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Development of Interactive Learning Media to Improve Reading Comprehension Among Fourth Grade Elementary School Students

Riska Mahdalena[1], Deni Herdianto[2]

[1] Universitas Negeri Yogyakarta, Yogyakarta, Indonesia; riskamahdalena.2022@student.uny.ac.id
[2] Universitas Negeri Yogyakarta, Yogyakarta, Indonesia; deniuny@gmail.com

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ABSTRACT

Reading comprehension is a fundamental skill in elementary education; however, many students experience difficulties due to limited engagement and the continued use of conventional teaching methods. This study aims to develop interactive learning media to enhance fourth-grade students' reading comprehension in Indonesian language learning. This study employed a Research and Development (R&D) design using the ADDIE model (Analysis, Design, Development, Implementation, Evaluation). The sample consisted of 68 elementary school students. Data were collected through learning outcome tests, questionnaires, interviews, and observations. Instruments included validation sheets for material and media experts, as well as student and teacher response questionnaires. Data were analyzed to assess feasibility, practicality, and effectiveness, including a paired sample t-test to measure learning improvement. The developed interactive media was rated highly feasible by material experts (87%) and media experts (95%). Practicality evaluations showed very positive responses from students (91%) and teachers (93%). Effectiveness testing revealed a significant improvement in students' reading comprehension, with paired sample t-test results indicating $p = 0.000$ ($p < 0.05$), confirming a statistically significant difference between pre-test and post-test scores. The findings indicate that interactive learning media are feasible, practical, and effective in improving reading comprehension. The integration of multimedia elements enhances student engagement and supports active learning. Therefore, interactive media can serve as an effective instructional tool to improve literacy outcomes in elementary education, although further studies with broader samples are recommended.

Corresponding Author:
Riska Mahdalena
Universitas Negeri Yogyakarta, Indonesia; riskamahdalena.2022@student.uny.ac.id

1. INTRODUCTION

Students in primary school need to learn to read in order to comprehend the material and develop critical and creative thinking abilities. However, a lot of pupils have trouble reading, whether it's with interest, comprehension, or fluency. Interactive learning may be beneficial with today's technology

advancements. Interactive learning may boost students' motivation to study, enhance their reading comprehension, and make learning more fun and interesting. A child's character and skill development are greatly aided by their education. Education is nothing more than help; it equips students to be active and constructive members of society both now and in the future. Students have the capacity or aptitude to grow as individuals. Rosad and Suaryanto (2015, 2020). Law No. 2 of 1989 defines education as a deliberate attempt to use instruction, mentoring, and training to prepare students for their future duties. (Republic of Indonesia Government Regulation, 1989)

Learning objectives are descriptions of behaviors students are expected to achieve after the learning process. Learning objectives have several important functions in educational management, including as a direction and goal in carrying out teaching and learning activities, as evidence of teacher performance accountability, and to create a pleasant learning experience. The teaching resources, learning tactics, techniques, and media to be used throughout the learning process are selected with reference to the learning goals. Observable and quantifiable operational verbs, such as attitudes, knowledge, and abilities, must be included in the formulation of learning goals. As a precondition for Learning Outcomes (IP), learning goals must also be organized chronologically according to the order of learning throughout time (Sugito and Warsito, 2017).

One of the most important courses taught in schools is Indonesian. Having strong and accurate language skills and the ability to understand Indonesian literature and language in accordance with the context, language goals, and elementary school students' experience level are the goals of studying Indonesian. Learning Indonesian is aimed at improving students' ability to communicate in Indonesian well and correctly, both orally and in writing, and fostering an appreciation for Indonesian literary works. A text-based method to language learning was used in the construction of the 2013 curriculum for the Indonesian language curriculum. Students are supposed to be able to create and use texts in accordance with their social functions and goals using this method. In an academic sociocultural setting, Indonesian is taught not only as a language but also as texts that help its users achieve self-actualization. (2020, Ali)

As a result, learning Indonesian has to be planned using certain methods, techniques, and learning models that fit the language's course materials. (Susanna Garvis & Donna Pendergast, 2023). Through reading and writing exercises, studying Indonesian may help pupils better understand who they are. Reading exercises in the Indonesian language may help students express their thoughts and emotions, learn about their own and other cultures, and develop their analytical and creative skills. By allowing students to express their thoughts and emotions in writing, writing exercises may also aid in their self-discovery. As a result, learning Indonesian has to be planned using certain methods, techniques, and learning models that fit the language's course materials. Reading and writing exercises should also be considered as a crucial component of the learning process (Rohmaniah, 2016)

One of the most important language skills for learning Indonesian is the ability to read. The goal of reading skills is to help children become more proficient readers and increase their understanding of texts. Reading, writing, watching, and listening all help to build literacy abilities. Reading exercises may also help children express their thoughts and emotions, learn to think critically and creatively, and understand themselves, their culture, and the cultures of others. Reading must thus be emphasized as a crucial component of learning Indonesian, and learning methods, techniques, and models specifically tailored to the language's subject matter must be used (Akhyar, 2019)

Children are given reading tasks to help them become better readers from a young age. This isn't matched with attempts to increase their understanding, however, which leads to a typical issue: kids don't fully comprehend the information that is offered to them and quickly forget it. Therefore, in order to maximize children's knowledge throughout time, it is essential to develop reading comprehension early on. Saraswati (2019) Reading can be done for a variety of reasons, according to Farida Rahim (2008: 11). These include: a) enjoyment; b) honing reading aloud skills; c) applying specific strategies; d) updating knowledge on a subject; e) connecting new information with previously learned information; f) gathering information for oral and written reports; g) verifying or disproving predictions; h) conducting experiments or applying information from the text in other ways; i) studying the text's structure; and j)

responding to particular questions.

One of the fundamental language skills taught in schools is the ability to read Indonesian text. Students' proficiency in reading is a major factor in determining how well they learn and participate in class. Pupils who struggle with reading will find it challenging to engage in all subject studies. According to Law No. 20 of 2003, there are a number of strategies to help kids become better readers, including using nam-nam boards, smart flannel media, video media, and picture media. While video learning materials may help deaf children read nouns, image-based media can help pupils with their reading comprehension. Students' reading abilities may also be enhanced by various educational resources like nam-nam boards and smart flannel media. As a result, creating relevant educational materials may aid in enhancing students' reading comprehension of Indonesian.

In order to make learning materials easier for students to accept throughout the learning process, media is used as an intermediate tool. This means that the right kind of media must be used to grab students' attention. Incorporating educational media into the teaching and learning process may boost students' drive to study and spark new interests and wants (Musami, Jumadi, & Kusuma, 2019). Students must be able to mimic, be more creative, and get feedback from digital learning materials. You may utilize the right programs to generate digital media. One benefit of interactive media is that instructors or teachers may utilize it as they see fit. We may choose the menu or content that will be shown next by utilizing this interactive media (Purwanti, 2019).

The learning process necessitates the teacher's ability to master learning, manage the class, and provide learning materials using particular learning methodologies that include as many students' talents as feasible (student-centered). In order to accomplish outcomes via the process that align with the goals or competence requirements, the best learning approach may be chosen (Purwanti, 2019). Based on the subject's features, the qualities of the students and teachers, and the real state of the resources available in the school, schools are free to use the best teaching and learning tactics, methods, and approaches. In general, there is a greater chance that student learning will be enhanced by student-centered learning strategies, methods, and procedures. Learning that prioritizes students' active learning above instructors' active teaching is known as student-centered learning.

Research on interactive media tailored to the Merdeka Curriculum and its effects on Indonesian fourth-grade students' reading comprehension is still scarce, despite the fact that several studies have shown the literacy-promoting potential of digital media. Researchers gathered information on the difficulties faced by teachers by conducting interviews with them and observing their activities in a number of primary schools. A dearth of compelling learning materials, instructors' persistent use of traditional teaching techniques, and students' restricted use of the learning resources that are accessible are some of the causes of students' lack of interest in reading, which leads to their low reading abilities. Given these facts, it is clear from observations that pupils are less engaged in the learning process when fewer varied media are used. Because teachers continue to use lecture techniques and basic teaching aids like whiteboards and textbook illustrations, many students lack focus and interest in the material they are being taught. This is especially true given that some students still struggle with reading fluently.

The goal of this study is to create interactive educational materials that will help fourth-grade primary school pupils become more proficient readers. Students can better comprehend reading materials thanks to interactive media, which is intended to provide a more effective and interesting learning environment.

2. METHOD

Research and Development (R&D) is the term for this kind of development research. The goal of this study is to create interactive learning materials that will help fourth-grade primary school pupils become more proficient readers. Research and development is a research methodology that seeks to create a product and evaluate its efficacy, according to Sugiyono (2015). 68 persons made up the study's sample.

The ADDIE model, which has five stages—analysis, design, development, implementation, and evaluation—is the development model that is used. The learning resources created include: (i) interactive

learning materials; (ii) a variety of videos, animations, and tests; and (iii) interactive multimedia PowerPoint based on the Spring Suite 11 application. The latter is focused on the Pancasila student profile strengthening project, which aims to enhance fourth-grade students' reading abilities.

The techniques used in this research and development were observation, subject teacher interviews, questionnaires, and learning outcome tests. The instruments used in this study were student learning outcome evaluation sheets and questionnaires consisting of: 1) a validation questionnaire given to the validator to measure media validity, 2) a student response questionnaire, 3) a teacher response questionnaire, and an evaluation sheet used to see the effectiveness of interactive multimedia.

The instruments in this research and development were developed through several systematic stages. The first stage was the development of an instrument grid that referred to the research variable indicators, namely media feasibility, practicality, and learning effectiveness. These indicators were derived from theoretical studies on interactive learning media and reading comprehension, then developed into statement items in the form of a Likert scale. A validation questionnaire was developed to assess aspects of content/material, language, presentation, and media appearance, while the student and teacher response questionnaires included aspects of ease of use, interestingness, usefulness, and involvement in learning. The learning outcome test instrument was developed based on the fourth-grade reading comprehension competency indicators, then presented in the form of questions that measure the ability to understand main ideas, explicit and implicit information, and conclusions from reading.

The instrument validation process is conducted through a content validity test involving subject matter experts and media experts as validators. The validators assess the suitability of the instrument items to the indicators using a provided assessment sheet and provide suggestions for improvement if necessary. The assessment results are then analyzed in the form of a feasibility percentage to determine the validity category (e.g., very feasible, feasible, sufficient, or less feasible). Instrument revisions are made based on validator input before use in the field trial. Furthermore, to improve the instrument's reliability, a reliability test (e.g., using Cronbach's Alpha coefficient) can be conducted after the limited trial to ensure the internal consistency of the statement items.

Regarding the ethical aspects of the research, the researcher first obtained official permission from the principal and the class teacher where the research was conducted. The researcher also explained the objectives, procedures, and benefits of the research to the school and respondents. Student participation was carried out with the consent of the teacher and the school as responsible guardians, and guaranteed that the data obtained would only be used for academic purposes. The confidentiality of respondents' identities was maintained, and the research results were reported in aggregate without naming individuals, thus fulfilling the ethical principles of educational research, namely consent, confidentiality, and scientific responsibility.

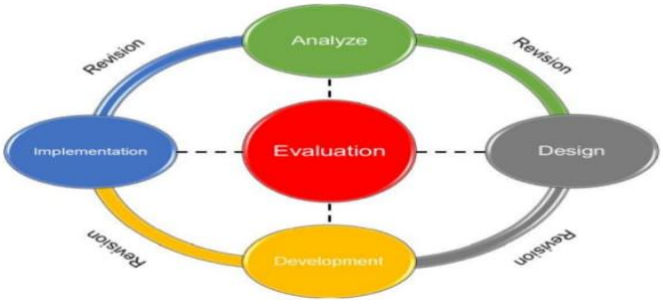

Figure 1. ADDIE Development Procedure

3. FINDINGS AND DISCUSSION

3.1 Findings

Interactive learning materials are created using the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) framework to help fourth-grade primary school pupils become better

readers. The analysis stage involves six research steps: (1) establishing the target audience; (2) establishing learning objectives; (3) verifying student learning independence; (4) identifying the necessary resources; (5) identifying possible delivery systems; and (6) developing a project management plan. Furthermore, in the Design stage, there are 3 activities that have been carried out, namely: (1) Formulating the objectives of preparing learning media; (2) Formulating learning activities; (3) Formulating learning media. The development stage includes 3 main activities, namely: (1) Producing content; (2) Developing learning media; (3) Conducting revisions based on formative evaluation and trials. The development stage has succeeded in developing the initial product of interactive learning media as follows.

3.1.1 Format and Content of Learning Media

The sections of each learning media unit illustrate activities that encourage students' reading skills through interactive learning media. The images of the media developed are as follows:

Figure 2. The images of the media developed

3.1.2 Subject Matter Expert Validation

The product has been validated by expert validators. The validation results, which demonstrate the product's suitability, can be seen in the table below.

Table 1 Results of Validation of Material Feasibility in Interactive Learning Media

No	Name	Institution of origin	Percentage Value	Category	Revision Suggestion
1	Dr. Anwar Senen, M.Pd	Faculty of Social and Political Sciences, UNY	87%	Very worthy	1. Conformity between student achievement and learning media materials 2. In media materials, use language that is easy for students to understand.
2	Dr. Hikmawati M.Pd	University of Mataram	95%	Very worthy	3. Words or punctuation, as well as font size in several places according to the notes in the media. 4. This media can be used with minor revisions.

3.1.3 Product Trial Results

Product trials during the development phase are conducted to assess student responses to the learning media. The quality of interactive learning media prior to implementation is assessed by students as users. Activities at this stage, including trials, also aim to determine the potential practicality of the learning media and identify areas that need revision. The following describes trials during the development phase, which include one-on-one trials, small group trials, and field trials.

1) *One-on-One Trial*

This experiment was conducted on six students at Baturan Elementary School. Student selection was based on teacher considerations. The experiment was conducted face-to-face on September 10, 2024, according to the school's schedule. Students were asked to complete a questionnaire to obtain response data to the learning media. The data obtained from the one-on-one experiment are presented in the following table.

Table 2 Results of the One-by-One Interactive Learning Media Trial

No	Subject Opinion Summary	Suggestion
1.	4 subjects felt less happy learning using learning media and 2 subjects felt very happy.	Needs to be revised
2.	5 subjects enjoyed learning using media and 1 subject did not enjoy using media.	No revision needed
3.	4 subjects were very happy to learn using media and 2 subjects felt less happy.	No revision needed
4.	6 subjects enjoyed learning using the module.	No revision needed
5.	3 subjects felt happy, 2 subjects were very happy, and 1 subject was less happy.	No revision needed
6.	5 subjects felt happy and 1 subject felt less happy.	No need to revise
7.	3 subjects felt very happy and 3 subjects felt happy	No revision needed
8.	4 subjects felt happy and 2 subjects felt less happy.	No revision needed
9.	3 subjects felt very happy and 3 subjects felt happy	No revision needed
10.	4 subjects felt happy and 2 subjects felt less happy.	No revision needed

2) *Small Group Trial*

This experiment was conducted on 12 students from Baturan Elementary School. The sample was selected purposively based on the teacher's considerations. This small-group experiment was the same as the one-on-one testing phase. This experimental phase was conducted offline on a predetermined date, namely October 11, 2024. The data obtained from the small-group experiment are presented in the following table.

3) *Field trials*

This experiment was conducted on 20 students (1 class) at Patran Elementary School on October 15, 2024, with the same process as the two previous experiments.

Table 3 Results of Field Trial of Interactive Learning Media

No.	Subject Opinion Summary	Suggestion
1.	10 subjects felt very happy and 8 subjects felt happy	No revision needed.
2.	7 subjects felt very happy, 10 subjects and 6 subjects felt happy, and 1 subject felt less happy.	No revision needed.
3.	6 subjects were very happy and 12 subjects felt happy	No revision needed.
4.	A total of 12 subjects felt very happy, 3 subjects felt happy, and 3 subjects felt less happy.	No revision needed.
5.	4 subjects were very happy and 14 subjects were happy	No revision needed.
6.	14 subjects felt very happy and 4 subjects felt happy	No need to revise
7.	11 subjects felt very happy and 7 subjects felt happy	No revision needed.
8.	5 subjects felt very happy, 17 subjects felt happy, and 1 subject felt less happy.	No revision needed.
9.	10 subjects felt very happy, 4 subjects felt happy, and 2 subjects felt less happy.	No revision needed.
10.	10 subjects felt very happy and 8 subjects felt happy	No revision needed.

4) Product Revision

Product feasibility testing is based on assessments from media experts, namely, (1) the learning media developed is good and interesting, and supports students to improve reading comprehension. (2) Correcting missing words or punctuation, this media can be used with minimal revision.

Material experts provided suggestions and input, and the material was modified to test its suitability. The results showed that the learning media were well-made and usable. The material was validated once, and revisions or improvements were only made once. The recommendations and suggestions provided included: (1) Adjustment between student achievement and learning media material. (2) In the media material, use language that is easy for students to understand.

Experimental activities were conducted to determine whether the interactive learning media was successful. From these experimental activities, there were suggestions and input for material that needed to be revised as a follow-up. In addition, there were positive responses and comments from students regarding the excellent and interesting learning media. Students became more enthusiastic about learning using the learning module. The experiment was conducted with readability tests (one-on-one trials, small groups, field trials) and practicality tests. Some suggestions and input that can be summarized include: 1) improving the content of the writing in the paragraphs of the learning module, so that they are not too long and students do not feel bored reading them.

5) Product Effectiveness Test Data Processing

Table 4. Paired Sample T-Test

T-Test Value	Significance (p)	Condition	Information
-4.80	0.000	P < 0.05	Ha accepted

The paired sample TT test showed a significant difference in reading comprehension ability before and after using PowerPoint-based interactive learning media. The results of the normality test with one-sample Kolmogorov-Smirnov showed that the pretest ($p = 0.368$) and posttest ($p = 0.307$) data were normally distributed ($p > 0.05$), so the TT test could be carried out. The results of the paired sample TT test showed a T value = -4.80 with a significance of $p = 0.000$ ($p < 0.05$), so Ho was rejected and Ha was accepted, which means there was a significant increase in reading comprehension ability after using interactive learning media.

3.2 Discussion

The findings of this study demonstrate that the developed interactive learning media is feasible, practical, and effective in improving fourth-grade students' reading comprehension. These results can be understood more deeply when examined through established learning theories and prior empirical studies in educational technology and literacy instruction.

From the feasibility perspective, the high validation scores from material and media experts indicate that the developed media aligns with sound instructional design principles. This is consistent with the ADDIE framework, which emphasizes systematic alignment between learning objectives, content, and evaluation (Branch, 2009). The strong alignment with curriculum goals suggests that the media supports meaningful learning experiences, as proposed by Ausubel's theory of meaningful verbal learning, where new information is effectively integrated with learners' existing cognitive structures (Ausubel, 1968). In this study, the structured presentation of reading materials, combined with interactive elements, likely facilitated better comprehension by connecting new content with prior knowledge.

The practicality findings, reflected in high student and teacher response scores, highlight the usability and engagement value of the developed media. These results align with the Technology Acceptance Model (TAM), which posits that perceived ease of use and perceived usefulness significantly influence users' acceptance of technology (Davis, 1989). Students' positive responses suggest that the media was not only accessible but also perceived as beneficial for learning. Furthermore, the interactive nature of the media supports the principles of student-centered learning, where learners actively engage

in constructing knowledge rather than passively receiving information (Jonassen, 1999). The inclusion of multimedia elements such as animations and quizzes likely enhanced learners' motivation and sustained attention, which are critical factors in elementary education.

The effectiveness of the media, as indicated by the significant improvement in reading comprehension scores, can be explained through constructivist learning theory. Constructivism asserts that learners actively build knowledge through interaction and experience (Piaget, 1970; Vygotsky, 1978). In this study, the interactive features of the media—such as embedded exercises and immediate feedback—provided opportunities for active engagement and scaffolding. Vygotsky's concept of the Zone of Proximal Development (ZPD) is particularly relevant, as the media may have functioned as a scaffold that supports learners in progressing beyond their current level of comprehension with guided interaction.

Additionally, the effectiveness of the multimedia elements can be interpreted through Mayer's Cognitive Theory of Multimedia Learning, which posits that individuals learn more effectively from words and pictures than from words alone (Mayer, 2009). The integration of visual and auditory information in the developed media likely reduced cognitive load and enhanced information processing, leading to improved comprehension outcomes. This is further supported by Dual Coding Theory, which suggests that the combination of verbal and visual representations strengthens memory and understanding (Paivio, 1986).

The improvement in reading comprehension also reflects the role of engagement and motivation in literacy development. According to Guthrie and Wigfield (2000), motivated readers are more likely to employ effective reading strategies and achieve better comprehension outcomes. The interactive and visually appealing design of the media likely increased students' intrinsic motivation, thereby encouraging deeper engagement with the reading materials.

Despite these positive findings, several limitations must be acknowledged. First, the study was conducted within a limited sample and specific educational context, which may affect the generalizability of the results. Future research should involve larger and more diverse populations to enhance external validity. Second, the study focused on short-term learning gains, as measured by pretest and posttest scores. Longitudinal studies are needed to examine whether the observed improvements in reading comprehension are sustained over time. Third, while the study demonstrates effectiveness, it does not fully explore individual differences in learning, such as prior knowledge or learning styles, which may influence the effectiveness of interactive media.

Future research should also consider integrating adaptive learning technologies that can personalize content based on students' abilities and progress. This aligns with contemporary trends in educational technology, which emphasize individualized learning experiences to maximize student outcomes (Holmes et al., 2019). Additionally, combining interactive media with collaborative or project-based learning approaches may further enhance students' higher-order thinking skills and literacy development.

In conclusion, this study provides strong empirical support for the use of interactive learning media in improving elementary students' reading comprehension. By integrating principles from constructivism, multimedia learning, and technology acceptance theories, the findings highlight the pedagogical value of well-designed digital learning tools. These results have important implications for educators and curriculum developers, suggesting that the integration of interactive media can significantly enhance the quality of literacy instruction in primary education.

4. CONCLUSION

This study concludes that the developed interactive learning media is feasible, practical, and effective in improving fourth-grade elementary students' reading comprehension, as evidenced by high expert validation scores, positive responses from both teachers and students, and statistically significant improvements in posttest results compared to pretest scores. The integration of multimedia elements and interactive features appears to enhance student engagement and facilitate deeper

understanding of reading materials, supporting its use in primary education contexts. However, this study is limited by its relatively small and localized sample, as well as its focus on short-term learning outcomes without examining long-term retention or broader applicability across diverse educational settings. Additionally, variations in student characteristics and potential inconsistencies in statistical reporting may affect the generalizability and robustness of the findings. Therefore, future research is recommended to involve larger and more diverse samples, apply more rigorous experimental designs, and incorporate longitudinal approaches to assess sustained impacts, while also exploring the integration of adaptive or personalized learning features to further enhance the effectiveness of interactive media in literacy development.

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