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Development of problem based e-comic on the theme of domestic politics on student learning achievement

Yulina Ismiyanti [1], Novi Mayasari [2], Setyo Wuri Kartika Nugraheni [3]
[1] Universitas Islam Sultan Agung, Semarang, Indonesia
[2] Universitas Islam Negeri Profesor Kiai Haji Saifuddin Zuhri, Purwokerto, Indonesia
[3] Universitas Islam Sultan Agung, Semarang, Indonesia

Corresponding author's e-mail: yulinaismiyanti@unissula.ac.id

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Abstract

In elementary schools, the lack of utilization of learning media and restricted learning tools causes children to become bored and have difficulties grasping the curriculum. This project aims to create problem-based e-comics that are valid, practical, and useful for educational purposes. This research and development project used the ADDIE development paradigm, which includes stages such as analysis, design, development, implementation, and evaluation. Of all the stages completed, the problem-based e-comic generated fits the valid requirements, with a validity percentage of 87% falling into the category of highly viable. Problem-based e-comics also meet practical standards, with instructor response questionnaire analysis yielding an 89% score and student answer questionnaires yielding a 100% score, indicating they are efficiently practical. A learning with problem-based e-comic media is effective for class student learning accomplishment IV SDN-04. Mejobo, the t-test results yielded a 0.00 significant value, indicating a difference in student learning achievement before and after learning using problem-based e-comics. The results of the t-test were strengthened by the results of the normalized gain test, which yielded a value of 0, 63, which falls into the medium group. It is intended that the production of problem-based e-comics will expand the repertory of intellectual property while also serving as a medium and learning resource for elementary school pupils.

INTRODUCTION

Background of the Study

There are several essential elements in the learning process in elementary schools, including media and learning resources (Buchori & Setyawati, 2015; Herlina & Linda, 2021). Elementary school students at the age 7 to 11, according to Piaget, are at a concrete operational stage (Poryadchenko & Lytvynova, 2023). It is

characterized by students starting to think logically and can only apply logic to physical objects such as learning media.

The media used to convey learning materials are classified into several types: audio, visual, and audiovisual (Nasrulloh et al., 2020; Priyangga et al., 2022; Setiawan et al., 2022). E-comic is a kind of visual media (Cahyaningtyas et al., 2022; Ntobuo et al., 2023). Visual media are primarily used in elementary school learning as teachers can use them more easily without supporting means. The teachers could demonstrate to students through visual media.

Along with the times, comics are now available in digital form or problem-based e-comic. Moreover, the development of technology has accelerated in recent years, resulting in most students preferring to use smartphones in many activities, including learning (Berger et al., 2023; Bodnenko et al., 2023; Prihandini & Siswati, 2022).

Problem of the Study

Preliminary studies in class IV SDN 04 Mejobo found including (1) the lack of maximum use of engaging learning media, primarily only using textbooks and LKS; (2) students glance bored during learning as seen from the lack of student participation in the learning process; and (3) the teacher-centered learning process results in students becoming less independent and passive in learning.

Research's State of the Art

Based on a preliminary study of the needs analysis to overcome existing problems, one of them is through problem-based e-comic. There are several previous studies related to problem-based e-comic media. The results of Nasrulloh's research entitled E-Comic Learning Media Based Problem-Based Learning In the Subject of Linear Equation System show the validity of learning media obtained based on an assessment of the validation of material experts (mathematics education lecturers). There are 4.2 with a valid category, an assessment of the validation of material experts (mathematics subject teachers) there are 4.8 with a very valid category, while the validation of media experts is 4.53 with a very valid category, and the response of students is 94% with a very agree category. (Nasrulloh et al., 2020). The similarity between Nasrullah's research and this research is that they both develop e-comics. The difference lies in the theme of e-comic development and data analysis in Nasrullah's research, which only reaches the expert validation or validity stage. In contrast, the analysis in this study includes the validity, reliability, and effectiveness of e-comic.

The results of Udayani's research entitled E-Comic Learning Media Development on the Topic of the Human Digestive System the results of the analysis show the average score of e-comic learning media validation on the topic of the human digestive system of 4.65 with excellent qualifications and material validation of 4.57 with excellent qualifications. So, the e-comic learning media on the topic of the human digestive system is declared valid and has excellent qualifications. (Udayani et al., 2021). The similarity with Udayani's research is that both develop e-comic media. The difference is that it lies in the e-comic theme developed and the data analysis of data analysis in Udayani's research up to the validity analysis. At the same time, this study includes validity, practicality, and effectiveness.

The results of Suri's research entitled E-Comics as an Interactive Learning Media on Static Fluid Concepts show that android-based e-comics are feasible to use in physics learning with an average validation score of 83.8. E-comics is one of the learning media innovations in the digital era that can be implemented by students and used without any space and time constraints (Suri et al., 2021). The similarity between Suri's research and this research is that they both develop e-comics. The difference lies in the theme of e-comic development and data analysis in Suri's research, which is limited to expert validation. At the same time, this study includes validity, practicality, and effectiveness.

A study entitled Using Comics with Novice EFL Readers to Develop Reading Literacy concentrated on the possible effects of using authentic comics on EFL learners. The results showed possible positive effects on vocabulary development, reading motivation, and overcoming linguistic barriers in reading authentic materials using context and prior knowledge (Cimermanová, 2015). The similarity between Cimermanová's research and this research is that both discuss comics. The difference lies in the type of research. Cimermanová conducted qualitative research with a case study type, while this research is a development research with ADDIE design.

Novelty, Research Gap, & Objective

Through problem-based e-comic in this study, students are shown an overview accompanied by fascinating stories about domestic political problems packaged according to the characteristics of elementary school students; based on these political realities, students also learn meters about the Indonesian government system. This is the novelty of this research. Entering the era of industrial revolution 4.0 and 5.0 based on digital technology, including learning media to facilitate

learning activities, must adjust by incorporating Technological Pedagogic Content Knowledge (TPACK) so as not to be left behind by the times. With the lack of digital-based technology in learning that has been developed, e-comic is one of the correct alternative solutions. It makes students enjoy reading comics and learning because the learning material is integrated with the storyline. In addition, problem-based e-comics with the theme of domestic politics can also be one of the fillers in the research gap related to topics in e-comic development.

E-comic has several advantages, including more cost-effective, more practical storage and use because it can be accessed using a smartphone, laptop or computer, and is more durable or not easily damaged (Afifah & Putri, 2021; Dewi et al., 2022; Ismiyanti, 2016). This research aimed to develop learning media, namely problem-based e-comic with the theme of domestic politics, that is valid, practical, and effective for the learning process. This problem-based e-comic is expected to be an exciting and meaningful learning media for students so that, hopefully, it can affect and improve student learning achievement..

METHOD

Type and Design

This research is an R&D research. R&D research is defined as research conducted to develop or produce products through researching, designing, creating, and testing products that have been created. (Solehhudin & Wulandari, 2023; Widyasari & Nurcahyani, 2021). The R&D method has a variety of development designs. The development design used in this development research is the ADDIE development design. This ADDIE design consists of 5 stages, namely Analysis, Design, Development, Implementation, and Evaluation (Adeliyanti et al., 2021; Branch & Stefaniak, 2019; Ismiyanti & Permatasari, 2021; Kurniawati & Azka, 2022).

Data Collection Technique

The subjects of this problem-based e-comic media development research are fourth-grade students of SDN 04 Mejobo, with a population of 22 students. The sampling technique through non-probability sampling technique is saturation sampling or saturated sampling, so the number of samples is 22 students. The data in this study were collected using several methods, namely product validity questionnaire techniques, response questionnaires, and written tests.

Data Analysis

The data analysis technique used is quantitative data analysis. Quantitative data analysis is used to process data in the form of numbers obtained from the learning media validation questionnaire by experts and teacher and student response questionnaires on the use of e- comic based problem media in the learning process (Fianto et al., 2023; Ismiyanti, 2020). In addition, quantitative data is also obtained from student test results. The media validity criteria used in this development research are as follows:

Table 1. Criteria of Expert Validation Questionnaire Percentage

Percentage	Qualification
81% – 100%	Very Proper
61% – 80%	Proper
41% – 60%	Fairly Proper
21% – 40%	Less Proper
< 20%	Not Proper

(Sastrawan et al., 2021; Suri et al., 2021)

Whether or not the problem-based e-comic media is valid can be known from the analysis results obtained. Problem-based e-comic media is said to be "Valid" if the analysis results meet the minimum criteria of "Proper" or obtain a percentage ≥ 61%. Criteria for media practicality used in research

The criteria for media practicality used in this development research are as follows:

Tabel 2 Percentage of Performance of Teacher and Student Response Questionnaire

Percentage	Qualification
81% – 100%	Very Proper
61% – 80%	Proper
41% – 60%	Fairly Proper
21% – 40%	Less Proper
< 20%	Not Proper

(Pratiwi et al., 2023)

Whether or not the problem-based e-comic media is practical can be known from the analysis results obtained. Problem-based e-comic media is said to be "Practical" if the analysis results meet the minimum criteria of "Good" or get a percentage ≥ 61%.

While the results of students' pre-test and post-test were analyzed using the t-test and normalized gain with the help of SPSS Statistics 20 to determine the effectiveness of problem-based e-comic. (Ismiyanti & Permatasari, 2021; Mariana, 2023; Shah Rullnizam et al., 2023). However, before the students' pre-test and post-test scores are tested, the pre-test and post-test scores are tested for normality first, whether the data distribution is normal or not. The data normality test was carried out using the Lilliefors test formula, calculated using SPSS Statistics 20 using the Shapiro-Wilk test. The normalized gain test criteria used in this development research are as follows:

Tabel 3 Criteria of Normalized Gain Test

N-Gain	Interpretation
-1,00 ≤ g ≤ 0,00	A decrease occur
g = 0,00	Remains
0,00 < g < 0,30	Low
0,30 ≤ g < 0,70	Moderate
0,70 ≤ g ≤ 1,00	High

(Ismiyanti & Cahyaningtyas, 2019; Maulidiana et al., 2021)

Whether or not e-comic problem-based media is effective in improving student learning achievement can be seen from the results of the analysis obtained. Problem-based e-comic media is said to be "Effective" if the analysis results meet a minimum value of 0.00 < g < 0.30 or are included in the low category. Likewise, on the contrary, if the analysis results do not meet the minimum value of 0.00 < g < 0.30, then the problem-based e-comic media is said to be "Ineffective".

RESULTS

The problem-based e-comic media was developed using the ADDIE model. The first stage is the analysis stage, which starts with observing and interviewing the fourth-grade teacher of SDN 04 Mejobo. The analysis stage in this study consists of 2 stages: performance analysis and need analysis. At the performance analysis

stage, researchers examined the problems in the learning process in class IV SDN 04 Mejobo. It was concluded that teachers still lacked learning media and had never used e-comic media in the learning process. Researchers conducted a needs analysis, namely developing a learning media as an e-comic.

The next stage is the design stage. This stage begins with designing the concept of learning media to be developed. The design of learning media is developed based on problems. This aims to develop students' problem-solving skills. At this stage, researchers have determined the theme of problem-based e-comic media, domestic politics, and a story about government. This stage also determined competencies and learning objectives.

The third stage is the development stage. At this stage, researchers began to develop a problem-based e-comic media framework. After the problem-based e-comic media was developed, researchers conducted media validation to 3 expert validators. The following are the results of expert validation questionnaires related to problem-based e-comic media that researchers have developed:

Table 4. Result of Expert Validation Questionnaire

Validators	Scores	Percentage	Qualification
Validator 1	76	84%	Very Proper
Validator 2	84	93%	Very Proper
Validator 3	72	82%	Very Proper

Based on the table of the problem-based e-comic media expert validation questionnaire results, it is known that the percentage of feasibility from validator 1, validator 2, and validator 3 is more than 81%, which is included in the very feasible category. Therefore, the overall media percentage from 3 validators is 87%. The media is proper if it has met the minimum limit of media feasibility of 61% so that the problem-based e-comic media has met the eligibility criteria.

The fourth stage is implementation. At this stage, researchers applied problem-based e-comic media to fourth-grade students of SDN 04 Mejobo. However, before implementing trials or applying problem-based e-comic media, researchers gave pre-test questions to students first to determine their initial ability. Product trials of e-comic problem-based media were conducted on students in class IV B of

SD Negeri Turirejo 1. The trial was conducted on 22 students in 2 x 35 minutes of learning time.

The fifth or last stage is the evaluation stage. In the evaluation stage, researchers gave questionnaires to teachers and students to find out their responses to problem-based e-comic media and test questions (post-test) to determine the effectiveness of problem-based e-comic media in the learning process.

Table 5. Result of Teacher Response Questionnaire

Aspects	Percentage	Qualification
Display design	90%	Excellent
Content	97%	Excellent
Ease-of-Use Aspect	80%	Excellent
Benefit Aspect	80%	Excellent

The teacher's response questionnaire analysis showed that the teacher gave an excellent overall response to using e-comic-based problem media. The percentage results obtained in the display design aspect is 90%, including in the excellent category, and the content aspect obtained a percentage of 97%, including in the excellent category. The ease of use aspect is 80%, including the excellent category, and the usefulness aspect is 80%, including the excellent category. Thus, the results of the teacher response questionnaire on problem-based e-comic media, when accumulated as a whole, obtained a percentage of 89% and included in the excellent category.

Table 6. Result of Teacher Response Questionnaire

Aspects	Percentage	Qualification
Enjoyment	100%	Excellent
Active Participation	100%	Excellent
Easy-to-Understand materials	100%	Excellent
Learning Interest	100%	Excellent
Readability	100%	Excellent
Excitement of studying on materials	100%	Excellent
Easy-to-use media	100%	Excellent
Media Benefit	100%	Excellent

The results of the student response questionnaire obtained a positive response with a percentage of 100% on all aspects included in the excellent criteria. So, based on teacher and student response questionnaire analysis, problem-based e-comic media meets practical criteria.

The t-test results of the pre-test and post-test values show differences in the learning achievement of fourth-grade students of SDN 04 Mejobo before and after using problem-based e-comic media. The following are the results of the t-test of students' pre-test and post-test scores:

Table 7. Result of Paired T-Test Samples

Action	Sig. (2-tailed)	Interpretation
Pre-test – *Post-test*	0,000	A difference found

Result of t-test was also supported by normalized gain test result. The following is the result of gain test on students' pre-test and post-test scores

Table 8. Result of Normalized Gain Test

Action	Rata-Rata	N-Gain	Kriteria
Pre-test	47,9	0,63	Sedang
Post-test	80,9		

Based on the table of normalized gain test results, it is known that obtaining a value of 0.63 increases student post-test results, which are included in the moderate category. Based on the t-test and the gain test results, learning mathematics using problem-based e-comic media effectively improves student learning achievement.

The problem-based e-comic media developed consists of (1) front cover, (2) writing team, (3) preface, (4) table of contents, (5) character introduction, (6) story content, and (7) synopsis.

DISCUSSIONS

Based on the results of problem-based e-comic research with the theme of domestic politics, a story about government has valid, practical, and effective criteria

for use. In terms of appearance design, the media has an attractive design; the type of color and font size have also been adjusted to the characteristics of students so that it can be read clearly. When observed in terms of content, problem-based e-comic media has complete components, from the introduction of characters to the story's content about domestic politics, in which there is learning about the Indonesian government system and synopsis. In addition, the language used is also clear and communicative, easy to understand. To make it easier for students to understand the learning material. This is in line with previous research conducted by Afifah and Putri. It can be concluded that the research conducted produced comic learning media with the Problem-Based Learning (PBL) model, which was included in the "very proper" category with a value of 3.60 and "very reliable" with a percentage of 92.8% (Afifah & Putri, 2021). Another study conducted by that Nasrullah's research on the development of PBL-based e-comic learning media was said to be proper because it obtained a percentage of learning content experts of 97%, learning design experts obtained a percentage of 97%, and learning media experts of 100% (Nasrulloh et al., 2020). Based on the results of Afifah, Putri, and Nasrullah's research, the e-comics developed obtained valid results, so the e-comics developed meet the criteria for feasible aspects of the suitability of content, language, and design.

Good learning media is learning media that has various benefits and can foster student interest in learning (Cahyaningtyas et al., 2022). The practicality of problem-based e-comic media can be seen in that students become more interested and active in participating in learning, and it helps students better understand the learning material. This is also in line with Ntobua's opinion, which reveals that the use of learning media can make students more active in the learning process, and the material becomes easier to understand (Ntobuo et al., 2023). In terms of appearance, the media has a look and design that can attract students to learn. In terms of content, the learning material presented is also more exciting and easy to understand. Of course, problem-based e-comic media is also easy to use because there are clear and easy-to-understand book instructions. This is also following previous research conducted by Dewi; the problem-based e-comic media developed received good responses from students and teachers with a practicality percentage of 87% (Dewi et al., 2022). Another study also conducted by Fianto showed that the learning media for Mathematics comics developed was practical, with a percentage of teacher questionnaire results of 91.4% included in the very practical category and

a percentage of student questionnaire results of 93.8% included in the very practical category (Fianto et al., 2023). Based on the study's results, one of the criteria for good learning is easy to operate or practical to use, which means that based on the questionnaire response to the use of learning media by students and teachers, the results are good or excellent.

Problem-based e-comic media, which has never been used in the learning process before, makes students more enthusiastic about the learning process; this is one of the supporters of the effectiveness of problem-based e-comic media. Another supporter is learning material in the form of everyday problems presented as illustrated stories that make the learning process more enjoyable and meaningful for students (Bodnenko et al., 2023). Thus, students find it easier to understand the learning material. In addition, a series of learning activities in problem-based e-comic media trains students to understand the material more systematically. The attraction of this problem-based e-comic media is that it is designed with bright colors, and the story illustrations to explain the material on the media are also exciting and varied. Image illustrations on learning media serve to support the explanation of learning materials (Berger et al., 2023). Through problem based e-comic, students seem to enjoy reading comics but also learning.

CONCLUSION

The development of problem-based e-comic media was carried out using the ADDIE development model, which consists of five stages: analysis, design, development, implementation, and evaluation. The problem-based e-comic media meets the valid criteria, with a validity percentage of 87%, and is included in the very feasible or valid category. The problem-based e-comic media meets the practical criteria, with the analysis of the teacher's response questionnaire to the problem-based e-comic media obtaining a percentage of 89%, including in the very good or practical category. Meanwhile, the student response questionnaire to the problem-based e-comic media obtained a percentage of 100%, including in the very good or practical category. Learning using problem-based e-comic media is effective on the learning achievement of grade IV students of SD Negeri Turirejo 1, with the results of the t-test of the pre-test and post-test values of class IV B students of SD Negeri Turirejo 1 showing that the pre-test and post-test values obtained a pre-test and post-test significance value of 0.000 less than α (0.05), so there is a difference in the pre-test and post-test of class IV B students of SD Negeri Turirejo 1. The t-test

results are also reinforced by the results of the normalized gain test of the pre-test and post-test values, which obtained a value of 0.63, which is included in the medium category.

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