 1 media expert, 1 language expert, and 1 teacher as a material expert, who played a crucial role in validating the content and appearance of the e-module. The study was carried out during the even semester of the 2024/2025 academic year.

2) Design
At this stage, using the Research and Development model with the ADDIE approach, the e-module concept was designed, including the structure of teaching materials, characteristics of teaching materials, curriculum, student analysis, concept analysis and objective analysis, types of interactive activities, and evaluation instruments (such as teaching material blueprints and questionnaires). This shows that the e-module is not only effective in achieving the established learning objectives but is also able to sharpen students' critical and creative thinking skills through clear, integrated, and interactive presentation of material. This stage is the realization of the design that has been made, namely the physical construction of the e-module, including content writing, integration of the applications Canva, Adobe Express, ElevenLabs, Immersity AI, FotoPlay, Wordwall, Puzzle, Flipbook PDF Professional, and hyperlinks, as well as the development of illustrations and icons relevant to local wisdom. The validation of the CRT-based local wisdom e-module at the development stage aims to produce a valid, practical, and effective CRT-based e-module.

3) Development Stage (Develop)
The researcher designed the CRT-based e-module teaching material flow concept shown in Figure 1, and the resulting e-module was tested for feasibility and validated by experts after being declared substantively and methodologically feasible.

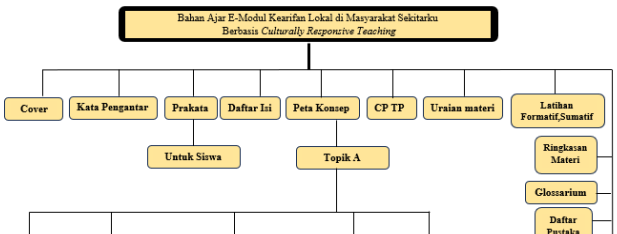


Figure 1. E-Module Teaching Material Flow Concept

The first trial stage involved 15 teachers. This number of teacher respondents is sufficiently representative to obtain initial feedback on the feasibility of the content, design and appearance, and language in relation to the potential adaptation of the e-module in classroom teaching. After the initial trial results from the teachers showed feasibility, the e-module was revised based on the input obtained and then tried out with the research subjects. At this stage, the CRT-based e-module showed a significant level of excellence in the media aspect, as evidenced by a score of 96% in the first validation, indicating "very good" quality, and the follow-up improvements that produced a perfect score of 100% in the second validation further strengthened the initial finding of very good media quality while confirming the effectiveness of the implemented suggestions. The language validation stage of the e-module showed a very good level of language quality, as reflected in a score of 90% in the first validation and 100% after revision in the second validation. Based on the results of the material expert validation, the e-module showed a very high level of material suitability, as indicated by a score of 99% in the first validation. This "very good" rating analytically indicates that the e-module content has been designed accurately, relevantly, and in accordance with the established learning objectives. Based on the final validation by the media expert, the indicators obtained were: appropriate font type, ease of reading, ease of spacing, appropriate text placement and user appeal, attractive images, harmonious image colors that do not clash with other objects (text, images, etc.), appropriate image placement, ease of use of the Flip PDF Professional teaching material, and consistency and ease of navigation, with a percentage of 100% ("Very good") and feasible for implementation. This is in line with Bourdeau et al. (2015), who state that Flip PDF Professional is a tool that can be used to create interactive and visually attractive e-modules. It allows the integration of multimedia elements that can be adapted to reflect cultural diversity. The resulting e-module can be seen in Figure 2.

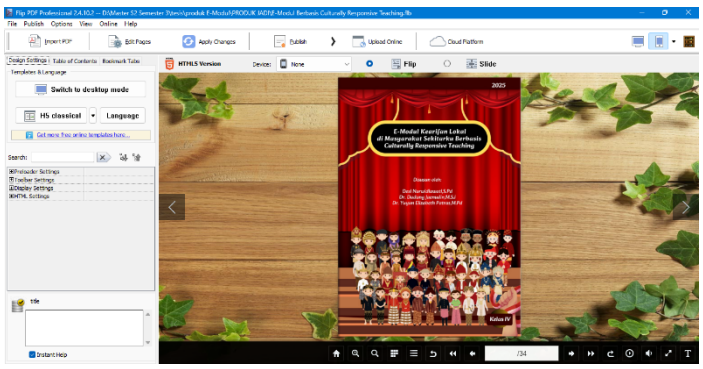


Figure 2. CRT-Based E-Module Teaching Material



Figure 3 shows the CRT-based material, comics, practice questions, and games in the e-module.
Figure 3. CRT-based material, comics, practice questions, and games

Furthermore, the increase to a perfect score of 100% in the second validation firmly confirms that, after going through a refined evaluation process, the e-module is feasible for use. Based on the average validation questionnaire results from the media, language, and material experts, which reached 97.17%, a figure well within the "very good" range (80–100%), it can be concluded that the Culturally Responsive Teaching-based e-module has met high quality standards across various crucial aspects of digital teaching material development. The e-module excels not only in attractive and functional media presentation but also in effective and accurate use of language and in the delivery of material that is relevant and aligned with the learning objectives, serving as an effective and high-quality learning resource.

4) Implementation

This stage included a limited trial with 10 students, after which the effectiveness trial was fully implemented in actual learning activities with 20 fourth-grade students at SDIT Utsmanil Hakim, where the e-module was used in the real learning process. Observation during this phase can provide qualitative and quantitative data on how the e-module can improve students' critical and creative thinking skills. At this stage, the e-module was used as the main learning resource in the IPAS (Natural and Social Sciences) subject topic on local wisdom in the surrounding community. The learning process was carefully monitored to see how the e-module influenced classroom dynamics and students' interaction with the material, and to measure the effectiveness of the e-module in an actual learning context. It was at this stage that the key research instruments were used: the critical thinking skill test, whose validity and reliability had been tested, was used to measure the improvement in students' critical thinking skills through a pretest and posttest design. The results were analyzed to determine whether there was a significant difference before and after the use of the e-module; the activities are shown in Figure 4.



Figure 4. Effectiveness Test

The presence of various comics, animated videos, games, documentaries, and practice questions in the e-module is expected not only to serve as a visual attraction that motivates students to read and explore the material but also to present content that considers different cultural perspectives.

5) Evaluation Stage

Based on the teachers' assessment of the e-module teaching material, several important components were assessed to ensure the quality and effectiveness of the module in the learning process. These components include content feasibility, presentation feasibility, and language feasibility, all of which play a crucial role in creating an optimal learning experience for students. In line with Lambert & Lambert (2012), descriptive analysis was used to summarize and interpret qualitative data from open-ended questionnaire responses. Content feasibility (0.713 – Good) indicates that the content of the e-module meets most of the expected criteria. Although the value is in the good category, there is still room for improvement so that the module content can be deeper and more relevant to students' needs. This is important so that students can gain a more comprehensive understanding of the material taught. Presentation feasibility (0.767 – Good) indicates that the way the material is presented in the e-module is quite effective and attractive for students. Good presentation can help students understand the concepts taught more easily and increase their engagement in the learning process. Language feasibility (0.753 – Good) indicates that the language used in the e-module is quite clear and easy for students to understand. Appropriate language use is very important to ensure that students can grasp the core of the material without confusion. However, more complex terms or phrases could be simplified to make them more accessible to all students. The CVI (0.744 – Good) shows that, overall, the e-module has a good level of content validity. This indicates that the module meets most of the criteria established for content validity, which forms the basis for further development. The ∑CVR (0.957 – Very Valid), on the other hand, shows a very valid Critical Validity Ratio value. This means that the module has received strong support from experts in terms of relevance and feasibility for use in the learning process. This value indicates that the e-module is not only considered good by teachers but is also recognized by evaluators as an effective tool for improving student learning.

Table 3. Analysis of Pretest and Posttest Results of Critical Thinking Skills

Score	Number of students	Score result	Normality Test		Homogeneity Test		Hypothesis Test	
			Value	Notes	Value	Notes	Value	Notes
Pretest	20	49.75	0.059	normal	0.001	Heterogeneous	0.000	H0 rejected
Posttest	20	84	0.075	normal				

Based on Table 3, the mean pretest score was 49.75 and the mean posttest score was 84. The normality test result was 0.059 for the pretest and 0.075 for the posttest. At a significance level of α = 0.05, the p-values for the pretest (0.059) and posttest (0.075) were both greater than 0.05. This indicates that the critical thinking scores in both the pretest and posttest were normally distributed, so the normality assumption for each group was met. Based on the homogeneity of variance test (Levene's test), with Sig. values consistently and significantly smaller than 0.05, the null hypothesis (H0) was rejected.

Table 4. Analysis of Pretest and Posttest Results of Creative Thinking Skills

Score	Number of students	Score result	Normality Test		Homogeneity Test		Hypothesis Test	
			Value	Notes	Value	Notes	Value	Notes
Pretest	20	62.40	0.011	normal	0.025	Heterogeneous	0.000	H0 rejected
Posttest	20	91.75	0.204	normal				

Based on Table 4, the mean pretest score was 62.40 and the mean posttest score was 91.75. The significance value (p-value) of the pretest normality test was 0.051; because this value is greater than 0.05 (p > 0.05), the pretest data were normally distributed, as also indicated in the table ("normal"). For the posttest, the significance value (p-value) of the normality test was 0.204; because this value is greater than 0.05 (p > 0.05), the posttest data were also normally distributed, as also indicated in the table ("normal"). For the hypothesis test, the significance value (p-value) was 0.000. Because this value is much smaller than the significance level α = 0.05 (p < 0.05) and H0 was rejected, there is a statistically significant difference between students' creative thinking scores in the pretest and posttest.

The results showed a significant improvement in students' critical and creative thinking skills after the implementation of the Culturally Responsive Teaching (CRT)-based e-module. Based on the data obtained, the mean pretest score for students' critical thinking skills was 51.75%, while the posttest reached 77.13%, an increase of 25.38%. Likewise, for critical and creative thinking skills, the pretest score of 54.14% increased to 74.14% in the posttest, an increase of 20%. The quantitative data were analyzed using SPSS to determine the statistical significance of the difference between the pretest and posttest (Pallant, 2010). This improvement shows that the implementation of the specially designed e-module succeeded in having a positive impact on students' critical and creative thinking skills. The improvement in learning outcomes can be attributed to several factors, such as more interactive teaching methods and the use of technology that facilitates the learning process. The e-module integrating CRT elements allows students to be more actively involved in learning, encouraging them to think more deeply and creatively in solving problems.

4. CONCLUSION AND RECOMMENDATION

The Culturally Responsive Teaching (CRT)-based e-module on Local Wisdom in My Community shows significant effectiveness in improving students' understanding of local wisdom and strengthening their critical thinking skills. The integration of content relevant to students' cultural backgrounds with inclusive learning design makes this e-module not only a learning tool but also a means of building students' identity and sense of belonging to their culture. Further research is recommended on the implementation of this e-module in various cultural contexts and at different levels of education, in order to explore its potential for adaptation and further development. In addition, training for teachers to maximize the use of

the e-module in learning should be prioritized in order to optimize its positive impact on students in developing their critical and creative thinking skills.

5. REFERENCES

Dick, W., Carey, L., & Carey, J. O. (2005). The systematic design of instruction.

Herlina, M., Syahfitri, J., & Ilista, I. (2020). Perbedaan kemampuan berpikir kritis dan hasil belajar kognitif dengan model pembelajaran problem based learning berbantuan media audio visual. Edubiotik, 5(01), 42-54.

Lambert, V. A., & Lambert, C. E. (2012). Qualitative descriptive research: An acceptable design. *Pacific Rim international journal of nursing research*, *16*(4), 255-256.

Leung, W. S., Coulter, D. A., Moes, C. C. M., & Horvath, I. (2012). Reflections on delivering a cross-discipline, cross-cultural, international, masters-level collaborative course using e-Learning technologies.

Nguyen, T. P., Razniewski, S., Varde, A., & Weikum, G. (2023, April). Extracting cultural commonsense knowledge at scale. In *Proceedings of the ACM Web Conference 2023* (pp. 1907-1917).

Nitko, A. J. (1996). *Educational assessment of students*. Prentice-Hall Order Processing Center, PO Box 11071, Des Moines, IA 50336-1071.

Nurwidiawati, D., Dhini, D. A., & Patras, Y. E. (2024). An implementation of primary school differentiated learning. DIKODA: JURNAL PENDIDIKAN SEKOLAH DASAR, 5(01), 24-45

Pallant, J. (2020). *SPSS survival manual: A step by step guide to data analysis using IBM SPSS*. Routledge.

Pentury, H. J., & Anggraeni, A. D. (2022). E-Literasi Dalam Mengembangkan Pedagogi Kreatif Guru PAUD. *Research and Development Journal of Education*, *8*(1), 58-64

Yampap, U., & Bay, R. R. (2020). Penerapan pendekatan keterampilan proses untuk meningkatkan keterampilan berpikir kritis siswa Sekolah Dasar. *Musamus Journal of Primary Education*, *3*(1), 57-64.

Yuniarti, I., Karma, I. N., & Istiningsih, S. (2021). Pengembangan modul pembelajaran berbasis kearifan lokal tema cita-citaku subtema aku dan cita-citaku kelas IV. *Jurnal Ilmiah Profesi Pendidikan*, *6*(4), 691-697.

Rasiman, R., Miyono, N., Kusumaningsih, W., & Wakhyudin, H. (2024). Penguatan Keterampilan Guru SD Kelas IV dalam membuat Bahan Ajar Digital dengan Pendekatan Culturally Responsive Teaching di Kecamatan Kaloran Temanggung. Bima Abdi: Jurnal Pengabdian Masyarakat, 4(2), 106–114. https://doi.org/10.53299/bajpm.v4i2.500

How to cite: Nurwidiawati, D., Jaenudin, D., & Patras, Y. E. (2026). Developing a culturally responsive teaching-based e-module on local wisdom in my community to improve students' critical and creative thinking skills. *Teknodika, 24*(2), 227-237. https://doi.org/10.20961/teknodika.v24i2.103835