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Development of E-Comic to Improve the Spirit of Mutual Cooperation and Learning Achievement of Class V Elementary School

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ABSTRACT
The background to the development of e-comics is due to students' low awareness of the environment. The aim of this research is to produce an e-comic about my environment to increase the spirit of mutual cooperation and appropriate, practical and effective learning achievements. This development research uses the ADDIE research model. The research subjects were 102 students and 4 teachers at elementary school cluster II, Kasihan subdistrict, Bantul district, Yogyakarta. Data collection techniques used interviews, needs analysis questionnaires, validation questionnaires, response questionnaires, self-assessment questionnaires, and pretest posttest. Data analysis used the independent sample t-test, paired sample t-test, and MANOVA test. The results of the independent sample t-test show a significant value of 0.019<0.05. The results of the paired sample t-test show a significant value of 0.002 <0.05. The MANOVA test results show a significant value of 0.006<0.05. Overall, there is a significant difference in the spirit of mutual cooperation and learning achievement between students who use e-comics and those who do not use the results of research on the development of e-comic material my environment. The spirit of mutual cooperation and learning achievement of students who use e-comics increases compared to those who do not use e-comics. It was concluded that e-comics were declared feasible, practical and effective for use as learning media.
Keywords: E-Comic; Mutual Cooperation; Learning Achievement

ABSTRAK
Latar belakang pengembangan e-comic disebabkan rendahnya kesadaran siswa terhadap lingkungan. Tujuan penelitian ini menghasilkan *e-comic* materi lingkunganku untuk meningkatkan semangat gotong royong dan prestasi belajar yang layak, praktis, dan efektif. Penelitian pengembangan ini menggunakan model penelitian ADDIE. Subjek penelitian sebanyak 102 siswa dan 4 guru di sekolah dasar gugus II kecamatan Kasihan, kabupaten Bantul, Yogyakarta. Teknik pengumpulan data menggunakan wawancara, angket analisis kebutuhan, angket validasi, angket respon, angket penilaian diri, dan *pretest posttest*. Analisis data menggunakan uji *independent sample t-test*, *paired sample t-test*, dan uji MANOVA. Hasil *independent sample t-test* menunjukkan nilai signifikan 0,019<0,05. Hasil uji *paired sample t-test* menunjukkan nilai signifikan 0,002<0,05. Hasil uji MANOVA menunjukkan nilai signifikan 0,006<0,05. Secara keseluruhan terdapat perbedaan yang signifikan pada semangat gotong royong dan prestasi balajar antara siswa yang menggunakan *e-comic* dan tidak menggunakan hasil penelitian pengembangan *e-comic* materi lingkunganku. Semangat gotong royong dan prestasi belajar siswa yang menggunakan *e-comic* meningkat dibandingkan dengan yang tidak menggunakan *e-comic.* Disimpulkan e-comic dinyatakan layak, praktis, dan efektif digunakan sebagai media pembelajaran.
Kata Kunci: *E-Comic; Gotong Royong; Prestasi Belajar*

INTRODUCTION

The development of technology has spread in all aspects of life, not spared in the world of education. The rapid development of this technology requires educators to be proactive in utilizing technology as a learning medium (Zhang, 2022). Learning media is defined as a tool that makes it easier for students to understand the message or information conveyed (Firmadani, 2020; Liando et al., 2022). The use of technology-based learning media can be used to motivate students in learning because by utilizing learning media, learning activities are not monotonous and fun. Therefore, the learning process that uses learning media can create an active and student-oriented classroom (Firdaus et al., 2022). The media that elementary school age students tend to prefer are colorful and graphic media (Anggriani et al., 2022; Luruk & Trivict, 2020; Scherer et al., 2023; Siregar et al., 2023).

One of the media that meets these criteria is comics. Comics are one of the media that is popular with elementary school students. Comics are a medium in which there are characters and dialogues about a certain subject (Syahmi et al., 2022). Initially, comics were developed only to discuss the theme of entertainment. However, as technology develops, comics that were originally in the form of paper media are now presented in digital form or can also be called e-comics. An ecomic is a comic that is presented in digital form or an electronic device that contains images, characters, and dialogues that discuss a subject (Afriana & Prastowo, 2022; Alawiah et al., 2023). The use of images in learning media allows attracting students' attention, when students are interested, learning can run efficiently (Alim et al., 2023; Ananda et al., 2022; Indariani et al., 2019; Oktaviani et al., 2022).

The use of comics can be applied in science and science subjects. Science and technology subjects emerged since the change of the thirteenth curriculum to the independent curriculum. The purpose of IPAS in learning is to develop inquiry-based learning, understanding oneself, and its environment related to knowledge in learning (Sugih et al., 2023). The implementation

of social studies in learning is divided into 2, science material in language in semester 1 and social studies material in semester 2. However, the application in the field of social studies learning is still not very effective, learning is still textbook oriented, meaning that learning is carried out by transferring knowledge in raw terms from the teacher's head to students (Derfi et al., 2023; Eva et al., 2020; Ginting, 2020). Learning is still focused on teachers, so the role of students in learning is still passive. The solution to this problem can be handled through the maximization of the use of learning media. Learning media can revive learning that looks passive (Alya et al., 2023; Kandia et al., 2023).

The sustainability of effective learning is also influenced by the environment (Murti & Maya, 2021; Villarreal Arroyo et al., 2023). In the learning process, of course, a conducive environment is needed in terms of cleanliness, feasibility, and comfort. The school environment has an important role in the comfort of learning at school. Various aspects that can create comfort in the learning process in the classroom are obtained by maintaining the cleanliness of the school environment (Nurfadillah, 2020). The responsibility to maintain the cleanliness of the environment in schools is carried out by school residents. School residents are not only focused on students, but also include teachers and employees. Therefore, the efforts of all parties are needed to create a comfortable learning environment so that the learning process is conducive (Kurino, 2022).

However, the conditions in the field were found that there were still many school residents who did not really understand the importance of protecting this environment. The low awareness of students at school can be seen from the fact that there are still many students who throw garbage carelessly (Purwanti et al., 2020). Students after snacking in the canteen then throw their garbage in the corners, sewers, and drawers of the school desk (Safitri, 2020). Supported by research by Nasitah et al. (2024) who researched student awareness in schools towards environmental care attitudes, a percentage of students reached 90% of students with low environmental awareness. The problems described above can be anticipated by instilling character from an early age. The implementation of character education for elementary school students is considered very urgent in the success of student character formation (As & Mustoip, 2023).

Mutual cooperation is one of the characters that must be instilled as early as possible. Some forms of mutual cooperation values that are commonly carried out by Indonesian people include cooperation, help, affection, and harmony (Prasetiawan et al., 2020). Further behavior is a form of helping which includes a social habit that leads to providing help to others. The form of affectionate behavior can give rise to cooperation between others which is also essential in the world of education and teaching, for example by reminding each other to protect the environment. However, currently, attention to the practice of mutual cooperation among elementary school children seems to be decreasing.

Based on the phenomena and problems found in the field, the development of E-comics will be carried out to stimulate student mutual cooperation and social studies learning achievement. The application of e-comics in learning activities is expected to stimulate students to the material taught. Previous research on the development of digital comics shows that the application of digital comic media for science subjects in grade V of elementary school can provide learning enthusiasm, achievement, and learning outcomes (Dika & Bektiningsih, 2023; Mirosunnaily & Pramudiani, 2021; Senjaya et al., 2022). The use of e-comics in learning

increases students' enthusiasm and motivation to learn. E-comics that present images, stories and combinations of many colors can provide their own uniqueness in learning (Fianto et al., 2023). The novelty of the learning media developed lies in the material presented, which is integrated with the value of the character of mutual cooperation. The purpose of this research is to produce an e-comic of my environmental material to increase the spirit of mutual cooperation and learning achievement that is feasible, practical, and effective.

METHODS

Type and Design

The research method used in this study is a type of research and development or Research and Development. This research aims to develop a learning medium that can be widely used at the elementary school level. In the development of this learning media, the researcher used the ADDIE model by Robert Branch. The syntax of the ADDIE model includes Analysis, Design, Development, Implementation, Evaluation. The following syntax image of the ADDIE model can be seen here (Branch, 2009).

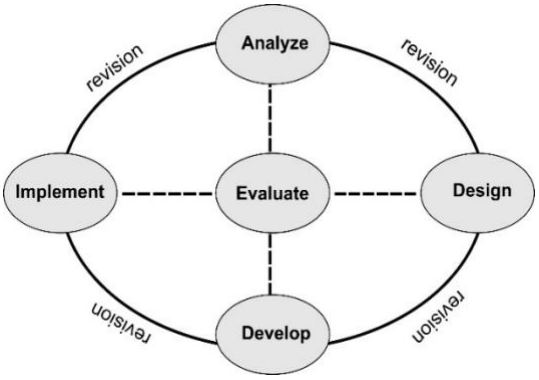

Figure 1. Model ADDIE

The advantage in using the ADDIE model, researchers can revise the learning media developed at each stage. This can affect the quality of the media developed when the revision is carried out. The procedure for developing the ADDIE model is first carried out an analysis. Researchers can analyze problems and explore information related to the need for learning media in schools. The second step is Design, after knowing the problem, the researcher determines the media and begins to design the learning media that has been determined. Third, Development, at this stage, the researcher conducts a test of learning media to determine the feasibility and practicality in the field. Fourth, Implementation, at this stage, the researcher applies learning media in the field to determine the effectiveness of the learning media developed. The final stage of Evaluation, which is the researcher evaluates the results of the tests that have been carried out to improve the product for the better.

Data and Data Sources

This research was carried out in cluster 2 elementary schools including Sonosewu Elementary School, Rejodadi Elementary School, Kadipiro 3 Elementary School, Kadipiro 1 Elementary School by paying attention to the homogeneity of each elementary school. As for the address of the elementary school cluster 2, it is located in Ngestiharjo, Kasihan, Bantul, DI Yogyakarta. This research was carried out on January 2 – 20, 2024. The data sources of this study are 3 validation experts, 4 teacher responses and 102 students. The validation experts

used are media experts, material experts, and instrument experts to find out the feasibility of the learning media developed. The response of teachers and students is to find out the practicality of learning media based on conditions in the field. Furthermore, the self-assessment sheet is used to measure the character of student mutual cooperation.

Data collection technique

The data collection techniques used are in the form of teacher and student interview sheets, analysis of teacher and student needs, validation sheets, teacher and student response questionnaires, pretest-posttest questions, self-assessment sheets. 1) Interviews between teachers and students are used by researchers to obtain information to develop learning media. 2) The analysis of the needs of teachers and students serves to dig deeper into the needs of the type of learning media developed. 3) The validation sheet is submitted to experts who have a doctoral degree and have a minimum functional position of lector by paying attention to their scientific field. The validation sheet is used to assess the feasibility of the learning media developed before the trial is carried out in the field. 4) Questionnaire of teacher and student responses to find out the responses given by teachers and students to the learning media tested. This is a consideration for revision by researchers to improve the learning media made. 5) These pretest-posttest questions are used to measure student learning achievement in learning before and after using learning media. 6) Self-assessment sheets with a likert scale are submitted to students to measure the character of student mutual cooperation.

Data analysis

The data analysis carried out in this study included calculating the value of the feasibility test, practicality test, and effectiveness test of the learning media developed. The following is an explanation of each test can be seen below:

a. Due diligence

The feasibility test was carried out by involving experts including instrument experts, media experts, and material experts. This is done to determine the feasibility of the learning media developed before being tested in the field. The feasibility test data analysis technique with the following formula (Widoyoko, 2015:236).

$$\text{Average Score} = \frac{\text{Total score}}{\text{Total of statements}}$$

Once the average number of grades is known, the results are then converted into the media feasibility classification table below:

Table 1. Classification of Feasibility of Learning Media

Interval	Category
>4,20 s/d 5,00	Highly Worthy
>3,40 s/d 4,20	Proper
>2,60 s/d 3,40	Enough
>1,80 s/d 2,60	Not Eligible
1,00 s/d 1,80	Very Unworthy

b. Practicality test

The practicality test is carried out by involving teachers and students at school. This test is to determine the practicality of learning media developed based on user feedback in the field. Here's how to calculate the practicality test (Akbar, 2013:42).

$$\text{Percentage} = \frac{\text{Total of scores obtained}}{\text{Total of statements}} x\ 100\%$$

After the percentage value of media feasibility is known, then the results are converted into the media practicality classification table below.

Table 2. Classification of Practicality of Learning Media

Percentage	Category
81% - 100%	Very Practical
61% - 80%	Practical
41% - 60%	Enough
21% - 40%	Impractical
<21%	Very Impractical

c. Test effectiveness

The effectiveness test was carried out by comparing the results of the pretest-posttest work before and after using the learning media. This step is to determine the effectiveness of the media developed so that it can be widely implemented. The steps taken are to calculate the t-test and the manova test.

1. T-test

   The t-test is carried out in 2 stages, namely the independent t-test and the paired t-test. Before calculating the t-test, there is a prerequisite test that must be met first by ensuring that the data tested is normal and homogeneous. The independent t-test and paired t-test were tested with IBM SPSS software with a significance level of 0.05.

2. Manova Test

   The manova test was carried out to determine the difference in the variables studied. The method of calculating the manova test must be carried out a multivariate normality test to ensure that the data tested is normal. The calculation of this test uses IBM SPSS software with a significance level of 0.05.

RESULTS AND DISCUSSION

The initial stage is to conduct an analysis to dig up information in the field to find problems, then an analysis of the need to develop the media is carried out. It was found that social studies learning, especially for social studies material, has not been carried out effectively. Based on the needs analysis, it was obtained that students need pictorial and colored media that can convey information related to the material and the character of mutual

cooperation. Based on this, the development of e-comics was carried out and adjusted the curriculum used by schools, namely the independent curriculum. The next stage is design, the design stage or design is carried out by the researcher to design e-comic media for my environmental material. This stage includes sketching, coloring, writing, and converting files into e-comic applications. Here is the front view of the e-comic.

Figure 2. E-Comics of my environment material

After the media is designed, it is continued with the development stage. This stage of media development is carried out a feasibility test based on media experts and material experts. The results of the feasibility test from media experts and linguists can be seen in table 2.

Table 3. Assessment Results by Media Experts and Material Experts

Media Experts				**Material Experts**		
No	**Aspects**	**Total Score**	**Category**	**Aspects**	**Total Score**	**Category**
1	E-comic display design	35	Highly Worthy	E-comic display design	13	Proper
2	E-comic text design	20	Highly Worthy	E-comic text design	24	Proper
3	Effectiveness and efficiency	25	Highly Worthy	Effectiveness and efficiency	12	Proper
4	Physical e-comic	10	Highly Worthy	Physical e-comic	4	Proper
Total Score		90		Total Score	53	
Average		5		Average	4,08	
Category		**Highly Worthy**		Category	**Proper**	

Furthermore, a media assessment was carried out from the teacher's response. The responses of teachers and students were obtained from a media assessment questionnaire given to class V teachers. The results of teacher and student responses can be seen in table 3

Table 4. Teacher's Response Results

No	Aspects	Total Score	Category
1	Display	95%	Very Practical
2	Effectiveness and efficiency	91,25%	Very Practical
3	Material	91,67%	Very Practical
	Total Score	**277,92%**	
	Average	**92,64%**	
	Category	**Very Practical**	

Further assessments were also carried out for grade V students. Assessments for these students include one-to-one trials, small group trials, and field trials. The results for student assessment can be seen in table 4.

Table 5. Student Assessment Results

Category		*One to One*		*Small Group*		*Field Trial*	
No	**Aspects**	**Average Score**	**Category**	**Total Score**	**Category**	**Total Score**	**Category**
1	Display	94,7%	Very Practical	94,3%	Very Practical	84,3%	Very Practical
2	Material	96,1%	Very Practical	93,3%	Very Practical	91,4%	Very Practical
3	Media	96,7%	Very Practical	96,7%	Very Practical	94,5%	Very Practical
Average		**95,8%**		**94,8%**		**90%**	
Category		**Very Practical**		**Very Practical**		**Very Practical**	

The next stage is implementation by conducting product effectiveness tests through pretsts-postest. The effectiveness test was carried out to determine the improvement of the spirit of mutual cooperation and the learning achievement of grade V elementary school students using e-comic. The results of the independent t test for product effectiveness on mutual cooperation and learning achievement can be seen in table 5.

Table 6. Test results independent sample t-test

			Mutual Cooperation			**Learning Achievement**		
No	**Data**	**Class**	**df**	**Sig. Value**	**Description**	**df**	**Sig. Value**	**Description**
1	Pre Questionnaire	Experiment and Control	52	0,762	Ho accepted	52	0,076	Ho accepted
2	Post Questionnaire	Experiment and Control	52	0,019	Ho rejected	52	0,005	Ho rejected

To see the effectiveness of the product, a pair t test was also carried out. The paired t-test was carried out to find out whether there was a significant increase in the spirit of mutual cooperation in the experimental class and the control class. The results of the paired t sample test can be seen in table 6.

Table 7. Results of paired t test

			Mutual Cooperation			Learning Achievement		
No	**Data**	**Class**	**df**	**Sig. Value**	**Description**	**df**	**Sig. Value**	**Description**
1	Pre Questionnaire	Experiment and Control	52	0,000	Ho rejected	52	0,000	Ho rejected
2	Post Questionnaire	Experiment and Control	52	0,002	Ho rejected	52	0,000	Ho rejected

The final stage of product effectiveness testing is carried out by the MANOVA test. The MANOVA test was carried out to determine the effectiveness of e-comics of my environment material to increase the spirit of mutual cooperation and student learning achievement. The results of the MANOVA test can be seen in table 7.

Table 8. MANOVA test results

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.990	2439.271[b]	2.000	51.000	.000	.990
	Wilks' Lambda	.010	2439.271[b]	2.000	51.000	.000	.990
	Hotelling's Trace	95.658	2439.271[b]	2.000	51.000	.000	.990
	Roy's Largest Root	95.658	2439.271[b]	2.000	51.000	.000	.990
Class	Pillai's Trace	.183	5.717[b]	2.000	51.000	.006	.183
	Wilks' Lambda	.817	5.717[b]	2.000	51.000	.006	.183
	Hotelling's Trace	.224	5.717[b]	2.000	51.000	.006	.183
	Roy's Largest Root	.224	5.717[b]	2.000	51.000	.006	.183

a. Design: Intercept + Class

b. Exact statistic

Based on the table of MANOVA test results above, it shows that the significant values of Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root have a value of $p<0.05$, which is 0.006 each, which can be interpreted as Ho being rejected. It can be concluded that there is a significant difference in the spirit of mutual cooperation and student learning achievement before and after using the e-comic of my environment material.

The last stage is evaluation. This stage is used by researchers to evaluate the e-comics developed. This evaluation aims to review and look for errors that still exist from the design stage to implementation. If errors are found, revisions can be made. This is done to improve the product based on the input and suggestions given by validation experts, teacher responses, and student responses. So that it can produce good e-comic media and is suitable for use in learning.

This comic media can be used by students in learning (Lee et al., 2021). Through the use of comic media in learning, it will make it easier for students to receive and understand the information provided (Priyangga et al., 2022). Comic media will usually attract more attention to students aged 6-12 years (Rina et al., 2020). Comics can be defined as illustrated storybooks that contain cartoon images to attract the reader's attention (Stephens Griffin, 2019). Through this comic, students not only learn to use learning media but also use interesting cartoon images in learning (Hartel & Dunst, 2019). Thus, comics can be used as a learning medium that facilitates the learning process and has an influence on learning success (Mustikasari et al., 2020).

E-comics are one of the learning tools that can strengthen students' character in the school environment (Astutik et al., 2021; Rina et al., 2020). In this study, E-comics are presented by containing my environment material in social studies subjects in the form of an application that can be accessed online or offline. The results of data analysis for the effectiveness test of n-gain, t-indecent test, and t-paired e-comic test of my environment material on the character of students, namely the spirit of mutual cooperation, obtained a posttest score greater than the pretest score. This means that the application of e-comics has a significant effect on the spirit of student mutual cooperation. The use of digital comics in learning has a significant effect on improving students' character (Solehhudin & Dewi Wulandari, 2023). Furthermore, previous research conducted by Allatif et al. (2024) explained that the use of comic electronic media in learning mutual cooperation materials can increase students' understanding of concepts with an N-Gain score of 0.70 in the "High" category. Another study by Handayani et al. (2024) stated that the effectiveness of the use of e-comic media in improving the character of mutual cooperation was obtained with a score of 63% with a fairly effective category.

Through the application of comics as a learning medium, it will also help students understand abstract material by displaying concrete examples in daily life that are in accordance with character values (Rina et al., 2020). Digital comics present colored images and materials that are suitable for daily life related to the integration of characters in them can increase students' character values (Rohmanurmeta & Dewi, 2019). The application of learning media by containing color images can be an attraction for elementary school age students (Alim et al., 2023; Fianto et al., 2023; Oktaviani et al., 2022).

The results of the related data analysis of the effectiveness of e-comics of my environment material on learning achievement are seen based on the results of the n-gain effectiveness test, t-indepent test, and t-pair test. Based on the analysis of the test results, it shows that the posttest score is greater than the pretest score in the effectiveness test results, which means that e-comic media has a significant effect on student achievement. Digital comic media is worthy of being used as a learning resource in improving student learning achievement (Endang Sutin et al., 2022; Kartika et al., 2023; Kurniawati & Koeswanti, 2021). Digital comics applied to student learning are also able to provide effectiveness on learning

achievement (Syamsurijal et al., 2022). Digital comics that contain images will foster students' literacy spirit (Priyangga et al., 2022). Digital comics can be used as an alternative in learning because they have been proven to be effective in helping student delivery so as to improve learning achievement (Barokahhuda et al., 2021). In addition, students at the elementary school level like learning media by displaying colorful pictures and interesting stories called comics (Winarto et al., 2018).

CONCLUSION

E-comics of my environment material should be used as a medium to increase the spirit of mutual cooperation and learning achievement of grade V elementary school students. This assessment is based on the results of the feasibility test by media experts and material experts. The use of E-comics of my environment materials can be significantly used to increase the spirit of mutual cooperation and learning achievement of grade V elementary school students. Overall, it can be concluded that E-comic of my environment material is effective in increasing the spirit of mutual cooperation and learning achievement of grade V elementary school students. This is based on the results of the e-comic effectiveness test that has been carried out, therefore e-comics are suitable to be applied to grade V students as a medium to improve mutual cooperation and learning achievement. Future research is expected to develop a wider range of e-comics to the material displayed and can add sound features to e-comics.

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