Improving Student Learning Outcomes Through E-Comic Learning Media Ecosystem Component Materials

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Abstrak

Penelitian ini dilatarbelakangi oleh minimnya variasi media pembelajaran yang diterapkan oleh guru pada saat proses pembelajaran. Hal ini tentu membuat guru kesulitan saat menyampaikan materi ajar yang tentu saja akan berpengaruh terhadap hasil belajar siswa Penilitian ini bertujuan untuk mengecek rancang bangun, kualitas, serta membuktikan efektivitas media pembelajaran e-komik. Penelitian menggunakan model pengembangan ADDIE. Subjek penelitian yaitu ahli isi mata pelajaran, desain, media, dan siswa kelas V SD. Metode pengumpulan data yaitu wawancara, kuesioner, dan metode tes. Analisis data yang digunakan adalah teknik analisis deskriptif kuantitatif dan kualitatif. Hasil dari penelitian ini yaitu: (1) Rancang bangun e-komik yang terdiri dari lima tahapan yaitu tahap analisis (Analyze), tahap desain (Design), tahap pengembangan (Development), tahap implementasi (Implementation), dan tahap evaluasi (Evaluations). (2) E-komik dinyatakan berkualitas dengan hasil review ahli isi mata pelajaran mencapai skor 94%, review ahli desain pembelajaran mencapai skor 94%, review ahli media pembelajaran mencapai skor 92%, uji coba perorangan mencapai skor 97%, uji coba kelompok kecil mencapai skor 96,4%, dan uji coba lapangan mencapai skor 96,3% dengan keseluruhan berkategori sangat baik. Berdasarkan hasil penelitian, disimpulkan bahwa e-komik efektif digunakan di sekolah dasar..

Kata Kunci: *Pengembangan, Media Pembelajaran, E-Komik.*

Abstract

This research is motivated by the lack of variety of learning media applied by teachers during the learning process. This certainly makes it difficult for teachers to deliver teaching materials which of course will affect student learning outcomes. This research aims to check the design, quality, and prove the effectiveness of e-comic learning media.development model ADDIE The research subjects were subject matter experts, design, media, and fifth grade elementary school students. Data collection methods are interviews, questionnaires, and test methods. The data analysis used is quantitative and qualitative descriptive analysis techniques. The results of this study are: (1) The design of the e-comic which consists of five stages, namely the analysis stage (Analyze), design phase (Design), development phase (Development), implementation phase (Implementation), and evaluation phase (Evaluations). (2) E-comic is declared qualified with the results reviews of subject content expert reviews learning design expert reviews reaching a score of 92%, individual trials reaching a score of 97%, small group trials achieved a score of 96.4%, and field trials reached a score of 96.3% with the overall category being very good. Based on the results of the study, it was concluded that e-comic was effectively used in elementary schools.

Keywords: Development, Learning Media, E-Comic.

1. INTRODUCTION

Education is one of the important role holders in life. The progress of each nation is reflected in the quality of quality education. To produce quality education, it is necessary to improve the quality of education both quantitatively and qualitatively on an ongoing basis (Ernata, 2017). The Covid-19 pandemic which until now continues to haunt the minds of the world community, including Indonesia, has an impact on the learning system in education units. This started on December 31, 2019 from the World Health Organization (WHO) China State Office with an outbreak of pneumonia cases of unknown etiology that were detected in Wuhan (Boetto, 2021). The impact of the pandemic is very large which brings changes in all aspects Life includes education with the implementation of online learning as it is now that uses technology and the internet to learn. The emergence of the internet brings fundamental changes to communication behavior (Philip, 2021). Change can occur in a positive or

negative direction depending on how you react to it. Educators can use social media or the internet to carry out an interaction in the online learning process to improve student learning outcomes depending on the activities and teaching techniques used (Hamadi, 2021). Basic education is a level of education in which there are many lessons taught which are contained in thematic lessons. One of them is Natural Science which can be shortened to IPA. Natural Sciences is a science that has special characteristics in which it learns about factual natural phenomena (Ketut Arisantiani, 2017). Science is a science that studies a series of events that occur in a well-constructed universe personally (Putri, 2017). Science or science is a quantitative study of how scientific agents such as writers, universities interact with each other with a focus that is more directed to scientific discoveries with the aim of better understanding something (Campedelli, 2021). The purpose of learning science in elementary schools is to arouse students' curiosity, positive attitude and awareness about the interrelationships that influence each other between the environment, technology, and society. (Wahyudi, 2021). The science learning process in elementary schools so far has focused more on the concept of science material which makes students' knowledge not concrete, of course making science learning seem boring to them coupled with the implementation of online learning. Students should not always be invited to dialogue, where the inclusion of other knowledge in the teaching and learning process must also be carried out so that it is in accordance with science (Sotero, 2020). If there is no change in teaching style, it can affect learning outcomes, especially students' science knowledge competence. Competence refers to adequate resources or adequate facilities for one's needs (Antera, 2021).

Media has a great influence as a supporter in achieving the goals of certain activities, it is said that because constructionism is based on the belief that learning grows starting from construction and ideas formed through different media (Nordby, 2022). Learning media are often replaced by other terms, such as learning materials (instructional material), visual communication (audio visual communication), visual educationaids, teaching aids and explanatory media (Azizi & Prasetyo, 2018). The learning media itself is an intermediary used by teachers during the teaching and learning process with the aim of assisting teachers in delivering learning materials (Kristianto & Rahayu, 2020). Learning media are everything that is used to convey messages that are able to stimulate the thoughts, feelings, attention, and willingness of students so that they can maximize the teaching and learning process that occurs intentionally, purposefully and controlled (Teni Nurrita, 2018). The use of learning media in the learning process is believed to be able to revive students' motivation and interest in learning, increase understanding, present material in an interesting, reliable manner, make it easier to interpret data, and condense information (Sukmanasa, 2017). Not only that, learning media must also be flexible which can be easily accessed anytime and anywhere through social media which has now become an important tool in everyone's life because people can share ideas, information, plans, and carry out the learning process on the media. social (Rashid, 2021).

Online learning is a new innovation in education which involves elements of information technology and learning (Wulandari & Agustika, 2020). This situation emphasizes that it is so important to develop a flexible, personal, and adaptive learning environment in facilitating the learning process anytime and anywhere without physical contact and minimized human intervention (Agbo, 2021). Learning remotely or online requires maturity, a high level of motivation, the ability to do more tasks, reach goals, and work in an independent with technology (Rotar, 2022). Effective use of technology for learning must acquire knowledge and skills by developing new skills to operate technology well (Farias & Ignacio, 2021). After an interview with the homeroom teacher of class V at SD Negeri 1 Tista on September 30, 2021, during the learning process teaching online thematic learning science content in class V on ecosystem component material explained that

students tend to feel bored as evidenced by the lack of participation from students. Though the content of science lessons should be fun and popular with many students. However, due to the lack of teaching media used by the teacher, students are lazy to pay attention, coupled with the material in the book that is too long and lacks pictures to explain the meaning of the material. The solution that can be given is to develop a learning medium for science content material for ecosystem components in the form of electronic comics or e-comic for short which is believed to be able to overcome problems during the learning process for fifth grade elementary school students.

Comic comes from the French "comique" which contains the adjective funny or ridiculous (Aeni & Yusupa, 2018). Comics as part of visual media can be developed as an alternative learning media. Angga (2020) states that comic media is a form of cartoon that reveals characters that contain a story in a certain order that has a close relationship with the image and is designed to provide entertainment to everyone who reads it.

This development research is relevant to research which states that digital comics learning media for learning mathematics in class V data processing is valid to be developed in elementary schools (Musdalifah, 2019). Furthermore, research on the development of digital comics as learning media states that digital comics are valid as learning media for international payment instruments (Hakim, 2017). Then similar research regarding the development of learning media in science subjects with the sub-theme of ecosystem components is declared feasible to use (Rahmawati, 2020). The next relevant research is research which shows that the contribution of learning styles and achievement motivation is very large to the competence of science knowledge (Yuliastini, 2020). The objectives of the development research carried out are to describe in detail the design of the e-comic learning media, determine the quality of the e-comic learning media, and determine the effectiveness of the e-comic learning media on the science competence knowledge of the ecosystem component components of class V students.

2. METHOD

This develops e-comic learning media for ecosystem component materials for fifth grade elementary school students by using the ADDIE which consists of 5 development stages, namely: (1) Analyze, (2) Design, (3) Development, (4) Implementation and,(5). Model ADDIE based on the suitability of its development path in developing e-comic learning media.development model ADDIE is one of the systematic learning design models (Tegeh & Kirna, 2014).

The subjects involved in the development of this learning media were a subject content expert, an instructional design expert, an instructional media expert, 3 students as individual test respondents, 9 students as small group trial respondents, and finally, using the entire fifth grade, namely as many as 15 students as respondents for field trials. The following explains more clearly the methods and instruments of data collection used in development research, which can be seen in Table 1 below.

Tabel 1. Matrix of Data Collection Methods and Instruments

No	Research Purposes	Methods and Instruments	Nature of Data	Data Analysis Techniques
1	Design Product	Questionnaire	Score	Descriptive Quantitative & Qualitative
2	Validity Product	Questionnaire	Score	Descriptive Quantitative & Qualitative
3	Effectiveness	Objective Test	Score	Inferential Statistics

The instrument used is a questionnaire sheet and multiple choice test questions. The instrument grid can be seen as follows.

Table 2. Grid of Subject Matter

Aspect	Indicators
Curriculum	1. The suitability of the material with KD
	2. The suitability of the material with indicators
	3. The suitability of the material with the learning objectives
Material	1. Interesting material
	2. The material is presented systematically
	3. The suitability of the material with the student's situation
	4. The material contains important concepts
	5. The material is supported with the right media
	6. Experiments in e-comic according to the concept of the material
	7. Questions presented
Grammar	1. The use of appropriate and consistent <u>language</u>
	2. The language used is in accordance with the characteristics of students

Tabel 3. Grid of Learning Design Experts

Aspect	Indicators
Accuracy	1. The suitability of the e-comic with student characteristics
	2. The suitability of the material with learning indicators
	3. The material in e-comic is packaged in a coherent way
Clarity	1. The language used is easy to understand
	2. Clarity of description and discussion
	3. Clarity of content provided
Interests	1. E-comics motivate students to learn
	2. Increase students' attention in the learning process
Quality of tests and assessments The	1. Consistency of evaluation with learning indicators
impact on students	1. Facilitate students to understanding of the material
Message design	1. Color images are comfortable to look
	2. Consistency of illustrations in descriptions

Tabel 4. Questionnaire Grid of Learning Media Experts

Aspect	Indicators
Display	1. Readability of text
	2. Use of images to support learning materials
	3. Use of font and font size
	4. Appropriate placement of images
	5. Use of line spacing and characters
	6. Composition used in e-comic
	7. Selection of colors with the right combination
	8. Attractive appearance of e-comic
	9. Compatibility of e-comic cover to content

Aspect	Indicators
Operation	1. Media can arouse students' motivation in learning
	2. The number of comic pages that are effective for student learning.
	3. Ease of using e-comic

Tabel 5. Grid of Individual, Small Group, and Field Trial Questionnaires

Aspect	Indicators
Display Design	1. Attractive display of e-comic media
	2. Readability of text
	3. Clarity of images
	4. Clarity of instructions for using links
Material	1. Material is easy to understand
	2. Clarity of description of material in the story
	3. Media motivates students in learning
Evaluation	1. Clarity of intructions working on questions
	2. The questions are in accordance with material
	3. Easy to understand language

The type of data generated is in the form of quantitative data and qualitative data so that the analytical techniques used are quantitative descriptive data analysis techniques and qualitative descriptive data analysis techniques. In this development research, quantitative descriptive analysis was used for data processing in the form of scores obtained through filling out questionnaires. The calculation of the percentage obtained from the answers of each respondent is carried out using the percentage formula obtained using a Likert scale with an even choice category, namely if getting a score of 1 means strongly disagree, a score of 2 disagrees, a score of 3 agrees, and a score of 4 strongly agrees (Sugiyono, 2019). After obtaining the percentage of each respondent through a Likert scale table, namely by comparing the total number of answers from respondents with the maximum score of each questionnaire, then the percentage can be classified into the decision-making criteria which are described as follows.

Tabel 7. Conversion Achievement

Rate Achievement (%)	Qualification
90-100	Very Good
75-89	Good
65-79	Fair
55-64	Poor
1-54	Very Poor

(Sumber: Agung, 2018)

Qualitative descriptive analysis is used by researchers to classify information obtained from interview questionnaire data in the form of responses, comments, input and suggestions for improvement which can then be grouped using classification criteria such as very good, good, sufficient, lacking, and very less. Furthermore, inferential statistical analysis is carried out which is data processing. Inferential statistical analysis is used to determine the level of product effectiveness on students' science knowledge competence before and after using e-comic products. Field trial data collected using pre-test and post-test on the subject matter being tested. After getting the results of the pre-test and post-test, then analyzed using the t-

test to determine the increase in the results of the pre-test and post-test. Before testing the hypothesis (sample dependent t-test), a prerequisite test (normality) was first tested using the formula from Shapiro Wilk. Shapiro Wilk is a calculation of the distribution of data made by Shapiro and Wilk which is also an effective and valid method used for small samples (Quraisy, 2020). The study did not use the homogeneity test because in this study using a trial technique used, meaning that the implementation of the trial was carried out simultaneously with the implementation of the actual research or the instrument was tested by being used directly on the research sample to obtain data (Pujiyanto and Budhi Widodo, 2015).

After obtaining the results of the prerequisite test, then the hypothesis test can be carried out.analysis technique in testing the hypothesis uses a sample dependent t-test technique. technique sample dependent t-test is to use two different treatments for one sample, namely using scores as learning outcomes obtained before and after using e-comic media development products for one group, namely class V students.

3. RESULT AND DISCUSSION

Result

The design of the previous e-comic learning media development research has been adapted to the needs of the product development used, namely the researcher using the ADDIE development model. The first stage is the needs analysis (analysis) stage. At this stage, the basic competencies and indicators are analyzed as follows:

Tabel 8. KD and Indicators

KD	Indicators
3.5 Analyzes the relationship between ecosystem components and webs food environment surrounding	3.5.1 Defines ecosystems and their constituents in life.
	3.5.2 Classifying the types of living things based on their composition in an ecosystem which includes individuals, populations, and communities.
	3.5.3 Analyzing the important role of ecosystems for living things.
	3.5.4 Identifying the surrounding environment as a source of information about the ecosystem and its components.
	3.5.5 Detecting components in an ecosystem.
	3.5.6 Linking examples of the benefits of biotic and abiotic components in everyday life.
	3.5.7 Differentiate the classification of animals based on the type of food.
	3.5.8 Summarizing various kinds of animals in the surrounding environment which are classified based on the type of food they eat.

Gambar 1. Display of E-Comic Products

The second stage is the designstage. Information previously obtained from the analysis stage is transferred in the form of notes such as material for ecosystem components. Furthermore, a comic dialogue script is made in detail. The next step is to start determining the characters and sketches that will be used as characters in the comics. The characters and sketches used were created with the help of the Pixton web program. At this stage, the selection of a suitable background to be used in each e-comic panel is also determined, which of course always pays attention to color harmony.

The third stage of the designed product is developed and arranged according to the design that has been previously made and the subject matter that has also been prepared beforehand and has been agreed upon. The development was carried out, such as starting to make a cover adapted to the material, then making panel by panel comics using the Microsoft Power Point 2016 with Google PDF Converter. After all is finished then the media can be used in the form of PDF files. The fourth stage is the implementationstage. This stage is first carried out by testing product validity from experts which include subject content experts, learning design experts, and learning media experts. After the product is declared valid, then the product can be used and shown to students to determine student responses in terms of the attractiveness and feasibility of the media. The fifth stage is also the last stage, namely the evaluationstage. This stage evaluates the data that has been collected in the fourth stage, namely the implementation stage. The evaluation is carried out by measuring or assessing learning media products that include expert validation, individual trials, small groups, fields, and the effectiveness test phase is carried out.

The next step is to carry out a series of product testing stages to determine the quality of the e-comic media, whether it is feasible to be developed or not. Product trials are carried out in various stages including (1) review of subject matter experts, (2) review of learning design experts, (3) review of learning media experts, (4) individual trials, (5) small group trials, and (6) field trials. Product trials were carried out using a questionnaire sheet. The content expert in the field of study or material in this development research is a science lecturer. Then for design and learning media experts, namely lecturers with a background in the Education Technology Study Program, Faculty of Education, Ganesha University of Education or lecturers who have qualifications in that field. Meanwhile, the subject of individual, small group, and field trials in this study used students with different science learning outcomes. The results of the trial of e-comic media products based reviews were obtained by a percentage of 94% for the subject content expert test with very good qualifications without the need for revision, 94% for the learning design expert test with very good qualifications included revisions according to directions, 92 % for learning media expert tests with very good qualifications included revisions according to directions, 97% for individual trials with very good qualifications without the need for revision, 96.4% for small group trials with very good qualifications without need revision, and 96.3% for field trials with very good qualifications without the need for revision.

Based on the percentage gain, it means that the e-comic learning media is of high quality and suitable for use in the learning process. Although qualified e-comic media is very feasible overall, the media also needs to be improved according to the directions or suggestions of experts, so that the product developed is closer to perfect. As for comments from design experts and learning media, namely the developer profile should be placed at the back of the comic, increase the contrast between the background and the text (page 5), and add the title "Introduction to Characters". Revisions made based on comments were changing the placement of the developer profile from the front to the back of the comic section, increasing the contrast between the background and the text (page 5), and adding the title "Introduction to Characters". The effectiveness of research on the development of e-comic media is obtained through the test method. Before knowing whether the development product

is declared effective or not, a prerequisite test is carried out which includes a pre-test and post-test data normality test. scores, pre-test and post-test then a prerequisite test was carried out, namely the normality test of the data with a significance level of 5%. Based on the difference in the scores on pre-test and post-test students, then Shapiro Wilk's table shows that 0.954 for n = 15 is at p = 0.5 and p = 0.9. This proves that p > 0.05, so it can be concluded that the sample comes from a normally distributed population.

Then proceed with testing the hypothesis using the sample dependent t-test. Based on data analysis, the tcount is 6.15861.tcalculated value is then compared with the ttable at a significance level of 5%, knowing that dk = (n1 − 1) + (n2 − 1) = (15 − 1) + (15 − 1) = 28 or (n1 + n2) − 2 = (15 + 15) − 2 = 28 is 2,04841. These results indicate that tarithmetic > ttable (6.15861 > 2.04841), so H_0 rejected and H_1 accepted. This means that there is a significant difference between before and after using e-comic in the science competence knowledge of ecosystem component materials in fifth grade elementary school students. Therefore, it can be concluded that e-comic media is effective in increasing students' interest and learning outcomes in ecosystem component materials.

Discussion

The development of this e-comic media uses the ADDIE (Analyze, Design, Development, Implementation, and Evaluation). One of the main functions of ADDIE is as a guide in building research program tools and infrastructure that is more effective, dynamic, and able to support training performance. The results of the first validity are reviewed by subject matter experts, namely lecturers science education background with assessment using a questionnaire instrument. The results review of subject matter experts show that the percentage of e-comic acquisitions of 94% is in very good qualifications. So that the content of the material contained in the e-comic media does not need to be revised. Based on the results of the expert test of these subjects, it was concluded that the developed e-comic media was feasible to use.

The next step is a review by learning design experts using a questionnaire instrument. The design expert in this research is a lecturer from the Department of Technology. The results review from learning design experts obtained a percentage of 94% being in very good qualifications, so that the design of e-comic learning media can be used in the learning process. Based on the results of the review , it can be concluded that the e-comic learning media developed is feasible to use but does not rule out the possibility of re-evaluation in the future. Next is the learning media expert. The expert involved in this is one of the lecturers from the Educational Technology Study Program, Faculty of Education, Ganesha University of Education. The results review showed that the product obtained a percentage of 92% which was in very good qualification. Based on these results, it is concluded that the media deserves to be developed for used in the learning process with a note that it is possible if the media is then re-evaluated.

Then, continued with individual trials on the quality of e-comic media products. As respondents from the individual trial, the fifth grade students at SD Negeri 1 Tista involved only three students who were divided into categories of learning ability level on the science content including one student with high ability level, one medium ability level student, and another student with high ability level. low level of ability. The instrument used in data collection is in the form of an individual test questionnaire sheet. The results of the individual trial show that the percentage obtained is 97% in the qualification with a scale conversion table of 5 being at the very good category level. Based on these results, it can be concluded that the e-comic media is feasible to use, but it is possible if there is a re-evaluation in the future. After that, it was continued with a small group trial. The subjects of this small group trial were students from class V at SD Negeri 1 Tista, taking students as subjects with a total

of nine students who were grouped as having high, medium and low abilities. The instrument used in data collection is a small group test questionnaire sheet. The results obtained based on student questionnaires were obtained, namely the percentage of 96.4% were in very good qualifications. Based on these results, it can be concluded that the e-comic media can be used, but it is possible that it will be re-evaluated later. After the small group trial, the next step was a field trial involving all fifth graders at SD Negeri 1 Tista. The instrument used in collecting data is a field test questionnaire sheet. The results of obtaining a field trial questionnaire, namely getting a percentage of 96.3% are in very good qualifications. Based on the acquisition data, it can be concluded that the e-comic media can be applied and is feasible to use. This finding is in line with the research "Development of Digital Comics as Learning Media" which states that digital comics are feasible to use (Hakim, 2017).

The advantage of this research is that based on the overall percentage gain, the e-comic media gets a very decent qualification, which means that the e-comic learning media on the science competence knowledge of ecosystem component materials is suitable for use for class V students. Although the media is declared very feasible to use, the media still has The drawback is that it will be difficult to apply to students who have an auditory learning style because the media does not contain sound as a support. With these limitations, it is expected to be able to develop more deeply by paying attention to the needs of students.

After going through the validity test stage, then the effectiveness test is carried out to determine whether the media is effectively applied to the fifth grade students of SD Negeri 1 Tista or vice versa. Before that, the data normality test must first be carried out.scores, pre-test and post-test then a prerequisite test was carried out, namely the normality test of the data with a significance level of 5%. Based on the difference in the scores on pre-test and post-test students, then Shapiro Wilk's table shows that 0.954 for n = 15 is at p = 0.5 and p = 0.9. This proves that p > 0.05, so it can be concluded that the sample comes from a normally distributed population. The normality test results are in line with the research "Development of Digital Comics in Mathematics Learning in Class V" which states that the normality test results with a significance value of 0.173, which means that the score data is normally distributed because the $t_{count} > 0.05$ (Musdalifah, 2019).

Based on data analysis, the t_{count} is 6.15861, t_{count} value is then compared with the t_{table} at a significance level of 5%, knowing that dk is 2,04841. These results indicate that $t_{count} > t_{table}$ (6.15861 > 2.04841), so H_0 rejected and H_1 accepted. This means that there is a significant increase between before and after using e-comics in the science competence knowledge of ecosystem components for fifth grade students of SD Negeri 1 Tista. Therefore, it can be concluded that the e-comic media is effective in increasing interest and learning outcomes of ecosystem component materials for students at SD Negeri 1 Tista.

4. SIMPULAN

Design of the e-comic learning media uses the ADDIE which is able to produce quality product outputs and is suitable for use in the learning process. Quality is determined from the results of reviews of experts and students who get very good qualifications. After being used, it turned out that the e-comic learning media was able to improve student learning outcomes as seen from the post-test results. This means that e-comic media is effectively applied in elementary schools.

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