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The multicultural e-comics: innovative media to improve elementary school students' social studies learning achievement

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Abstract

In the form of a multicultural-based educational e-comic, to improve the learning achievement of fourth-grade IPAS students at Kaliwadas 01 State Elementary School. This type of research is Research and Development (R&D), which was developed referring to the 4D development stage; the e-comic learning media developed is feasible to be applied in learning. The subjects in this study were fourth-grade students at Kaliwadas 01 State Elementary School. The data sources in this study were primary data and secondary data. Data collection techniques used interviews, observations, tests, questionnaires, and documentation. Data analysis techniques used were interview data analysis, expert validation assessment questionnaire data, and student responses. The results of the study obtained that multicultural-based educational e-comic media is feasible and valid to use, based on the results of media validation by media experts getting 80% in the "good" category and material experts getting 81.1% in the "good" category, and the assessment given by students getting 90% in the "good" category. The development of multicultural-based educational e-comic media is feasible to use in learning, and the results of understanding the overall score for the pretest of 940 and post-test of 1650, while the average pretest score is 47 and the average post-test score is 82.5. So it can be concluded that there is an increase in students' understanding of IPAS

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subjects related to the material of Indonesia, which is rich in culture using multicultural-based educational e-comic media.

INTRODUCTION

Background of the Study

Education is one of the benchmarks of a progress and develop nation. Law Number 20 of 2003 defines education as a conscious and planned effort to create a learning process and atmosphere so, students are actively able to develop their abilities to have spiritual religious strength, self-control, personality, intelligence, glorious character, and skills. There are many subjects taught at the education level, one of them is Natural and Social Sciences or IPAS (Oktaviana & Ramadhani, [2023](#)). IPAS lectures students about various things that happen in real world and how they can understand. The initial knowledge (preconception) owned by students is one of the factors that usually causes they do not understand the concept of IPAS (Oktaviana & Ramadhani, [2023](#)).

Social Science learning in Elementary Schools must be designed interestingly, enjoyable, that pay attention to development of students' understanding, and by providing curiosity learning. Educational Technology has an important role in overcoming learning problems, fostering learning, and facilitating the learning process (Angga et al., [2020](#), p. 94) (Utami et al., [2024](#)) (Izzah et al., [2025](#)). This is in accordance with the definition of Educational technology according to the Association for Educational Communication and Technology (AECT). (Angga et al., [2020](#)) states "Educational Technology is a study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources". Based on this definition, it can be concluded that Educational technology has a role in solving learning problems. Learning problems can be overcome by applying the principles of educational technology.

The success of a country in facing the industrial revolution 4.0 (Lezzi et al., [2025](#)) (Safa et al., [2025](#)) is also determined by the quality of educators such as teacher. They are required to master skills, abilities to adapt new technologies and global challenges (Jr & Jung, [2025](#)). The success of learning activities can be measured by the students' success in understanding the learning material (Rachmawati et al., [2025](#)). In addition, learning facilities such as learning media is one aspect that determines the success of learning is the availability of Learning media is a tool used for communication and interaction between teachers and

students during learning process. Learning media is specifically used to achieve a set of certain goals or competencies. Learning media encourages students to be more motivated to learn, to write, to speak, and to imagine, and allows for better relationships between teachers and students. Therefore, experts emphasize how important a learning media in a learning process, including in elementary schools. The use of appropriate media can help the learning process become more effective, efficient and improve student achievement. The development of multicultural-based educational e-comics, is a way to improve learning achievement of social science at elementary school students'. Educational e-comics are interesting and innovative learning media that combine comic elements with subject matter and are presented in an interesting and interactive manner (Afriana & Prastowo, [2022](#)).

The development of multicultural-based educational e-comics is one way to improve elementary school students' science learning achievement. Educational e-comics are interesting and innovative learning media that combine comic elements with subject that presented in interesting and interactive way (Afriana & Prastowo, [2022](#)). Social science learning outcomes of Elementary school students' can be improved by using interactive learning media (Rahman & I Nyoman, [2020](#)). The use of interactive learning media can increase students' interest and desire to learn. It can also instill a positive attitude as a way to foster good character in children.

The Problem of The Study

Despite the widespread implementation of thematic and technology-integrated learning in elementary education, several critical pedagogical and operational challenges persist:

1. Educator Competency Gap: Elementary school teachers often lack adequate training, pedagogical knowledge, and instructional skills needed to effectively implement thematic learning and integrate modern educational media.
2. Surface-Level Digital Integration: The adoption of digital devices (e.g., computers, tablets) frequently fails to go beyond passive media consumption; teachers rarely leverage technology to foster interactive learning, critical thinking, or active student participation.
3. Systemic and Operational Constraints: Schools face persistent infrastructure barriers—such as limited hardware access, unstable internet connections, and insufficient digital tools—alongside heavy teacher workloads and rigid curriculum timelines that restrict instructional flexibility.

4. Declining Engagement and Learning Outcomes: Traditional, non-interactive teaching methods fail to motivate elementary students, leading to reduced engagement, lower retention rates, and sub-optimal mastery of complex thematic concepts.

Research's State of the Art

Current academic literature and educational practices in elementary education highlight several key trends:

1. Thematic Learning as a Standard Paradigm: Integrated thematic instruction is widely recognized as an effective pedagogical model for primary education because it connects diverse subjects into meaningful, holistic contexts.
2. Pervasive Shift Toward Educational Technology: Recent studies emphasize the growing necessity of integrating Information and Communication Technology (ICT)—such as digital applications, multimedia presentations, and interactive media—to modernize elementary classrooms.
3. Focus on Student-Centered Learning: Modern instructional frameworks prioritize active, student-centered learning over rote memorization to foster 21st-century skills, including critical thinking, collaboration, and creative problem-solving.

Novelty, Research Gap, & Objective

While existing research confirms the general benefits of thematic learning and educational technology, significant gaps remain:

1. Disconnect Between Theory and Classroom Practice: Prior studies extensively cover the theoretical advantages of ICT, but limited research evaluates how elementary teachers practically combine thematic curriculum requirements with digital tools under real-world resource constraints.
2. Lack of Integrative Frameworks: There is a scarcity of empirical research exploring holistic instructional strategies that simultaneously address teacher competency, interactive digital tool usage, and systemic institutional support within elementary school settings.

This study provides unique contributions to the field of primary education research:

1. Holistic Multi-Dimensional Analysis: It provides an integrated examination of pedagogical, technical, and institutional factors influencing thematic and technology-based learning in primary schools.

2. **Practical Contextual Framework:** The study offers actionable, context-specific solutions—such as targeted continuous professional development (CPD) and scalable digital integration techniques—tailored to overcome real-world classroom challenges.

The primary objectives of this study are:

1. **To Evaluate Current Practices:** Examine the extent and effectiveness of thematic learning and digital technology integration implemented by elementary school teachers.
2. **To Identify Key Challenges:** Pinpoint the specific pedagogical, technical, and structural obstacles teachers encounter during technology-enhanced thematic instruction.
3. **To Formulate Recommendations:** Propose actionable strategies, professional development models, and policy recommendations to enhance teacher readiness, optimize digital resource usage, and improve student learning outcomes.

METHOD

Type and Design

This research was conducted at SD Negeri Kaliwadas 01, Bumiayu Regency, Central Java. This applied Research and Development (R&D) research that create and test certain products. There are many types of R&D models. The 4-D development model, is a learning media development model. The 4D model consists of four stages: defining, creating, developing, and disseminating. The 4D development model can also be changed into 4P, namely defining, designing, developing, and disseminating.

The subjects of this study were 20 fourth grade students of SD Negeri Kaliwadas 01, where 10 students were taken as subjects of small-scale trials and 20 students as subjects of large-scale trials. In this research, the data collected using test techniques (pre-test and post-test) and non-test techniques (observation, interviews, questionnaires, and documentation). The data analysis technique in this research used initial and final data analysis. In the initial data analysis using normality and homogeneity tests, while the final data analysis using the t-test. The calculation of data analysis in this research used the SPSS version 16 application.

Data and Data Sources

1. **Primary Data:** Primary data in this study consists of qualitative information obtained directly from key informants regarding the development, implementation, and effectiveness of multicultural e-comics in Social Studies instruction. The data includes the observations of student engagement,

feedback from elementary school students, and evaluations from classroom teachers.

2. **Secondary Data:** Secondary data includes quantitative learning achievement scores (pre-test and post-test results) collected before and after utilizing the multicultural e-comics, as well as relevant documentations, syllabus guidelines, and literature supporting the study.
3. **Data Sources:**
Informants: Elementary school Social Studies teachers and elementary school students who participated in the learning process using multicultural e-comics.
Documents & Media: Student score sheets, lesson plans, instructional materials, and the multicultural e-comics media itself.

Data Collection Technique

To ensure comprehensive data collection, the study employs the following techniques:

1. **Observation:** Direct observation conducted during the learning process to assess student behavior, interest, and interaction with the multicultural e-comics media.
2. **Testing (Measurement):** Administration of Pre-tests and Post-tests to measure student learning outcomes and social studies achievement before and after using the e-comics.
3. **Interviews:** Semi-structured interviews with teachers and selected students to gather in-depth responses, perspectives, and qualitative feedback regarding the usability and impact of the e-comics.
4. **Document Study:** Collecting written records, instructional materials, validation sheets from experts (media and content experts), and assessment records relevant to the research.

Data Analysis

The study utilizes a mixed-method analysis approach (combining qualitative and quantitative techniques):

Qualitative Data Analysis: Analyzed using interactive qualitative analysis techniques (Miles & Huberman model):

1. **Data Reduction:** Selecting, focusing, simplifying, and transforming raw field data (interview transcripts, observation notes) into categorized themes.

2. Data Display: Presenting the reduced qualitative findings in organized narrative forms, matrices, or charts for clear interpretation.
3. Conclusion Drawing / Verification: Formulating conclusions based on identified patterns and cross-verifying them with field observations and expert validations.

Quantitative Data Analysis:

1. Validation Analysis: Calculating average validity scores from expert evaluations (media and subject matter experts) to determine the feasibility of the e-comics.
2. Inferential Statistics (Gain Score / T-test): Analyzing pre-test and post-test scores using Normalized Gain (*N-gain*) or paired sample t-tests to determine the statistical significance of improvement in student learning outcomes.

RESULTS

After conducting an analysis, it was found that the main focus of the 4th grade social science subjects according to the Merdeka curriculum that the implementation of practice and projects. The concept of social science is connected to children's daily experiences so they learn more from their environment in order to be more familiar and meaningful. So that students understand about the social science concepts and their skills will create a product. However, the adaptation of social science curriculum must be adjusted to the needs and students' abilities, by conducting an assessment to find out students' initial knowledge, then the teacher must also observe the students' daily behavior and provide group assessment to find out students' behavior.

Based on these results, teachers will distribute them according to their respective abilities. In addition, the main challenge in facing social science learning based on interviews is the limited of teaching or learning media in teaching it. Now, to create fun learning is by using technology, combined with games and evaluations using quiz to the students. In a multicultural context, teachers teach the concept of cultural and social diversity to students by linking other subjects, such as traditional food to a particular region or by giving group assignments to create a diversity situation. In this case, the use of technology in teaching social science is very important in helping teachers deliver material and explain the abstract concepts. Technology can be used for evaluation so learning is more enjoyable, for example using YouTube in delivering material and evaluating it with quiz. However, in

learning diversity material, the learning media used is only book, power point, simple teaching media that adjusted to material.

Based on this, teachers choose learning media by identifying the material to fit the appropriate learning media for social science material. Now, teachers have not found effective learning media to teach social science, especially in cultural and socio-cultural diversity material. Based on this problem regarding the effective interactive learning media for social science and natural sciences subjects, researcher conducted research to develop interesting and innovative interactive learning media, such as multicultural-based educational e-comics as a solution to improve social science learning achievement in IV grade of elementary school students.

Product design

After doing the data collection stage, the next step is to develop a multicultural-based educational e-comic media product design. The appearance of it is more varied, where it is not only texts, but also there are many animations interrelated to form an interactive story in this learning media. It, later will be a PDF with attractive and colorful images with 598x2161 that can be downloaded on student's smartphone, in addition, this media can also be accessed offline. Later, the parts of this multicultural-based educational e-comic learning media will include; (1) cover page; (2) introduction of characters in the story, (3) conversation about the diversity of traditional houses and traditional clothing in Indonesia, (4) along with reflections at the end of the conversation.

Design validation

After completing the product design stage, the next stage is validating the product design to expert validators. The expert validators involved in this study were two expert lecturers; media expert lecturers and material experts. While for the eligibility criteria from the two experts: (1) very feasible if the percentage is 81%-100%, (2) feasible if the percentage is 61%-80%, (3) quite feasible if 41%-60%, (4) less feasible if 21%-40%, and not feasible if 0%-20%. The recapitulation of the questionnaire results of the validation assessment of the e-comic educational learning media based on multiculturalism is presented in the Table 1.

Table 1. Media Feasibility Assessment Validation Results

Media validation	Material Validation
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Amount of Score	64	69
Maximal Score	80	85

Based on the table data, it can be concluded that the assessment of each component of the multicultural-based educational e-comic learning media from media experts got 64 scores with the percentage 80% and it included feasible criteria. In addition, the assessment from material experts got 69 score with percentage 82% it included very feasible category. Based on the result of feasibility questionnaire recapitulation by media and material expert validators, it can be concluded that the multicultural-based educational e-comic learning media was declared very feasible both in terms of appearance, design, content, and material to be tested. The distributed media to users, such as teachers, will be validated by media experts and material experts before being used as learning media. The next stage, teachers were given a practicality questionnaire regarding the development of multicultural-based educational e-comic learning media from several aspects of effectiveness, instructiveness, efficiency, and creativity. The results can be seen in Table 2.

Table 2 Results of practicality questionnaire analysis

Indicator	Score	Score Max	Percentage (%)	Criteria
Effective	10	10	100%	So Practical
Interactive	14	15	93%	So Practical
Efficient	15	15	100%	So Practical
Creative	9	10	90%	So Practical
Amount	48	50	96%	So Practical

Based on the table 8 analysis the results questionnaire on the practicality of multicultural-based educational e-comics, there are 4 aspects checked by expert validators; effective, interactive, efficient and creative. Based on the table, the overall validator score is 48 out of a maximum score of 50 and has 96% percentage with the category Very Valid. So, this multicultural-based educational e-comic learning media is practical to use with revisions due to criticism and suggestions contained in the practicality questionnaire.

Design revision

At this stage, the media expert provides suggestions by increasing the variety of movements and improving the writing quality. While the material expert, gives suggestions to be improved, adjusted: based on the results of material validation, validator provides suggestions to add background variations of image,

resize the font, variative image and add dialogue with the reader. After doing revision based on expert's suggestion then the multicultural-based educational e-comic learning media are presented in Figures 1 to 5.



Figure 1. Writing of "SD 1 Serasa"

Based on the media expert validation advice that previous image above is a background of school with words "SD 1 Serasa" on the school roof, effected un-clearly read. Then the words "SD 1 Serasa" revised by using a board in front of the school.

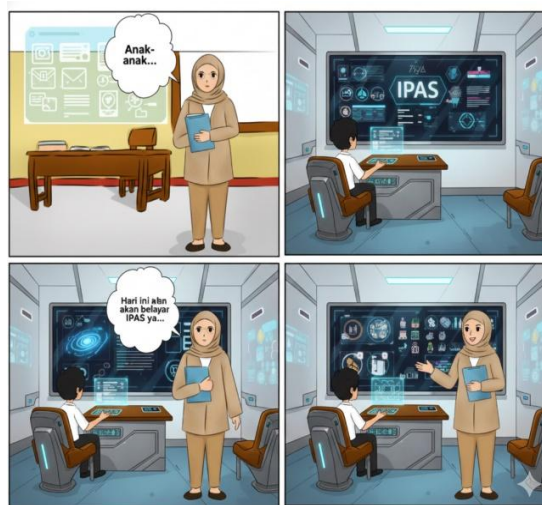


Figure 2. The change of teacher movement

Based on the suggestions from media expert validation, the picture above of previous image the teacher position in the class only holds a book on the right hand and the left hand is straight down. Then teacher position changed by adding up movements of left hand.



Figure 3. Mr. Suyas' hand movement

Based on the media expert validation advice, the previous image above the character of Mr. Surya hands folded on his chest, then revised that his hands raised.



Figure 4. The text does not cover characters

Based on media expert validation advice. The previous image some image characters were covered by dialogue text. Then revised that some text was moved to free space that.



Figure 5. Adding background

Based on suggestion of validation of the material expert, the previous image above there only had two backgrounds; museum and a school. Then revised by adding background of an exhibition place.

Product trial (small scale)

This trial was tested to students in IV grade of SD Negeri Kaliwadas 01 by taking 10 samples of 20 existing students. They selected for this small-scale product trial from varying ranks. They gave an hour to do the pre-test and post-test questions. Learning was carried out 1 time using multicultural-based educational e-comic learning media. The recapitulation of student and teacher response questionnaires to multicultural-based educational e-comic learning media is presented in Table 3.

Table 3. Small Scale Trial Response Questionnaire Results

Response	Percentage	Explanation
Teacher	96%	Very Feasible
Student	97%	Very Feasible

Based on the data obtained in table 2, it can be concluded that the percentage of responses given by teachers and students were 96% and 97%, it means very feasible of both. This indicates that the assessment of teachers and students received a positive response, so multicultural-based educational e-comic learning media is very feasible to be used in IV grade students as a supporting media for learning.

Product revision trial of usage (large scale)

The final stage is a large-scale product trial. This large-scale product trial was conducted in IV grade of SD Negeri Kaliwadas 01 with 20 students. Learning process was carried out for 2 times. In this large-scale trial, students were given pre-test and post-test to determine whether there was an increase in learning outcomes

or not, after using multicultural-based educational e-comic learning media. From large-scale trial the data obtained will be processed and analyzed for effectiveness based on 3 aspects; (1) the completeness of student learning outcomes after using learning media; (2) the results of paired t-test calculation; and (3) the results of the average increase. The completeness of student learning is shown in Figure 6.

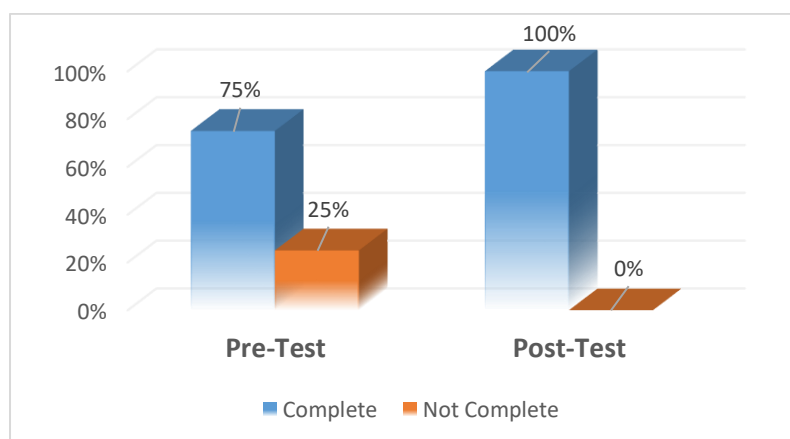


Figure 6. student learning outcomes

Based the Figure 6, can be seen that there is an increase in students' understanding of Social Sciences material; rich culture Indonesia theme, using multicultural-based educational e-comic media with a percentage of student understanding completion of pre-test is 25% and a percentage of student understanding completion of the posttest is 100%. So, there is an increase 75% before using multicultural-based educational e-comic learning media. The data obtained from the results of large-scale trials then analyzed using initial data analysis; through normality tests to determine the type of data that will be used. The calculation results are presented in the Table 4.

Table 4. Normality Test Results

	Pre-test	Post-test
Statistic	0.909	0.918
Df	20	20
Sig.	0.061	0.091

Based on the results of normality trial in pre-test results of social science learning achievement in the Shapiro Wilk column, it is known that the significance value (Asymp sig) is 0.061 the specified criteria data if sig > 0.05 then H_0 is accepted. So, it can be concluded that the data on the results of pre-test social science learning achievement are normally distributed. While the results of the trial of the normality of the results of the posttest science learning achievement in the Shapiro Wilk

column are known that the significance value (asymptotic sig.) is 0.091 of the specified criteria if $\text{sig} > 0.05$ then H_0 is accepted. So, it can be concluded that the data on the results of the posttest science learning achievement questions are normally distributed. The final data analysis was carried out through the t-test (paired samples t-test). The calculation results are presented in Table 5.

Table 5. Paired Sample T-test Results

Pre-test	Post-test	df	Sig. (2-tailed)
47	82,5	19	.000

Based on the table, the results of average pre-test and post-test show that the Sig. (2-tailed) value is 0.000. Therefore, it can be concluded that there is a significant difference between learning outcomes before and after using multicultural-based educational e-comic learning media for My rich culture Indonesia material. This is indicated by the Sig. (2-tailed) value is $0.000 < 0.05$. This means that multicultural-based educational e-comic learning media is declared effective in improving the social science learning achievement of IV grade students in SD Negeri Kaliwadas 01. The results of effectiveness that have been analyzed are also strengthened by the student and teacher responses presented in Table 6.

Table 6. Student and Teacher Response Questionnaire Results

Pre-test	Post-test	df
Teacher	96%	Very Feasible
Student	97%	Very Feasible

Based on the recapitulation table of student and teacher response questionnaires in small-scale trials, it can be seen that multicultural-based educational e-comic learning media received a very positive response and has a "very effective" category to use as supporting media in the learning process

DISCUSSIONS

The creation of multicultural-based digital comic learning materials has been successfully applied to fourth-grade pupils at Kaliwadas 01 Elementary School, according to the research results. The development of digital comic learning media is very important for use in learning, because it can support the learning process and help achieve learning outcomes. This is in accordance with the results of research conducted by Suprpto et al. (2023), which states that the use of digital comics can improve student learning outcomes. Furthermore, the use of digital media can also

assist in the delivery of learning materials in schools. This finding aligns with the theory proposed by Banks (Rina et al., [2020](#)), that the primary goal of multicultural education is to help students develop the knowledge, attitudes, and skills necessary to function in a pluralistic society. The success of this comic as a practical implementation of the content integration and prejudice reduction dimensions in Banks' model.

The figures obtained from the expert validation results meet the development feasibility standards by Borg and Gall. The majority of development results set a minimum feasibility score of 70%, while research scores from users, namely teachers and students, were above 90%. These results statistically exceed the minimum score limit and are very convincing for use. Although this comic is very suitable for use, it is necessary to note for further research how students' attitudes are after using this comic media. This multicultural learning idea is in accordance with the characteristics of the multicultural Indonesian nation.

CONCLUSION

After conducting this research, the results and data obtained, it can be concluded that this research can find the answer of the problem formulation. The student's ability to understand the material of My rich culture Indonesia can be seen from the data on student learning outcomes obtained by conducting pre-test and post-test tests. The researcher has succeeded in developing a multicultural-based educational e-comic learning media for IV grade elementary school students with the material My rich culture Indonesia. The media is in PDF form consisting 27 pages, and can be used using a cellphone of both at school or at home with parental guidance. The multicultural-based educational e-comic learning media for science learning for IV grade elementary school students with the material My rich culture Indonesia that has been developed is valid, practical and feasible to use in the learning process.

In terms of validity, the quality of multicultural-based educational e-comic learning media that has been developed has a good quality (B) with an average score and has an ideal percentage. While in terms of effectiveness, it is obtained from student learning outcomes through pre-test and post-test trials. The average score from 47 to 82.5 with this multicultural-based educational e-comic learning media can improve the learning achievement of fourth grade students in social science

learning process, especially in the material My rich culture Indonesia, so multicultural-based educational e-comics are effective

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