

Flipbook-Based Digital Comic Learning Media in Science Content to Improve Student Learning Outcomes

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ARTICLE INFO

Article history:

Received May 26, 2023

Accepted October 06, 2023

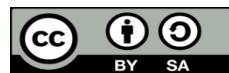
Available online October 25, 2023

Kata Kunci:

Komik Digital, IPAS, Hasil Belajar

Keywords:

Digital Comics, IPAS, Learning Outcomes



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Published by Universitas Pendidikan Ganesha.

ABSTRAK

Permasalahan yang sering terjadi saat ini di sekolah yaitu kurangnya media pembelajaran yang mendukung kegiatan belajar sehingga pembelajaran menjadi membosankan. Tujuan penelitian ini yaitu mengembangkan media pembelajaran komik digital berbasis flipbook pada muatan IPAS untuk meningkatkan hasil belajar siswa. Jenis penelitian ini yaitu penelitian pengembangan dengan menggunakan model Borg and Gall. Subjek dalam penelitian ini terdiri dari 23 siswa kelas IV B. Teknik pengumpulan data yang digunakan yaitu teknik tes dan non tes. Teknik nontes dilakukan dengan observasi, angket dan wawancara. Sedangkan teknik tes dilakukan dengan pretest dan posttest. Instrumen pengumpulan data menggunakan kuesioner dan soal tes. Teknik yang digunakan untuk menganalisis data yaitu analisis deskriptif kualitatif, kuantitatif, dan N-gain. Hasil penelitian yaitu hasil uji ahli yang dilakukan oleh ahli materi mendapatkan presentase sebesar 91,7% dengan kriteria sangat layak dan ahli media 90% dengan kriteria sangat layak. Berdasarkan efektifitas, hasil belajar peserta didik kelas IV mengalami peningkatan rata-rata dari 55 menjadi 85. Hal ini dibuktikan dengan uji N- Gain yaitu diperoleh N-Gain sebesar 0,69 yang menunjukkan kategori cukup efektif. Disimpulkan bahwa komik digital berbasis flipbook dalam pembelajaran IPAS materi norma dalam adat istiadat daerahku valid dan layak digunakan dalam pembelajaran. Implikasi penelitian ini yaitu penggunaan komik digital berbasis flipbook dapat meningkatkan hasil belajar siswa.

ABSTRACT

The problem that often occurs today in schools is the need for more learning media that supports learning activities, making learning boring. This research aims to develop flipbook-based digital comic learning media on science content to improve student learning outcomes. This type of research is development research using the Borg and Gall model. The subjects in this research consisted of 23 students of class IV B. The data collection techniques used were test and non-test techniques. Observations, questionnaires, and interviews carry out non-test techniques. Meanwhile, the test technique is carried out using pretest and posttest. Data collection instruments use questionnaires and test questions. The techniques used to analyze the data are qualitative, quantitative, and N-gain descriptive analysis. The research results, namely the results of expert tests carried out by material experts, obtained a percentage of 91.7% with very feasible criteria and 90% for media experts with very feasible criteria. Based on effectiveness, the learning outcomes of class IV students have increased on average from 55 to 85. It is proven by the N-Gain test, namely an N-Gain of 0.69, which shows the category is quite effective. It was concluded that flipbook-based digital comics in science and science learning, norm material in my local customs, were valid and suitable for learning. This research implies that using flipbook-based digital comics can improve student learning outcomes.

1. INTRODUCTION

Education is an important component in advancing a nation, because it is able to improve the quality of Human Resources (HR). Education has an important role in human life, especially in the progress of a nation (Chen, 2022; Dagnew et al., 2020; Darmaji et al., 2019; Zafar et al., 2022). The role of education is to develop the potential of students so that students have strengths, good morals and skills needed by society and the country (Humaeroh & Dewi, 2021; Satya Yoga et al., 2015). Education can also be interpreted as a learning process that can develop talents in children, whether they are intelligence,

personality, religious and spiritual. Education must adapt to changing times. Education must have innovations that are in line with advances in science and technology (Bouton et al., 2021; Goldin & Katz, 2019; Vicentini et al., 2022). Learning innovation can be carried out by utilizing appropriate learning media in the learning and teaching process in the classroom. This is what causes the world of education to implement 21st century learning which is synonymous with technological developments (Andrian & Rusman, 2019; Syahputra, 2022). One of those things that influence the learning process is learning media (Dewi et al., 2020; Melindawati et al., 2021; Zaini & Dewi, 2017). In the world of education, technological developments can simplify and streamline the educational process through the use of learning media.

However, several problems that often occur today in schools are the lack of learning media that supports learning activities. This is reinforced by previous findings which revealed that some learning activities did not use learning media (Hendriawan & Muhammad, 2018; Sukmana & Suartama, 2019; Wisada et al., 2019; Wulandari et al., 2020). Other findings also reveal that the lack of learning media is caused by teachers having difficulty developing appropriate media for students (Priantini, 2020; Rahayuningsih, 2020). Apart from that, other findings also confirm that teachers lack skills in developing media, so students often feel bored when participating in learning activities in class (Ayu et al., 2020; Rahmawati & Ramadan, 2021; Udayani et al., 2021). Students who feel bored while studying cause students to find it difficult to capture learning material. This certainly has an impact on low student learning outcomes (Dewi & Sujana, 2021; Rofiq et al., 2019). This problem was also found at SD Negeri Kedungsari 5, Magelang City. Based on the results of observations carried out in class IV of SD Negeri Kedungsari 5, Magelang City, several problems were found in class IV B of SD Negeri Kedungsari 5, Magelang City. One of the main problems is the lack of student interest in science learning which is considered boring due to the lack of varied learning media. This is because learning has not utilized IT-based media optimally.

In learning, teachers generally only use media such as maps, globes and pictures that are printed and pasted in front of the class. Apart from that, teachers also use reference sources from the internet or YouTube (Balbay & Kilis, 2017; Syafiq et al., 2021; E. Wulandari & Nugroho, 2020). Of course, this also has an impact on less varied learning, so that students are less interested and motivated to participate in learning optimally. The lack of use of supportive learning media reduces student interest (Krishna et al., 2015; Masturah et al., 2018; Wulandari & Wiarta, 2022). Moreover, science and science learning has quite a lot of material, so a medium is needed that can make learning activities easier (Surya et al., 2023). Apart from that, students are starting to get used to online learning so other methods are needed to improve and motivate students to be able to participate in learning at school (Irfan et al., 2020; Lailatussaadah et al., 2020).

Based on these problems, teachers are required to be more creative and innovative in using learning media so that students become active and motivated in the learning process (Andriana et al., 2017; Purnami & Suarni, 2021). Therefore, other methods are needed so that science learning becomes interesting and enjoyable for students. This method will have a good impact because students will become interested and motivated in the learning process. Teachers must be able to modify learning and create good or effective learning strategies by presenting learning materials in new forms (Basri, 2018; Firmansyah, 2015; Suci, 2019). One alternative to improve this is to develop media to help achieve learning goals and optimize processes to improve student learning outcomes. Students' enthusiasm for the material taught during learning can also increase because teachers use a variety of learning media so that students are motivated to learn (Annisa et al., 2021; Hardiyanti et al., 2019; Hardiyanti et al., 2019).

One learning media that utilizes technology is comics. In general, comics are defined as a work that presents characters acting out a story (Handayani, 2021; Hardiyanti et al., 2019). As technology develops today, comics are not only printed but also packaged in digital form (Aeni & Yusupa, 2018; Asnawi et al., 2023). Teachers can use digital comic media to make it easier to convey material to students. Digital comics are electronic-based comics that can be accessed at any time via smartphones and laptops (Aeni & Yusupa, 2018; Asnawi et al., 2023; Taufiq et al., 2020). The most important benefit of using digital comic media is that it is effective in conveying character values through illustrative characterizations in comic stories. In order to reach digital comics for students, they can use flipbooks to convert several files to make them more interesting like an e-book. The existence of a flipbook can also change files such as digital magazines, company catalog flipbooks, digital catalogs and others (Andani & Yulian, 2018; Awwaliyah et al., 2021).

Previous research findings reveal that digital comics can make it easier for students to learn (Handayani, 2021; Megantari et al., 2021). Other findings also reveal that digital comics can increase students' learning motivation (Hidayah et al., 2017; Sukmanasa et al., 2017; Wahyudin et al., 2020). Based on this, it can be concluded that digital comics are appropriate to use to facilitate and increase student

learning motivation, especially in science and science learning. The advantage of flipbook-based digital comic learning media is that the media display is more varied, not in the form of text or images, but there are videos that make learning activities more interesting. Based on this, the aim of this research is to develop flipbook-based digital comic learning media on science content to improve student learning outcomes.

2. METHOD

This type of research is development research. The development model used is the Borg and Gall model. The Borg and Gall model was chosen because this model is more detailed at each stage and can be adapted to conditions that occur in the field. This development model uses a waterfall flow at the development stage. The stages of this model consist of 10 steps, namely: 1) potential and problems, 2) data collection, 3) product design, 4) design validation, 5) design revision, 6) product trial, 7) product revision, 8) test try the product, 9) product revision, and 10) mass production (Firdaus & Wilujeng, 2018). This research was carried out at SD Negeri Kedungsari 5, Magelang City. The population in this study were all students in class IV B of SD Negeri Kedungsari 5, Magelang City with a total of 23 students. This research used data collection techniques, namely test and non-test techniques. The test technique is carried out by pre-test and post-test, while the non-test technique is through observation, interviews and questionnaires. Data regarding the quality of flipbook-based digital comic learning media was obtained from the results of tests with material experts and media expert tests. The instruments used to collect data were questionnaires and tests. The questionnaire grid is presented below Table 1.

Table 1. Instrument for Student Responses to Flipbook-Based Digital Comic Media

No.	Statement
1	The display of flipbook-based digital comic learning media is attractive.
2	All components of flipbook-based digital comic learning media are clearly visible
3	Flipbook-based digital comic learning can be studied in small groups
4	The size and type of letters used in flipbook-based digital comics are clearly legible
5	Flipbook-based digital comic learning media motivates students to learn
6	Flipbook-based digital comic learning media creates a pleasant learning atmosphere
7	The material in flipbook-based digital comic media includes norms in the customs of my area.
8	The material in flipbook-based digital comic learning media is easy to understand.
9	The material presented in flipbook-based digital comic learning media adds to students' insight and knowledge of the main material.
10	The display of flipbook-based digital comic learning media is attractive.

The techniques used to analyze the data are qualitative, quantitative and N-gain descriptive analysis. Qualitative descriptive analysis was used to analyze input provided by experts on flipbook-based digital comic learning media on IPAS content. Quantitative descriptive analysis is used to analyze the results of expert assessments in the form of scores on flipbook-based digital comic learning media on IPAS content. The N-gain test is used to determine whether there is an increase in the average student learning outcomes (the effectiveness of flipbook-based digital comic learning media on science content).

3. RESULT AND DISCUSSION

Result

Research on the development of flipbook-based digital comics to improve science and science learning outcomes for class IV B students at SDN Kedungsari 5 uses the Research and Development (R&D) method. The development of learning media in this research uses the Borg and Gall development model. This model has 10 stages. Considering the limitations, this study applies these steps to be modified as needed. The research carried out refers to product development that has been explained by Borg & Gall. There are 8 stages, namely: potential and problems, gathering information, designing the product, validating the design, revising the design, testing the product, revising the product and testing the product. There are several stages in making flipbook-based digital comic media, namely as follows.

First, Potential and Problems. The initial stage carried out by researchers was to discuss problems that occurred in elementary schools. Data was obtained through pre-research including observation, interviews and documentation in class IV of SD Negeri Kedungsari 5, Magelang City. After conducting pre-research, potential and problems were obtained. The results of the analysis were that several problems

were found in class IV B at SD Negeri Kedungsari 5, Magelang City. One of the main problems is the lack of student interest in science learning which is considered boring due to the lack of varied learning media. This is because learning has not utilized IT-based media optimally.

Second, gathering information. In this stage, the researcher identified the problems that existed at SD Negeri Kedungsari 5, specifically in class IV B in the science and technology lesson content. Researchers look for references to previous research that is relevant to this problem. Then the researcher collected data which was used to plan the research, namely distributing questionnaires regarding the needs of teachers and students regarding the media to be used. Third, design the product. In this stage, image concepts and storylines in digital comics are created using editing applications. Fourth, design validation. After completing the product design, it is then validated by experts consisting of media experts and material experts. In this case, an instrument is prepared containing questions and statements regarding the product being developed to be tested by validators (experts). The results of validation tests from experts can be described in a table of learning media feasibility test results. Can be seen at [Table 2](#).

Table 2. Media Due Diligence

Expert	Percentage	Information
Materials Expert	91.7%	Very worthy
Media Expert	90%	Very worthy

Fifth, Product Revision. Design validation is carried out by material experts and media experts with the aim of improving it if there are parts that are not optimal before testing. In this case, researchers apply suggestions and input from validators as a reference for improving digital comic media. This is a design addition to a digital comic after receiving suggestions and revision directions from media experts. The results of the revision from media experts were adding pages which included adding the university logo, adding the name of the supervisor, and providing a comic title. The results of product revisions are presented in [Figure 1](#).

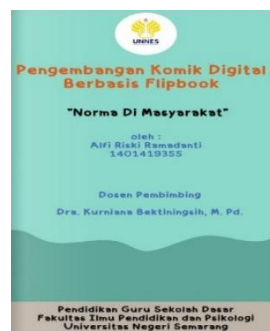


Figure 1. Revised Results of Flipbook-Based Digital Comic Development

Sixth, product testing. At this stage, researchers conducted product trials on a small scale in the VB class of SD Negeri Kedungsari 5, Magelang City. This trial used a purposive sampling technique. Taking development research subjects using the Borg and Gall model only requires 6-12 subjects based on intelligence heterogeneity. Because the subjects of this research were limited, the researchers took 6 samples from different intelligence levels consisting of 2 children at the top rank, 2 children at the middle rank, and 2 children at the lowest rank. The research collected student response data through questionnaires. Filling out this questionnaire aims to find out students' responses to the products that have been used. The response from class IV B students, which consisted of 23 students, received a positive response. The following are the results of student responses to flipbook-based digital comic media. Based on the results of data analysis, the results obtained from student responses were: 89.2% so that the media developed is suitable for use in learning.

Seventh, product revision. This product revision was carried out after the researchers discovered the product's shortcomings when carrying out product trials on a small scale. Eighth, test use. After the product had been revised, it was then tested in class IV B at SD Negeri Kedungsari 5 with 23 students. In this case, the aim is to test the effectiveness of flipbook-based digital comic learning media on science content to improve student learning outcomes. Below are some pictures during test use. This testing is carried out by giving tests (pretest and posttest) and providing response questionnaires to teachers as well as student responses regarding the media that has been developed. The aim of this stage is to find out

the effectiveness of flipbook-based digital comic media in learning science and science, norm material in my local customs. The results of large-scale product trials involving 23 students are presented in [Table 3](#).

Table 3. Product Trial Learning Results

Information	Grade Average	Difference
Pretest	55.60	
Posttest	85.78	30.18

Based on the results of the analysis presented in table 3, it is known that the average student learning outcomes show progress in implementing correct scale product trials. The results of student learning on norm material in my local customs resulted in changes between before and after using flipbook-based digital comic media in learning. The N-gain test is also used to determine whether there is an increase in the average student learning outcomes. The results of the N-Gain test in a large group using flipbook-based digital comic media are presented in [Table 4](#).

Table 4. N-Gain Test Results

Information	Average value	Average Difference	N-Gain	Information
Pretest	55.60869565			
Posttest	85.7826087	30.17391304	0.695929544	Effective enough

Based on [Table 4](#) based on the results of the N-gain test, learning outcomes in large group product trials showed that the average N-gain score was 0.69, which is classified as quite effective. There was an increase in the average learning outcomes from pretest to posttest. So it can be concluded that flipbook-based digital comic media has an influence on improving student learning outcomes.

Discussion

Based on the results of data analysis, it can be concluded that flipbook-based digital comic learning media with IPAS content is suitable for use in learning. This is caused by several factors, namely as follows. First, flipbook-based digital comic learning media in science content can improve student learning outcomes. Learning outcomes regarding norm material in my local customs have improved after using flipbook-based digital comic media. The validation results from material experts regarding the suitability of the material to the competencies to be achieved are also very good so that it can improve student learning outcomes. The suitability of the material to the competencies to be achieved will have an impact on students' understanding of learning. This was also confirmed in previous research which revealed that the suitability of learning materials in comics can make it easier for students to learn ([Astutik et al., 2021](#); [Kurniawati & Koeswanti, 2021](#); [Pinatih et al., 2021](#)). The media applied in this research are comics which contain educational value so they can be used as media in teaching and learning. It is also very important to instill educational values in students so that they can improve students' character ([Rahmi et al., 2021](#); [Risdiyani & Lestari, 2021](#)). Apart from that, other findings also reveal that comic media can be made according to the content of the material and can be used in a learning context ([Aeni & Yusupa, 2018](#); [Taufiq et al., 2020](#)). This is useful to make it easier for students to receive and understand the material presented by the teacher ([Aeni & Yusupa, 2018](#); [Rahmata et al., 2020](#)).

Second, flipbook-based digital comic learning media in science content can increase students' learning motivation. The suitability of the material to the content of comic stories can also increase student motivation in learning ([Hobri et al., 2021](#); [Udayani et al., 2021](#)). Good learning media can convey messages, stimulate students' thoughts, feelings and motivation, so that this can encourage the creation of a learning process and also achieve learning goals well ([Andriana et al., 2017](#); [Laksmi & Suniasih, 2021](#); [Purnami & Suarni, 2021](#)). The use of technology as a learning medium can be used as a solution to answer innovations in making learning media in increasing student learning motivation ([Nopiantari & Agung, 2021](#); [Suyanti et al., 2021](#)). Comics are defined as a work that presents characters acting out a story that is closely connected with images and is designed to provide entertainment to readers ([Aeni & Yusupa, 2018](#); [Asnawi et al., 2023](#); [Taufiq et al., 2020](#)). Comic media is also defined as media that has interconnected and harmonious plots so that it is very popular with readers. Not only that, the comic is also equipped with pictures that match the storyline, making it easier for readers to understand the contents of the comic so that readers are more motivated to read ([Abdurrohman et al., 2020](#); [Handayani, 2021](#); [DA Hardiyanti et al., 2019](#)).

Third, flipbook-based digital comic learning media in IPAS content creates a pleasant learning atmosphere. The suitability of the material with learning evaluation and the clarity of the language used

makes it easier for students to use this learning media. The function of digital comics is as a medium that can convey learning material and information in the form of comic stories (Abdurrohim et al., 2020; Lestari et al., 2021). This is also in line with the comic character itself which is entertaining and attracts attention (Hobri et al., 2021; Udayani et al., 2021). Comics can be used as innovative media for use in learning at school. Therefore, digital comic media is very useful for helping students apply science and science material, because it fosters learning motivation in students from the material taught so that it can improve student learning outcomes. This is in line with research which shows that comic media is worthy of being developed as a learning medium because it is able to improve learning outcomes (Ambaryani & Airlanda, 2017; Laksmi & Suniasih, 2021; Udayani et al., 2021).

The advantage of flipbook-based digital comic learning media is that the media display is more varied, thereby increasing students' enthusiasm for learning. Previous findings also stated that flipbooks were created with the aim of helping students understand the material, improving student learning outcomes, increasing creative thinking skills and increasing student learning motivation (Roemintoyo & Budiarto, 2021; Setiawan et al., 2020). The use of flipbook media also increases students' interest in learning (Aprilia, 2021; Perdana et al., 2021). The implication of this research is that the flipbook-based digital comic learning media that has been developed can eliminate student boredom and boredom when reading material, as well as quickly and easily distributing the material. Apart from that, it can also increase students' learning motivation and make it easier for students to read. With flipbook-based digital comics, students can learn them flexibly anywhere, anytime via smartphone, laptop or computer.

4. CONCLUSION

Based on the results of the analysis, it was found that the digital comics based on flipbooks containing science and technology material on norms in my regional customs that were developed were suitable for use in classroom learning. The development of digital comic media has proven to be effective as seen from the increased student learning outcomes after using this media. It was concluded that flipbook-based digital comic media can effectively improve student learning outcomes. The development of flipbook-based digital comics can be used as a supporting medium for science and science learning, especially in presenting information related to the material being taught.

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