# Jurnal Penelitian Pendidikan

# Development of E-Comic Teaching Materials to Improve the Learning Outcomes of IPAS Digestive System Materials for Grade V Students SD Negeri Pagerkukuh

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## Abstract

This research aims to develop e-comic teaching materials to improve the learning outcomes of IPAS digestive system material in class VA students of SD Negeri Pagerkukuh. The method used in this study is Research and Development (R&D) with the ADDIE model which includes the stages of analysis, design, development, implementation, and evaluation. The data collection instruments used include interviews, observations, questionnaires, and tests. Data analysis techniques include the feasibility and effectiveness of teaching materials. The research subjects consisted of teachers and students of the VA class of SD Negeri Pagerkukuh. The results of the study show that the e-comic teaching materials developed are declared very feasible to use based on the results of validation of material experts and media experts. The results of the questionnaire responses of teachers and students in small-scale trials and field trials were in the very good category. The effectiveness test showed an increase in learning outcomes as shown by the difference in pretest and posttest scores, and the results of the n-gain test can be concluded that e-comics teaching materials are quite effective in improving the learning outcomes of science of digestive system materials in grade V students of SD Negeri Pagerkukuh.

**Keywords**: e-comics, digestive system, learning outcomes

## INTRODUCTION

Education is an important foundation for the progress of a country, weak education can have a bad impact on a country (Parinata, 2021). Education in Indonesia is basically an effort to educate the life of the nation, as stated in the 1945 Constitution article 31 states that every Indonesian citizen has the right to education without discrimination. With education, human resources in a country will be of quality. Based on Law Number 20 of 2003 concerning the National Education System Chapter 1 Article 1, it is states that education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential. If the learning process goes well and students get enough support, then their potential or abilities will develop optimally. This potential can later be useful not only for themselves but also for society. Thus, education is an important provision to realize a better life in the future.

A supportive learning atmosphere will make the learning process more interesting, so that educational goals can be achieved well. Education is very important because it can help a person develop into a better person. In line with this, the Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 20 of 2018 concerning Strengthening Character Education in Formal Education Units emphasizes the importance of instilling character values in the learning process. Through education, a person can gain knowledge and skills, both from formal channels such as school and from daily experience or the surrounding environment. Education also plays an important role in improving the

quality of life. Education is an effort to improve human welfare in advancing the nation and state (Mardhiyah et al., 2021). Every citizen has different potentials, and education helps develop that potential.

At school, students learn a variety of skills that can be used to face future life. With proper learning, all students have an equal opportunity to develop within their abilities. If the learning process goes well and students get enough support, then their potential or abilities will develop to the maximum. This ability can later be useful not only for themselves, but also for society. Thus, education is an important provision to realize a better life in the future.

The learning process is the first step in the success of education because it is through learning that the goals of education can be achieved. According to (Sihombing et al., 2022) learning is a relatively permanent change in behavior or potential behavior as a result of an experience or reinforced practice. Learning is an activity or process to acquire knowledge, improve skills, improve behavior, attitudes, and strengthen personality. However, in its implementation, not all learning processes can go as planned, sometimes problems will arise during the learning process. One of the main problems that is often found in the field is the low availability of teaching materials that are interesting and in accordance with the needs of students, especially at the elementary school level. This has an impact on students' lack of interest and motivation to learn, which can ultimately affect their learning outcomes.

In the world of education, teaching materials have an important role as a means to convey learning materials to students. According to the Ministry of Education, Culture, Research and Technology (Kemendikbudristek, 2021), teaching materials are all forms of materials used to help students acquire the necessary knowledge, skills, and attitudes. Teaching materials are not limited to textbooks, but also include modules, digital media, learning videos, and visual teaching materials such as comics. Various teaching materials adapt to needs, not only in print form but can also be in digital form by utilizing technology. One of the innovations of technology-based teaching materials is e-comics (electronic comics), which are visual teaching materials that contain illustrated stories in digital format that are packaged in an educational manner according to the learning objectives. According to Afifah dan Dewi (2022), e-comics can improve students' understanding of concepts and attractiveness to the material being studied because they combine visual elements, narrative texts, and story elements that make learning more contextual and fun.

E-comics as teaching materials are very suitable to be applied in learning at the elementary school level, especially for materials that require visualization such as the human digestive system. The presentation of material through e-comics makes it easier for students to imagine the processes that occur in the digestive system because it is supported by illustrations and interesting storylines. In addition, the use of e-comics has also been proven to increase students' motivation to learn and strengthen concept understanding due to the repetition of information in the form of visuals and text (Novita et al., 2025). Thus, the application of e-comics as teaching materials is a strategic step to improve the quality of learning, especially in creating a meaningful and enjoyable learning experience for students. Research by Fitri et al. (2023) shows that e-comics are effective in improving student learning outcomes, especially in learning Pancasila values in elementary schools. E-comics present information in the form of illustrated stories that make it easier for students to remember and understand the concepts being taught. E-comics also provide opportunities for students to be more active in the learning process through interaction with these teaching materials.

One of the problems that is still often encountered in the learning process in elementary schools is the teacher's dependence on the use of textbooks as the only learning resource. Textbooks that are dominated by writing and lack of illustrations are often less able to attract students' attention. This happened at SD Negeri Pagerkukuh where there are still many teachers who use textbooks as a learning resource so that participants have difficulty understanding concepts due to the lack of illustrations or media that support imagination. In this condition, teachers are required to be more creative in choosing teaching materials that are not only informative, but also interesting and in accordance with the characteristics of students.

Based on this explanation, this study aims to improve the learning outcomes of IPAS matei digestive system assisted by e-comic teaching materials in grade V students of Pagerkukuh State Elementary School. E-comics as digital-based teaching materials present learning materials through storylines and interesting illustrations so that they are easier for students to understand. Not only improving learning outcomes, e-

comics are also able to build conceptual understanding in a fun and thorough way. By utilizing e-comics, teachers can bridge the limitations of textbooks and create a more interactive and colorful learning experience.

## METHOD

The method used in this study is *Research and Development* (*R&D*). According to Okpatrika (2023), *Research and Development* is a series of stages carried out to develop a new product or improve an existing product. This research aims to develop electronic teaching material products in the form of electronic comics or e-comics. The development model used in this study is the ADDIE model. There are five stages carried out in the ADDIE model, as follows.

1.  Stages of Analysis

The initial stage carried out in this study is to analyze and identify problems that arise in the field. Generally, at this stage, an analysis of obstacles that may be faced in learning is carried out, where the researcher will define what students need to learn through the analysis of needs, materials, and students.

2.  Design Stage

The design stage begins with designing the concept of teaching materials. At this stage, the researcher began to design the structure of the e-comic, the preparation of materials, and the design of the script to be developed in the e-comic

3.  Development Stage

At this stage of development, it begins to complete the initial product design so that the specifications of the developed teaching materials are obtained. After the e-comic product is completed, then a validation process is carried out by material and media experts. Feedback and suggestions are used to revise the product to fit the needs.

4.  Implementation Stage

At this stage, the e-comic teaching materials will be tested on a small scale to find out the responses of students and teachers to the e-comics teaching materials. After that, field trials were carried out to measure the effectiveness of e-comics in improving learning outcomes, as well as improving the design of teaching materials which were carried out after obtaining the results of the assessment of the response questionnaire at the trial stage.

5.  Evaluation Stage

The evaluation stage is carried out to evaluate the feasibility and validity of the developed product. Based on the results of the evaluation, a final revision was then carried out to improve the teaching materials so that they could be used optimally in learning science of digestive system materials.

The research will be conducted on students in class VA of SD Negeri Pagerkukuh. Data collection instruments include interviews, observations, questionnaires, and tests. The data analysis techniques used are as follows.

Product feasibility analysis:

$$NP = \frac{R}{SM} \times 100\%$$

(Sugiyono, 2022)

Remarks:

| | | |
|---|---|---|
| P | : | Eligibility Presentation |
| f | : | Initial score number obtained |
| N | : | Highest score in the questionnaire |

Product Effectiveness Analysis:

$$\text{N} - gain\ score\ = \frac{Skor\ Posttest - Skor\ Pretest}{Skor\ ideal\ (100) - Skor\ Pretest}$$

## RESULTS AND DISCUSSION

**Development of E-Comic Teaching Materials**

E-comics teaching materials are designed to improve the learning outcomes of IPAS materials for the digestive system. The e-comic teaching material is 14.8 cm x 21 cm designed using the Canva application with a format tailored to learning needs. Electronic comics, consisting of covers, forewords, table of contents, instructions for the use of books, learning outcomes, learning objectives, character introductions, material introductions, practice questions, developer profiles, and bibliography. The typefaces used are berthold block, league spartan, and marykate. After the teaching materials are designed, the researcher completes the initial product design so that the specifications of the teaching materials to be developed are obtained.

**E-Comic Teaching Materials Eligibility**

**Expert Validation**

Before conducting product trials, e-comics teaching materials are validated to determine the feasibility of the product that has been made. The results of validation from media experts and subject matter experts can be seen as follows.

Table 1. Feasibility Validation Results

| Material Expert | Media Member | Average | Criteria |
|---|---|---|---|
| 90% | 93,75% | 91,875% | Highly Worth It |

The assessment results showed an average gain of 91.875%. This confirms that the teaching materials developed are in the category of being very suitable for use in the learning process.

**Small-Scale Trials**

The small-scale trial was carried out after the e-comic teaching materials had been validated and revised based on input and suggestions from experts. This small-scale trial involved 10 students in the VA class of SD Negeri Pagerkukuh. At this stage, an assessment of the feasibility of teaching materials is carried out which is measured through a student response questionnaire. The results of the students' responses are as follows.

Tabel 2. Student Response Results

| Number of Students | Acquisition Score | Maximum Value | Percentage Value |
|---|---|---|---|
| 10 | 147 | 150 | 98% |

The results of the small-scale trial showed a score of 98% with the criterion of "excellent". The teaching materials are then refined according to input and suggestions. Further improvements are focused on increasing the font size to make it more user-friendly.

In addition to the student response questionnaire, the teacher's response questionnaire was also given to measure the feasibility of e-comics teaching materials. The results of the teacher's response questionnaire are as follows.

Table 3. Teacher's Response Results

| Score Obtained | Total Score | Percentage Value | Criteria |
|---|---|---|---|
| 96,67 | 100 | 96,67% | Excellent |

The assessment of the teacher's response questionnaire obtained a score of 96.67 with the criterion

of "very good", showing the level of readability and feasibility for e-comic teaching materials.

### Field Trials

After making improvements according to the responses given by teachers and students. The next stage was to conduct large-scale trials on 23 students in the VA class of SD Negeri Pagerkukuh. The results of the student response questionnaire are as follows.

Table 4. Student Response Results

| Number of Students | Acquisition Score | Maximum Value | Percentage Value |
|---|---|---|---|
| 23 | 342 | 345 | 97,71% |

The results of the field trial on the students' responses showed a score of 97.71% with the criterion of "excellent".

The results of the questionnaire of teachers' responses to the field trial are as follows.

Table 5. Teacher's Response Results

| Score Obtained | Total Score | Percentage Value | Criteria |
|---|---|---|---|
| 98,83% | 100 | 98,83% | Excellent |

The results of the teacher's response questionnaire showed a score of 98.83% with the criterion of "excellent". The comments given were that in this learning students looked more enthusiastic. E-comic teaching materials are good applied to students.

### Effectiveness of E-Comic Teaching Materials

At the large-scale trial stage, an effectiveness test was also carried out to determine the improvement of learning outcomes. Students will be given a pretest before using the teaching materials and a posttest after using the teaching materials. The form of the test used was in the form of multiple choice totaling 20 questions. The average results of the pretest and posttest are as follows.

Table 6. Pretest dan Posttest Average

| Pretest Average | Posttest Average |
|---|---|
| 67,17 | 83,91 |

The average results of pretest and posttest scores showed an average pretest score of 67.71 and an average posttest score of 83.91. The average score difference is 16.2.

The scores that have been obtained by students, before being analyzed using the paired t-test, must be tested for normality using the shapirowilk test, the results of the pretest significance value of 0.131 > 0.05 so that the data is distributed normally. Meanwhile, the test results on the posttest value obtained a significance of 0.093 > 0.05 so that the posttest value is distributed normally.

In the results of the hypothesis test using the paired sample t-test formula, *a sig value was obtained. (2-tailed)* of <.001 which means less than 0.005 so Ho is rejected and Ha is accepted. Based on the hypothesis that has been determined, it can be concluded that e-comics teaching materials are effective in improving the learning outcomes of IPAS materials for the digestive system.

The n-gain test was conducted to determine the effectiveness of the use of e-comic teaching materials in improving learning outcomes. N-gain test formula:

$$N - gain\ score\ = \frac{Skor\ Posttest - Skor\ Pretest}{Skor\ ideal\ (100) - Skor\ Pretest}$$

Overall, the learning outcomes of the digestive system material in the VA class have increased. This can be seen from the results of *the n-gain score test* found an average of 0.48 which is included in the category of moderate effective. This value shows a significant increase in pretest and posttest results. Therefore, e-comic teaching materials are considered quite effective in improving the learning outcomes of IPAS digestive system material in the VA class of SD Negeri Pagerkukuh.

This finding is in line with the research of Oktaviani and Ramadhani (2023) showing that the use of digital comic media or e-comics can improve cognitive learning outcomes, this is evidenced by the n-gain score test getting an average score of 61.51% with the criterion of "quite effective".

## CONCLUSION

Based on the results of research and the development of e-comic teaching materials to improve the learning outcomes of IPAS for the digestive system material in grade V of Pagerkukuh State Elementary School, it can be concluded as follows.

a. Comic teaching materials to improve the learning outcomes of IPAS digestive system material were declared "very feasible" as evidenced by the results of the validation of the material experts with a score percentage of 90% and the results of the validation of media experts with a score percentage of 93.75%.

b. The comic teaching materials to improve the learning outcomes of the science of the digestive system material were declared "excellent" as evidenced by the results of the teacher's response questionnaire obtained a score percentage of 97.71% and the student response questionnaire obtained a score percentage of 98.33%.

c. E-comic teaching materials to improve the learning outcomes of the digestive system material IPAS are quite effective in improving the learning outcomes of the learning outcomes of the digestive system material IPAS which can be seen at an N-Gain value of 0.48 with moderate criteria.

## REFERENCES

Afifah, A., & Dewi , P. A. (2022). Pengembangan Media E-Komik Untuk Meningkatkan Pemahaman Konsep Matematika Siswa. *Jurnal Axioma : Jurnal Matematika dan Pembelajaran*, 7(1)

Fitri, A. S., Aeni, A. N., & Nugraha, R. G. (2023). Pengembangan Komik Digital Untuk Meningkatkan Hasil Belajar Pada Materi Nilai-Nilai Pancasila Siswa Kelas IV Sekolah Dasar. *Al-Madrasah: Jurnal Pendidikan Madrasah Ibtidaiyah*, *7*(1), 220.

Mardhiyah, R. H., Aldriani, S. N. F., Chitta, F., & Zulfikar, M. R. (2021). Pentingnya Keterampilan Belajar di Abad 21 sebagai Tuntutan dalam Pengembangan Sumber Daya Manusia. Lectura: *Jurnal Pendidikan,* 12(1), 187-193.

Novita, A., Huda, N., & Junita, R. (2025). PENGEMBANGAN E-KOMIK MATEMATIKA BERBASIS STEM UNTUK MENINGKATKAN KEMAMPUAN BERPIKIR KREATIF MATEMATIS SISWA PADA MATERI BANGUN RUANG SISI DATAR. *Jurnal PEKA (Pendidikan Matematika)*, *08*(02), 58–69

Okpatrioka. (2023). Research And Development (R&D) Penelitian Yang Inovatif Dalam Pendidikan. *Dharma Acariya Nusantara: Jurnal Pendidikan, Bahasa Dan Budaya*, *1*(1), 86–100.

Oktaviana, M., & Ramadhani, S. P. (2023). Pengembangan Media Pembelajaran IPA Berbasis Komik Digital Untuk Meningkatkan Hasil Belajar Kognitif Siswa. *Jurnal Ilmiah Profesi Pendidikan*, *8*(1), 48–56.

Parinata, D. (2021). Pengaruh Penggunaan Aplikasi Youtube Dan Facebook Terhadap Hasil Belajar Matematika. *Jurnal Ilmiah Matematika Realistik*, *2*(1), 11–17.

Sihombing, N. mahrani, Zulfadli, Z., & Nasution, S. R. A. (2022). UPAYA MENINGKATKAN HASIL BELAJAR PKn MATERI KEANEKARAGAMAN BUDAYA INDONESIA MELALUI PENERAPAN MODEL SNOWBALL THROWING SISWA KELAS IV B SD NEGERI 200407 PASANGSIDIMPUAN. *Jurnal Jipdas (Jurnal Ilmiah Pendidikan Dasar)*, *2*(4), 302–312.

Sugiyono. (2022). Metode Penelitian Kuantitatif Kualitatif dan R&D. Bandung: Penerbit Alfabeta.

Sugiyono. (2022). Metode Penelitian Kuantitatif Kualitatif dan R&D. Bandung: Penerbit Alfabeta.